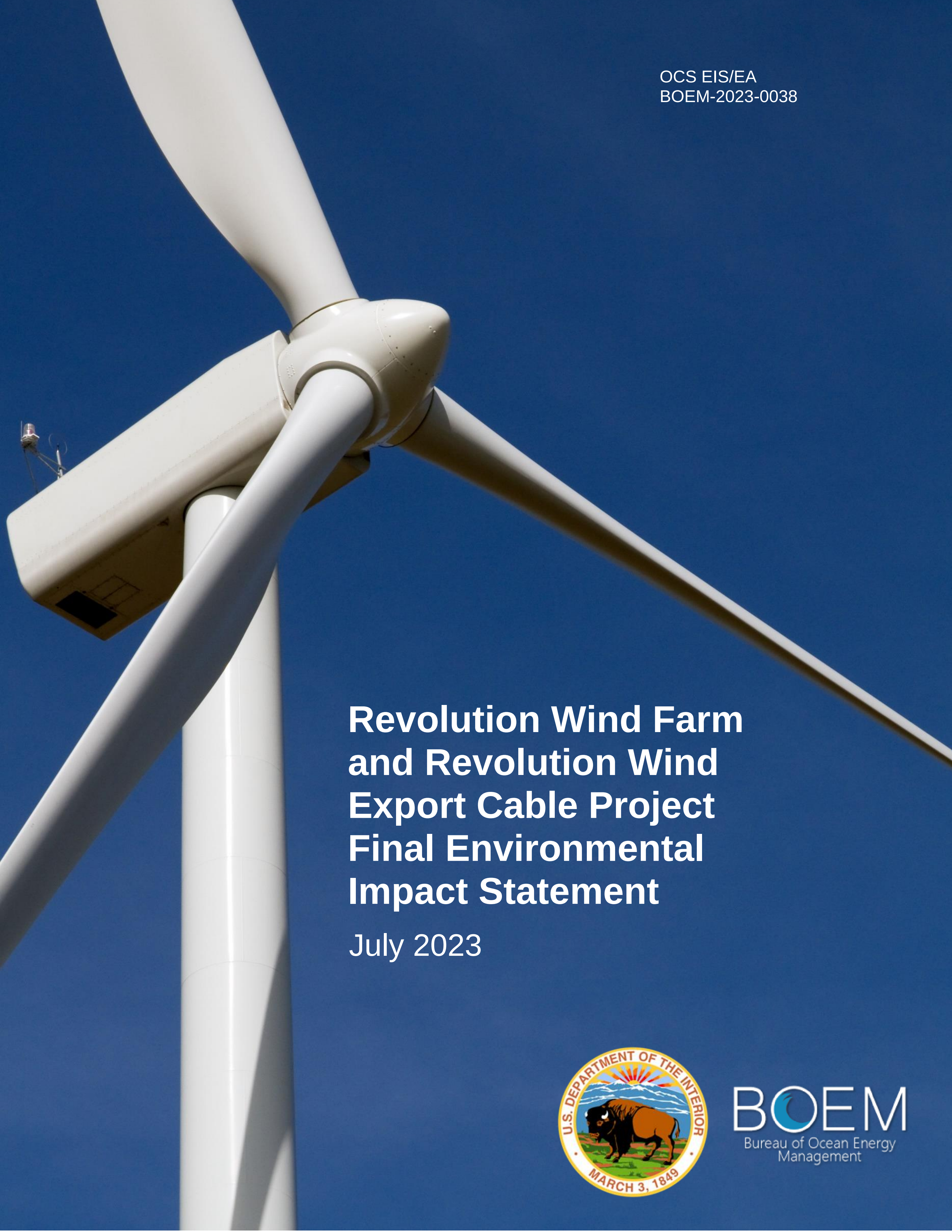

OCS EIS/EA
BOEM-2023-0038

# Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement

July 2023

U.S. Department of the Interior
March 3, 1849

BOEM
Bureau of Ocean Energy Management

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Author:

Bureau of Ocean Energy Management
Office of Renewable Energy Programs

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# Revolution Wind Farm and Revolution Wind Export Cable Project Environmental Impact Statement

**Draft ( ) Final (X)**

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|---|---|
| **Lead Agency:** | U.S. Department of the Interior,<br>Bureau of Ocean Energy Management (BOEM) |
| **Cooperating Federal Agencies:** | National Oceanic and Atmospheric Administration, National Marine Fisheries Service<br>U.S. Army Corps of Engineers<br>U.S. Coast Guard<br>U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement<br>U.S. Environmental Protection Agency |
| **Participating Federal Agencies:** | Advisory Council on Historic Preservation<br>Federal Aviation Administration<br>National Park Service<br>U.S. Department of Defense<br>U.S. Department of Navy<br>U.S. Fish and Wildlife Service |
| **Cooperating State and Local Agencies:** | Commonwealth of Massachusetts<br>Massachusetts Office of Coastal Zone Management<br>State of Rhode Island<br>Rhode Island Coastal Resources Management Council<br>Rhode Island Department of Environmental Management |
| **Contact Person:** | Laura Lee Wolfson<br>National Environmental Policy Act Coordinator<br>Office of Environment, Gulf of Mexico Regional Office<br>Bureau of Ocean Energy Management<br>1201 Elmwood Boulevard<br>New Orleans, Louisiana 70360<br>(703) 787-1433 |
| **Area:** | Lease Area OCS-A 0486 |

**Abstract:**

This environmental impact statement (EIS) assesses the potential biological, socioeconomic, physical, and cultural impacts that could result from the construction, operations and maintenance, and decommissioning of the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (the Project), as proposed by Revolution Wind, LLC (Revolution Wind), in its construction and operations plan. The Project would be located in the area covered by Bureau of Ocean Energy Management's (BOEM's) Renewable Energy Lease Number OCS-A 0486, approximately 15 nautical miles (nm) (18 statute miles) southeast of Point Judith, Rhode Island and approximately 13 nm (15 miles) east of Block Island, Rhode Island.

The Project is designed to contribute to Connecticut's mandate of 2,000 megawatts of offshore wind energy by 2030 and Rhode Island's 100% renewable energy goal by 2030. BOEM has prepared the EIS following the requirements of the National Environmental Policy Act (42 United States Code 4321–4370f) and implementing regulations. This EIS will inform BOEM in deciding whether to approve, approve with modifications, or disapprove the Project. Cooperating agencies will rely on the EIS to support their decision making and to determine if the analysis is sufficient to support their decision. BOEM's action furthers United States policy to make the Outer Continental Shelf energy resources available for development in an expeditious and orderly manner, subject to environmental safeguards (43 United States Code 1332(3)), including consideration of natural resources and existing ocean uses.

# EXECUTIVE SUMMARY

This environmental impact statement (EIS) assesses the potential biological, socioeconomic, physical, and cultural impacts that could result from the construction, operations and maintenance (O&M), and decommissioning of the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (the Project), as proposed by Revolution Wind, LLC (Revolution Wind), in its construction and operations plan (COP) (VHB 2023). The RWF COP is located on the Bureau of Ocean Energy Management (BOEM) webpage for the RWF Project at this link: https://www.boem.gov/renewable-energy/state-activities/revolution-wind. BOEM has prepared the EIS following the requirements of the National Environmental Policy Act (NEPA) (42 United States Code 4321 et seq.) and implementing regulations (40 Code of Federal Regulations 1500–1508). Additionally, this EIS was prepared consistent with the U.S. Department of the Interior's NEPA regulations (43 Code of Federal Regulations [CFR] 46), longstanding federal judicial and regulatory interpretations, and U.S. Administration priorities and policies including the Secretary of the Interior's (Secretary's) Order No. 3399 requiring bureaus and offices to not apply any of the provisions of the 2020 changes to Council on Environmental Quality regulations (the "2020 rule") (Council on Environmental Quality 2020) in a manner that would change the application or level of NEPA that would have been applied to a proposed action before the 2020 rule went into effect.

Cooperating agencies may rely on this EIS to support their decision-making. In conjunction with submitting its COP, Revolution Wind applied to the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) for an incidental take authorization in the form of a Letter of Authorization for Incidental Take Regulations under the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 USC 1361 et seq.), for incidental take of marine mammals during Project construction. Under the MMPA, NMFS is required to review applications and, if appropriate, issue an incidental take authorization. NMFS intends to adopt the Final EIS if, after independent review and analysis, NMFS determines the Final EIS to be sufficient to support its separate proposed action and decision to issue the authorization, if appropriate. The U.S. Army Corps of Engineers intends to adopt BOEM's EIS to support its decision on any permits requested under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act.

## Purpose and Need for the Proposed Action

Through a competitive leasing process under 30 CFR 585.211, Deepwater Wind New England, LLC, was awarded commercial Renewable Energy Lease OCS-A 0486 (Lease Area) covering an area offshore Rhode Island. Subsequent to the award of the Lease, BOEM approved an application to assign a portion of the Lease to Deepwater Wind South Fork, LLC, which resulted in the segregation of the Lease and a new lease number, OCS-A 0517, for that portion. Deepwater Wind South Fork, LLC, changed its name to South Fork Wind, LLC. The remaining portion of Lease OCS-A 0486 was assigned to DWW Rev I, LLC. DWW Rev I, LLC changed its name to Revolution Wind, LLC (Revolution Wind).

Revolution Wind's goal is to develop a commercial-scale offshore wind energy facility in the Lease Area with wind turbine generators (WTGs); a network of inter-array cables (IACs); up to two offshore substations (OSSs) (OSS1 and OSS2); up to two export cables making landfall in North Kingstown, Rhode Island; one onshore substation; and one interconnection facility. The Project is the Proposed Action considered by BOEM in this Final EIS. The need for the Project is to contribute to Connecticut's mandate of 2,000 megawatts (MW) of offshore wind energy by 2030, as outlined in Connecticut Public Act 19-71, and Rhode Island's 100% renewable energy goal by 2030, as outlined in Rhode Island Governor's Executive Order 20-01 of January 2020. The Project would have the capacity to deliver up to 880 MW of power to the New England energy grid, satisfying the current power purchase agreement (PPA) total of 704 MW. Specifically, Revolution Wind's goal to construct and operate a commercial-scale offshore wind energy facility in the Lease Area is intended to fulfill the following three PPAs:

1. A 200-MW contract with the State of Connecticut approved in January 2019
2. A 400-MW contract with the State of Rhode Island approved in June 2019
3. A 104-MW contract with the State of Connecticut approved in December 2019

Based on BOEM's authority under the Outer Continental Shelf Lands Act (OCSLA) to authorize renewable energy activities on the Outer Continental Shelf (OCS), and Executive Order 14008; the shared goals of the federal agencies to deploy 30 GW of offshore wind energy capacity in the United States by 2030, while protecting biodiversity and promoting ocean co-use (The White House 2021); and in consideration of the goals of the applicant, the purpose of BOEM's action is to determine whether to approve, approve with modifications, or disapprove Revolution Wind's COP. BOEM will make this determination after weighing the factors in subsection 8(p)(4) of the OCSLA that are applicable to plan decisions and in consideration of the above goals. BOEM's action is needed to fulfill its duties under the lease, which require BOEM to make a decision on the lessee's (Revolution Wind's) plans to construct and operate a commercial-scale offshore wind energy facility within the Lease Area (the Proposed Action).

The National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) received a request for authorization to take marine mammals incidental to construction activities related to the Project, which NMFS may authorize under the Marine Mammal Protection Act (MMPA). NMFS's issuance of an MMPA incidental take authorization in the form of a Letter of Authorization (LOA) for Incidental Take Regulations (ITRs) is a major federal action and, in relation to BOEM's action, is considered a connected action (40 CFR 1501.9(e)(1)). The purpose of the NMFS action—which is a direct outcome of Revolution Wind's request for authorization to take marine mammals incidental to specified activities associated with the Project (e.g., pile driving)—is to evaluate Revolution Wind's request under requirements of the MMPA (16 USC 1371(a)(5)(A)) and its implementing regulations administered by NMFS and to decide whether to issue the authorization. NMFS needs to render a decision regarding the request for authorization due to NMFS's responsibilities under the MMPA (16 United States Code [USC] 1371(a)(5)(A and D)) and its implementing regulations. If NMFS makes the findings necessary to issue the requested authorization, NMFS intends to adopt, after independent review, BOEM's EIS to support that decision and fulfill its NEPA requirements. The U.S. Army Corps of Engineers (USACE) New England District anticipates requests for authorization of a permit action to be undertaken through authority delegated to the District Engineer by 33 CFR 325.8, pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344). The USACE considers issuance of a permit under these two delegated authorities a major federal action connected to BOEM's Proposed Action (40 CFR 1501.9(e)(1)). USACE'S overall Project purpose for Section 404(b)(1) guidelines evaluation, as determined by the USACE, is the construction and operation of a commercial-scale offshore wind energy project, including associated transmission lines, for renewable energy generation and distribution to the Connecticut and Rhode Island energy grids. The

USACE intends to adopt BOEM's EIS to support its decision on any permits requested under Section 10 of the Rivers and Harbors Act or Section 404 of the CWA.

## Public Involvement

Before the preparation of the EIS, BOEM conducted a 30-day public scoping period between April 30 and June 1, 2021, with an additional 7-day extension between June 4 and 11, 2021, following the correction of the notice of intent. During the public scoping period, BOEM held three public scoping virtual meetings via the Zoom webinar platform to solicit feedback and identify issues and potential alternatives for consideration. BOEM considered all scoping comments while preparing the draft EIS. Additional public input occurred during the Project's planning and leasing phases between 2010 and 2018. Publication of the draft EIS initiated a 45-day public comment period between September 2 and October 17, 2022, after which BOEM assessed and considered all the comments received in preparation of the final EIS. All public comments received on the draft EIS have been responded to by BOEM and are presented with their responses in Appendix L (Comments Received on Draft Environmental Impact Statement and BOEM's Responses to Public Comments on the Draft Environmental Impact Statement). See Appendix A (Required Environmental Permits and Consultations) for additional information on public involvement in the development of the EIS.

## Alternatives

The EIS analyzes in detail a No Action alternative and six action alternatives, as briefly described in Table ES-1. Chapter 2 provides detailed descriptions of the analyzed alternatives.

**Table ES-1. Alternative Descriptions**

| Alternative | Description |
|---|---|
| A: No Action Alternative | Under the No Action Alternative, BOEM would not approve the COP. Project construction and installation, O&M, and decommissioning would not occur, and no additional permits or authorizations for the Project would be required. Any potential environmental and socioeconomic impacts, including benefits, associated with the Project as described under the Proposed Action or the Preferred Alternative would not occur. However, all other past and ongoing impact-producing activities, including approved offshore wind projects (South Fork Wind Farm and Vineyard Wind), would continue. Under the No Action Alternative impacts to marine mammals incidental to construction activities would not occur. Therefore, NMFS would not issue the requested authorization under the MMPA to the applicant. The current resource condition, trends, and impacts from ongoing activities under the No Action Alternative serve as the baseline against which the direct and indirect impacts of all action alternatives are evaluated.<br>Over the life of the proposed Project, other reasonably foreseeable future impact-producing offshore wind and non-offshore wind activities would be implemented, which would cause changes to the affected environment even in the absence of the Proposed Action or the Preferred Alternative. The continuation of all other existing and reasonably foreseeable future activities described in Appendix E (Planned Activities Scenario and Reasonably Foreseeable Future Activities and Projects) without the Proposed Action or any alternative |

<table>
<tr><th>Alternative</th><th>Description</th></tr>
<tr><td></td><td>action serves as the baseline against which the cumulative impacts of all action alternatives are evaluated.</td></tr>
<tr><td>B: Proposed Action Alternative (Proposed Action)</td><td>The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the project design envelope (PDE) and implementation of applicable environmental protection measures (EPMs), as described in the COP. The Proposed Action would include up to 100 WTGs ranging in nameplate capacity of 8 to 12 MW sufficient to fulfill at a minimum the existing PPAs (total of 704 MW) up to 880 MW, the maximum capacity identified in the PDE. The WTGs would be connected by a network of IACs; up to two OSSs[1] connected by one OSS-link cable; up to two submarine export cables co-located within a single corridor; up to two underground transmission circuits located onshore; one onshore interconnection facility; and one onshore substation inclusive of up to two interconnection circuits connecting to the existing Davisville Substation in North Kingstown, Rhode Island. The Proposed Action includes the burial of offshore export cables below the seafloor in both the OCS and Rhode Island state waters and a uniform east-west and north-south grid of 1 × 1–nautical mile (nm) spacing between WTGs.[2]</td></tr>
<tr><td>C: Habitat Impact Minimization Alternative</td><td>The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and implementation of applicable EPMs, as described in the COP. To reduce impacts to complex fisheries habitats most vulnerable to permanent and long-term impacts from the Proposed Action, however, certain WTG positions would be eliminated while maintaining a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs. The placement of WTGs would be supported by location-specific benthic and habitat characterizations conducted in close coordination with NMFS. Under Alternative C, fewer WTG locations (and potentially fewer miles of IACs) than the Proposed Action would be approved by BOEM. Under this alternative, there would be five “spare” WTGs:<ul><li>Alternative C1: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations to maintain a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 35 WTGs and associated IACs would be removed from consideration, resulting in up to 65 WTGs and associated IACs being approved.</li><li>Alternative C2: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations to maintain a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 36 WTGs and associated IACs would be removed from consideration, resulting in up to 64 WTGs and associated IACs being approved.</li></ul>Refer to Appendix K (Supplemental Information on Alternatives Development) for background information on the development of the Alternative C1 and C2 layouts.</td></tr>
</table>

[1] Each OSS has a maximum nominal capacity of 440 MW; therefore, two OSSs are required to achieve the PPA obligations of 704 MW.

[2] In accordance with 30 CFR 585.634(c)(6), micrositing of WTG foundations may occur within 500 feet from each proposed WTG location. WTG micrositing would be performed on a case-by-case basis to avoid significant seafloor hazards such as surface and subsurface boulders (see COP Section 2.2.1.1).

| Alternative | Description |
|---|---|
| D: No Surface Occupancy in One or More Outermost Portions of the Project Area Alternative | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and implementation of applicable EPMs, as described in the COP. However, to reduce conflicts with other competing space-use vessels, WTGs adjacent to or overlapping transit lanes proposed by stakeholders or the Buzzard's Bay Traffic Separation Scheme Inbound Lane would be eliminated while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs. Under Alternative D, BOEM could select one, all, or a combination of the following three alternatives, while still allowing for the fulfillment of existing PPAs and up to the maximum capacity identified in the PDE (i.e., 880 MW). Under this alternative, fewer WTG locations (and potentially fewer miles of IACs) than the Proposed Action would be approved by BOEM. Under this alternative, there would be up to six "spare" WTGs:<br>• Alternative D1: Removal of the southernmost row of WTGs that overlap the 4-nm east-west transit lane proposed by the Responsible Offshore Development Alliance (RODA), as well as portions of Cox Ledge. Under this alternative, up to seven WTGs and associated IACs would be removed from consideration, resulting in up to 93 WTGs and associated IACs being approved.<br>• Alternative D2: Removal of the eight easternmost WTGs that overlap the 4-nm north-south transit lane proposed by RODA. Under this alternative, up to eight WTGs and associated IACs would be removed from consideration, resulting in up to 92 WTGs and associated IACs being approved.<br>• Alternative D3: Removal of the northwest row of WTGs adjacent to the Inbound Buzzards Bay Traffic Lane. Under this alternative, up to seven WTGs and associated IACs would be removed from consideration, resulting in up to 93 WTGs and associated IACs being approved.<br>The selection of all three alternatives (i.e., D1, D2, and D3) would eliminate up to 22 WTG locations and associated IACs, resulting in up to 78 WTGs and associated IACs being approved while maintaining the 1 × 1–nm grid spacing proposed in the COP and as described in Alternative B. Based on the design parameters outlined in the COP, allowing for the placement of 78 to 93 WTGs and two OSSs would still allow for the fulfillment of up to the maximum capacity identified in the PDE (e.g., 880 MW = 74 WTGs needed if 12-MW WTGs are used). |
| E: Reduction of Surface Occupancy to Reduce Impacts to Culturally-Significant Resources Alternative | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and implementation of applicable EPMs, as described in the COP. However, to reduce the visual impacts on culturally important resources on Martha's Vineyard and in Rhode Island, some WTG positions would be eliminated while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs. Under Alternative E, fewer WTG locations (and potentially fewer miles of IACs) than the Proposed Action would be approved by BOEM. Under this alternative, there would be up to five "spare" WTGs:<br>• Alternative E1: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 36 WTGs and associated IACs would be removed from consideration, resulting in 64 WTGs and associated IACs being approved. |

| Alternative | Description |
|---|---|
| | • Alternative E2: Allows for a power output delivery identified in the PDE of up to 880 MW while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 19 WTGs and associated IACs would be removed from consideration, resulting in 81 WTGs and associated IACs being approved.<br>Refer to Appendix K for background information on the development of the Alternative E1 and E2 layouts. |
| F: Selection of a Higher Capacity Wind Turbine Generator | The construction and installation, O&M, and eventual decommissioning of a wind energy facility implementing a higher nameplate capacity WTG (up to 14 MW) than what is proposed in the COP. This higher capacity WTG must fall within the physical design parameters of the PDE and be commercially available to the Project proponent within the time frame for the construction and installation schedule proposed in the COP. The number of WTG locations under Alternative F would be sufficient to fulfill the minimum existing PPAs (total of 704 MW and 56 WTGs, including up to five "spare" WTG locations). Using a higher capacity WTG would potentially reduce the number of foundations constructed to meet the purpose and need and thereby potentially reduce impacts to marine habitats and culturally significant resources and potentially reduce navigation risks. |
| G: Preferred Alternative | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the range of the design parameters outlined in the COP, subject to applicable EPMs. Alternative G (the Preferred Alternative) was designed to reduce impacts to visual resources and benthic habitat. This alternative would include up to 79 possible positions for the installation of 65 WTGs, which would range in nameplate capacity of 8 to 12 MW sufficient to fulfill at a minimum the existing PPAs (total of 704 MW) while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs. Under this alternative, there would be up to 14 "spare" WTG positions available for use if unforeseen siting conditions occur necessitating relocation of any of the 65 WTGs from the possible positions. Two of the 65 WTGs could be located in three different spots within the 79 WTG possible positions. As a result, Alternative G includes the analysis of three alternatives for installation of the 65 WTGs, G1–G3. This flexibility in design could allow for further refinement for visual resources impact reduction on Martha's Vineyard and Rhode Island, or for habitat impact reduction in the NMFS Priority 1 area.<br>• Alternative G1: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while relocating two WTG locations from a NMFS Priority 1 area to reduce fishery and essential fish habitat impacts. Under this alternative, 35 WTGs and associated IACs would be removed from consideration, resulting in 65 WTGs and associated IACs being installed in the positions identified under this alternative.<br>• Alternative G2: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while relocating two WTG locations to reduce visual impacts on the horizon from the Aquinnah Overlook, a culturally important resource. Under this alternative, 35 WTGs and associated IACs would be removed from consideration, resulting in 65 WTGs and associated IACs being installed in the positions identified under this alternative.<br>• Alternative G3: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while relocating two WTG locations closest to the shore of |

| Alternative | Description |
|---|---|
| | Martha's Vineyard to reduce visual impacts to this culturally important resource. Under this alternative, 35 WTGs and associated IACs would be removed from consideration, resulting in 65 WTGs and associated IACs being installed in the positions identified under this alternative.<br>All other components of Alternative G are the same as the Proposed Action: two OSSs connected by an OSS-link cable; up to two submarine export cables co-located within a single corridor; up to two underground transmission circuits located onshore within a single corridor; and an onshore substation inclusive of up to two interconnection circuits within a single corridor connecting to the existing Davisville Substation in North Kingstown, Rhode Island.<br>Refer to Appendix K for background information on the development of the Alternative G and Alternatives G1, G2, and G3. |

## Environmental Impacts

The EIS uses a four-level classification scheme to characterize the potential adverse or beneficial impacts of alternatives as either **negligible**, **minor**, **moderate**, or **major**. Chapter 2, Section 2.3, provides a summary and comparison of the impacts under the No Action Alternative and each action alternative assessed in Chapter 3, which is provided below as Table ES-2. Under the No Action Alternative, any potential environmental and socioeconomic impacts, including benefits, associated with the Proposed Action or Preferred Alternative would not occur; however, impacts could occur from other ongoing and planned activities. This table also provides a summary of the overall cumulative impacts by environmental resource and alternative. Impacts include both Project-specific impacts and incremental impacts of the Project when combined with other current and reasonably foreseeable projects (i.e., cumulative impacts). Where directionality (e.g., adverse or beneficial) is not specifically noted, the reader should assume the impact is adverse. Impacts associated with the other action alternatives are generally similar to those described for the Proposed Action.

In Table ES-2, green cell color represents negligible to minor adverse overall impact. Yellow cell color represents moderate adverse overall impact. Orange cell color represents major adverse overall impact. Resources with beneficial impacts are denoted by an asterisk, and alternatives within those resource rows with beneficial impacts are denoted by a bolded blue outline and an asterisk. See Section 3.3 for additional information on impact level definitions. Detailed comparisons of both adverse and beneficial impacts by environmental resource and alternative, as well as evaluation of impacts across alternatives, are provided in each resource area within Chapter 3 (Sections 3.4 through 3.22).

BOEM analyzes the impacts of past and ongoing activities in the absence of the Project as the No Action Alternative. The No Action Alternative serves as the baseline against which all action alternatives are evaluated. BOEM also separately analyzes cumulative impacts of the No Action Alternative, which considers all other ongoing and reasonably foreseeable future activities described in Appendix E. In this analysis, the cumulative impacts of the No Action Alternative serve as the affected environment against which the cumulative impacts of all action alternatives are evaluated.

Council on Environmental Quality NEPA implementing regulations (40 CFR 1502.16) require that an EIS evaluate the potential for unavoidable adverse impacts associated with a proposed action. Adverse impacts that can be reduced by mitigation measures but not eliminated are considered unavoidable. The same regulations also require that an EIS review the potential impacts on irreversible or irretrievable commitments of resources resulting from implementation of a proposed action. Irreversible commitments occur when the primary or secondary impacts from the use of a resource either destroy the resource or preclude it from other uses. Irretrievable commitments occur when a resource is consumed to the extent that it cannot recover or be replaced.

Appendix I (Other Impacts) describes these potential unavoidable adverse impacts. Most potential unavoidable adverse impacts associated with the Proposed Action would occur during the construction phase and would be temporary. Appendix I also describes irreversible and irretrievable commitment of resources by resource area. The most notable such commitments could include effects on habitat or individual members of protected species, as well as potential loss of use of commercial fishing areas.

**Table ES-2. Comparison of Alternatives and Overall Cumulative Impacts by Alternative**

| Resource | Alternative A (No Action Alternative) | Alternative B (Proposed Action) | Alternative C (Habitat Alternative) | Alternative D (Transit Alternative) | Alternative E (Viewshed Alternative) | Alternative F (Higher Capacity Turbine Alternative) | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| Air quality – Alternative impacts* | Continuation of current air quality trends and sources of air pollution would be **moderate** adverse. | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* |
| Air quality: – Cumulative impacts* | **Minor** to **moderate** adverse; **minor** to **moderate** beneficial* | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse |
| Bats: Alternative impacts | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **negligible** adverse. | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse |
| Bats: Cumulative impacts | **Negligible** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Benthic habitat and invertebrates: Alternative impacts* | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **minor** to **moderate** adverse. | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* |
| Benthic habitat and invertebrates: Cumulative impacts* | **Minor** to **moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* |
| Birds: Alternative impacts | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **minor** adverse. | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Birds: Cumulative impacts | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Coastal habitats and fauna: Alternative impacts | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **negligible** adverse. | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse |
| Coastal habitats and fauna: Cumulative impacts | **Negligible** to **minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |

| Resource | Alternative A (No Action Alternative) | Alternative B (Proposed Action) | Alternative C (Habitat Alternative) | Alternative D (Transit Alternative) | Alternative E (Viewshed Alternative) | Alternative F (Higher Capacity Turbine Alternative) | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| Commercial fisheries and for-hire recreational fishing: Alternative impacts* | Continuation of current trends would be **moderate** to **major** adverse for commercial fisheries and **minor** to **moderate** adverse and **minor** beneficial for for-hire recreational fishing.* | **Negligible** to **major** adverse; **minor** beneficial* | **Negligible** to **major** adverse; **minor** beneficial* | **Negligible** to **major** adverse; **minor** beneficial* | **Negligible** to **major** adverse; **minor** beneficial* | **Negligible** to **major** adverse; **minor** beneficial* | **Negligible** to **major** adverse; **minor** beneficial* |
| Commercial fisheries and for-hire recreational fishing: Cumulative impacts* | **Moderate** to **major** adverse for commercial fisheries; **minor** to **moderate** adverse and **minor** beneficial for for-hire recreational fishing* | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse |
| Cultural resources: Alternative impacts | Continuation of individual IPF impacts to cultural resources from past and current activities would be **negligible** to **major** negative.† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† |
| Cultural resources: Cumulative impacts | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† |
| Demographics, employment, and economics: Alternative impacts* | Continuation of current trends would be **moderate** to **major** adverse and **minor** to **moderate** beneficial.* | **Negligible** to **moderate** adverse; **minor** beneficial* | **Minor** beneficial* | **Minor** beneficial* | **Minor** beneficial* | **Minor** beneficial* | **Minor** beneficial* |
| Demographics, employment, and economics: Cumulative impacts* | **Major** adverse; **minor** to **moderate** beneficial* | **Major** adverse; **moderate** beneficial* | **Major** adverse; **moderate** beneficial* | **Major** adverse; **moderate** beneficial* | **Major** adverse; **moderate** beneficial* | **Major** adverse; **moderate** beneficial* | **Major** adverse; **moderate** beneficial* |
| Environmental justice: Alternative impacts* | Continuation of current trends would be **negligible** to **major** adverse and **negligible** to **moderate** beneficial. | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* |
| Environmental justice: Cumulative impacts* | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse |
| Finfish and essential fish habitat: Alternative impacts* | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **moderate** adverse. | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* |
| Finfish and essential fish habitat: Cumulative impacts* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* |

| Resource | Alternative A (No Action Alternative) | Alternative B (Proposed Action) | Alternative C (Habitat Alternative) | Alternative D (Transit Alternative) | Alternative E (Viewshed Alternative) | Alternative F (Higher Capacity Turbine Alternative) | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| Land use and coastal infrastructure: Alternative impacts* | Continuation of current trends would be **minor** adverse. | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* |
| Land use and coastal infrastructure: Cumulative impacts | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Marine mammals: Alternative impacts | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **moderate** adverse for all marine mammals except for the North Atlantic right whale (NARW). Continuation of population trends and human-caused stressors would be **major** for NARW. | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* |
| Marine mammals: Cumulative impacts* | **Moderate** adverse; **minor** beneficial* (**major** for NARW) | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* |
| Navigation and vessel traffic: Alternative impacts | Continuation of current trends would be **minor** to **moderate** adverse. | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Minor** to **moderate** adverse | **Moderate** adverse | **Minor** to **moderate** adverse |
| Navigation and vessel traffic: Cumulative impacts | **Minor** to **moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse |
| Other marine uses: aviation and air traffic: Alternative impacts | Continuation of current trends would be **negligible** adverse. | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse |
| Other marine uses: aviation and air traffic: Cumulative impacts | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Other marine uses: land-based radar: Alternative impacts | Continuation of current trends would be **negligible** adverse. | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Other marine uses: land-based radar: Cumulative impacts | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse |
| Other marine uses: military and national security: Alternative impacts | Continuation of current trends would be **negligible** adverse. | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |

| **Resource** | **Alternative A (No Action Alternative)** | **Alternative B (Proposed Action)** | **Alternative C (Habitat Alternative)** | **Alternative D (Transit Alternative)** | **Alternative E (Viewshed Alternative)** | **Alternative F (Higher Capacity Turbine Alternative)** | **Alternative G (Preferred Alternative)** |
|---|---|---|---|---|---|---|---|
| Other marine uses: military and national security: Cumulative impacts | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse |
| Other marine uses: scientific research and surveys: Alternative impacts | Continuation of current trends would be **moderate** adverse. | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse |
| Other marine uses: scientific research and surveys: Cumulative impacts | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse |
| Other marine uses: undersea cables: Alternative impacts | Continuation of current trends would be **negligible** adverse. | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse |
| Other marine uses: undersea cables: Cumulative impacts | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse |
| Recreation and tourism: Alternative impacts | Continuation of current trends would be **minor** adverse. | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Recreation and tourism – Cumulative impacts* | **Minor** adverse | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* |
| Sea turtles: Alternative impacts* | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **minor** adverse. | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* |
| Sea turtles: Cumulative impacts* | **Minor** adverse; **minor** beneficial* | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Visual resources: Alternative impacts | Continuation of impacts to viewsheds from past and current activities would be **negligible** to **moderate** adverse. | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse |
| Visual resources: Cumulative impacts | **Moderate** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse |
| Water quality – Alternative impacts | Continuation of current water quality trends and sources of pollution would be **minor** adverse. | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Water quality – Cumulative impacts | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |

| **Resource** | **Alternative A (No Action Alternative)** | **Alternative B (Proposed Action)** | **Alternative C (Habitat Alternative)** | **Alternative D (Transit Alternative)** | **Alternative E (Viewshed Alternative)** | **Alternative F (Higher Capacity Turbine Alternative)** | **Alternative G (Preferred Alternative)** |
|---|---|---|---|---|---|---|---|
| Wetlands and non-tidal waters: Alternative impacts | Continuation of current wetland resources trends and sources of pollution would be **negligible** adverse. | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse |
| Wetlands and non-tidal waters: Cumulative impacts | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |

* Resources with beneficial impacts are denoted by an asterisk, and alternatives within those resource rows with beneficial impacts are denoted by a bolded blue outline and an asterisk.

† The term "adverse" has a specific meaning under NHPA Section 106 regulations (in 36 CFR 800.5) and, therefore, to remove confusion in the Cultural Resources section, the terms "negative" and "beneficial" are used in the identification of impacts under NEPA.

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# Contents

# Figures

## Tables

## Appendices

# Abbreviations

| | |
|---|---|
| °C | degrees Celsius |
| °F | degrees Fahrenheit |
| $\mu m/s^2$ | micrometers per second squared |
| μPa | micropascal |
| $\mu Pa^2$ | micropascal squared |
| $\mu Pa/sec^2$ | micropascal per second squared |
| μV | microvolt |
| ABMP | avian and bat monitoring plan |
| AC | alternating current |
| ADLS | aircraft detection lighting system |
| AGL | above ground level |
| AIS | Automatic Identification System |
| amsl | above mean sea level |
| ANSI | American National Standards Institute |
| APE | area of potential effects |
| AQRV | air quality related values |
| ASMFC | Atlantic States Marine Fisheries Commission |
| ASL | above sea level |
| ASR | airport surveillance radar |
| ATON | aid to navigation |
| AVERT | AVoided Emissions and geneRation Tool |
| BA | biological assessment |
| BACI | before-and-after-control-impact |
| BCC | Birds of Conservation Concern |
| BID | Block Island State Airport |
| BiOp | biological opinion |
| BIWF | Block Island Wind Farm |
| BMP | best management practice |
| BOEM | Bureau of Ocean Energy Management |
| BRI | Biodiversity Research Institute |
| BSEE | Bureau of Safety and Environmental Enforcement |
| CAA | Clean Air Act |
| CBRA | Cable Burial Risk Assessment |
| CEQ | Council on Environmental Quality |

| | |
|---|---|
| CFR | Code of Federal Regulations |
| cm | centimeter |
| CMECS | Coastal and Marine Ecological Classification System |
| CMR | Collision Minimization Report |
| CO | carbon monoxide |
| $CO_2e$ | carbon dioxide equivalents |
| COBRA | CO-Benefits Risk Assessment |
| COP | construction and operations plan |
| CTV | crew transport vessel |
| CWA | Clean Water Act |
| CZMA | Coastal Zone Management Act |
| cy | cubic yards |
| dB | decibels |
| dBA | A-weighted decibels |
| dB re 1 μPa | decibels referenced to a pressure of one micropascal |
| dB re 1 $μPa^2s$ | decibels referenced to the sum of cumulative pressure in micropascals squared, normalized to 1 second |
| $dB_{RMS}$ | root mean square decibels |
| DMA | dynamic management area |
| DO | dissolved oxygen |
| DOD | U.S. Department of Defense |
| DOI | U.S. Department of the Interior |
| DME | distance-measuring equipment |
| DP | dynamic positioning |
| DPS | distinct population segment |
| EA | environmental assessment |
| EFH | essential fish habitat |
| EIS | environmental impact statement |
| EO | Executive Order |
| ECO Edison | Edison Chouest Offshore |
| EMF | electromagnetic field |
| eNGO | environmental non-governmental organization |
| EPA | U.S. Environmental Protection Agency |
| EPM | environmental protection measure |
| ERM | Environmental Resource Map |
| ESA | Endangered Species Act |

| | |
|---|---|
| EWR | early warning radar |
| FAA | Federal Aviation Administration |
| FDR | facility design report |
| FGDC | Federal Geographic Data Committee |
| FHWG | Fisheries Hydroacoustic Working Group |
| FMP | fishery management plan |
| FONSI | finding of no significant impact |
| FRMP | fisheries research and monitoring plan |
| FTE | full-time equivalent |
| GAA | geographic analysis area |
| GARFO | Greater Atlantic Regional Fisheries Office |
| G&G | geological and geophysical |
| GDP | gross domestic product |
| GHG | greenhouse gas |
| GUS | Get Up Safe system |
| GW | gigawatt |
| HAPC | Habitat Area of Particular Concern |
| hazmat | hazardous materials |
| HDD | horizontal directional drilling |
| HF | high frequency |
| HFC | high-frequency cetaceans |
| HMS | highly migratory species |
| HRG | high-resolution geophysical |
| HRVEA | historic resources visual effects assessment |
| HVAC | high-voltage alternating current |
| HVDC | high-voltage direct current |
| Hz | hertz |
| IAC | inter-array cable |
| ICF | interconnection facility |
| IHA | Incidental Harassment Authorization |
| IMO | International Maritime Organizatio |
| IMPROVE | Interagency Monitoring of Protected Visual Environments |
| IPaC | Information for Planning and Consultation |
| IPF | impact-producing factor |
| ITA | Incidental Take Authorization |

| | |
|---|---|
| ITR | Incidental Take Regulation |
| IWG | Interagency Working Group on Social Cost of Greenhouse Gases |
| JEDI-OWM | Jobs and Economic Development Impacts Offshore Wind Model |
| kHz | kilohertz |
| kJ | kilojoule |
| km | kilometer |
| $km^2$ | square kilometers |
| KOP | key observation point |
| kV | kilovolt |
| LCA | Landscape Character Area |
| Lease | Commercial Lease OCS-A 0486 |
| Lease Area | Lease Number OCS-A 0486 |
| Leq | equivalent sound level |
| LGL | LGL Ecological Research Associates |
| LOA | Letter of Authorization |
| LOS | level of service |
| Lpk | zero-to-peak sound pressure level |
| Lrms | root-mean-square sound pressure level (also SPL) |
| LFC | low-frequency cetaceans |
| m | meter |
| m3 | cubic meter |
| MA CZM | Massachusetts Office of Coastal Zone Management |
| MAFMC | Mid-Atlantic Fishery Management Council |
| MARA | marine archaeological resources assessment |
| MARCO | Mid-Atlantic Regional Council on the Ocean |
| MARIPAS | Massachusetts and Rhode Island Port Access Study |
| MARPOL | International Convention for the Prevention of Pollution from Ships |
| MA WEA | Massachusetts Wind Energy Area |
| MBTA | Migratory Bird Treaty Act |
| MDAT | Marine-life Data and Analysis Team |
| MEC | munitions and explosives of concern |
| met | meteorological |
| MFC | mid-frequency cetaceans |
| mG | milligauss |
| mg/L | milligrams per liter |

| | |
|---|---|
| $mg/m^3$ | microgram per cubic meter |
| MHC | Massachusetts Historical Commission |
| mm | millimeter |
| MMPA | Marine Mammal Protection Act |
| MMS | Minerals Management Service |
| MOA | memorandum of agreement |
| MOU | memorandum of understanding |
| m/s | meters/second |
| MVAs | minimum vectoring altitudes |
| MVCO | Martha's Vineyard Coastal Observatory |
| mV/m | millivolt/meter |
| MW | megawatt |
| NAAQS | National Ambient Air Quality Standards |
| NABCI | North American Bird Conservation Initiative |
| NARW | North Atlantic right whale |
| NEFMC | New England Fishery Management Council |
| NEFOP | Northeast Fisheries Observer Program |
| NEFSC | Northeast Fisheries Science Center |
| NEPA | National Environmental Policy Act |
| NEXRAD | Next Generation Weather Radar |
| $NH_3$ | ammonia |
| NHL | national historic landmark |
| NHPA | National Historic Preservation Act |
| nm | nautical mile |
| NMFS | National Marine Fisheries Service |
| $NO_2$ | nitrogen dioxide |
| NOA | notice of availability |
| NOAA | National Oceanic and Atmospheric Administration |
| NOI | notice of intent |
| $NO_x$ | nitrogen oxide |
| NPDES | National Pollutant Discharge Elimination System |
| NPS | National Park Service |
| NREL | National Renewable Energy Laboratory |
| NSRA | navigational safety risk assessment |
| NWR | National Wildlife Refuge |

| | |
|---|---|
| NYMRC | New York Marine Rescue Center |
| NYSERDA | New York State Energy Research and Development Authority |
| O&M | operations and maintenance |
| $O_3$ | ozone |
| OBIS-SEAMAP | Ocean Biodiversity Information System Spatial Ecological Analysis of Megavertebrate Populations |
| OCA | Ocean Character Area |
| OCM | Office for Coastal Management |
| OCS | Outer Continental Shelf |
| OCSLA | Outer Continental Shelf Lands Act |
| OMB | Office of Management and Budget |
| OnSS | onshore substation |
| OSAMP | Ocean Special Area Management Plan |
| OSRP | oil spill response plan |
| OSS | offshore substation |
| OSS-link cable | offshore substation-link cable |
| OSW | offshore wind |
| OTR | Ozone Transport Region |
| PAL | Public Archaeology Laboratory, Inc. |
| PAM | passive acoustic monitoring |
| PATON | private aids to navigation |
| PMB | potential biological removal |
| PCBs | polychlorinated biphenyls |
| PDE | project design envelope |
| $PM_{10}$ | particulate matter 10 microns or less |
| $PM_{2.5}$ | particulate matter 2.5 microns or less |
| PMEL | Pacific Marine Environmental Laboratory |
| POWERON | Partnership for an Offshore Wind Energy Regional Observation Network |
| PPA | power purchase agreements |
| ppb | parts per billion |
| ppm | parts per million |
| Project | Revolution Wind Farm and Revolution Wind Export Cable Project |
| PSO | protected species observer |
| psu | practical salinity unit |
| PTS | permanent threshold shift |
| PVD | Providence |

| | |
|---|---|
| RAM | Radar Adverse-impact Management |
| Revolution Wind | Revolution Wind, LLC |
| RFA | Regional Fisheries Area |
| RICR | Rhode Island Code of Regulations |
| RI CRMC | Rhode Island Coastal Resources Management Council |
| RIHPHC | Rhode Island Historic Preservation and Heritage Commission |
| RI/MA WEA | Rhode Island/Massachusetts Wind Energy Area |
| RIDEM | Rhode Island Department of Environmental Management |
| RIEMC | Rhode Island Environmental Monitoring Collaborative |
| RINHP | Rhode Island Natural Heritage Program |
| RIPDES | Rhode Island Pollutant Discharge Elimination System |
| RIWAP | Rhode Island Wildlife Action Plan |
| rms | root mean square |
| RMP | reasonable and prudent measure |
| ROD | record of decision |
| RODA | Responsible Offshore Development Alliance |
| ROW | right-of-way |
| RSZ | rotor swept zone |
| RWEC | Revolution Wind Export Cable |
| RWEC-OCS | RWEC offshore segment in federal waters |
| RWEC-RI | RWEC offshore segment in state waters |
| RWF | Revolution Wind Farm |
| RWSC | Regional Wildlife Science Collaborative for Offshore Wind |
| SAP | site assessment plan |
| SAR | search and rescue |
| SAV | submerged aquatic vegetation |
| SCA | Seascape Character Area |
| SCADA | supervisory control and data acquisition |
| SCRAM | Stochastic Collision Risk Assessment for Movement |
| SC-GHG | Social Cost of Greenhouse Gases |
| Secretary | Secretary of the Interior |
| SEFSC | Southeast Fisheries Science Center |
| SEL | sound exposure level |
| SESC | soil erosion and sedimentation control |
| $SF_6$ | sulfur hexafluoride |

| | |
|---|---|
| SFEC | South Fork Export Cable |
| SFV | sound field verification |
| SFWF | South Fork Wind Farm |
| SIP | state implementation plan |
| SLIA | seascape and landscape impacts assessment |
| SLVIA | seascape, landscape, and visual impacts assessment |
| SMA | seasonal management area |
| $SO_2$ | sulfur dioxide |
| SOV | service operations vessel |
| SPCC | spill prevention, control, and countermeasures |
| SPL | root-mean-square sound pressure level (also Lrms) |
| STSSN | Sea Turtle Stranding and Salvage Network |
| T&C | terms and conditions |
| TARA | terrestrial archaeological resources assessment |
| TCP | traditional cultural places |
| THPO | tribal historic preservation office |
| TJB | transition joint bay |
| TNEC | The Narragansett Electric Company d/b/a Rhode Island Energy |
| TOY | time of year |
| tpy | tons per year |
| TRACON | Terminal Radar Approach Control |
| TSS | total suspended solid |
| TTS | temporary threshold shift |
| UDP | Unanticipated Discovery Plan |
| U.S. | United States |
| USACE | U.S. Army Corps of Engineers |
| USC | United States Code |
| USCG | U.S. Coast Guard |
| USFWS | U.S. Fish and Wildlife Service |
| UXO | unexploded ordnance |
| VFR | Visual Flight Rules |
| VIA | visual impact assessment |
| VMS | vessel monitoring system |
| VOC | volatile organic compound |
| VOR | VHF omnidirectional range |

| | |
|---|---|
| VTR | vessel trip report |
| WEA | wind energy area |
| WOTUS | waters of the United States |
| WSDOT | Washington State Department of Transportation |
| WTG | wind turbine generator |

# 1 Introduction

This environmental impact statement (EIS) assesses the potential biological, socioeconomic, physical, and cultural impacts that could result from the construction, operations and maintenance (O&M), and decommissioning of the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (the Project), as proposed by Revolution Wind, LLC (Revolution Wind) (formerly DWW Rev I, LLC) in its construction and operations plan (COP) (VHB 2023). The Project would be located in the Bureau of Ocean Energy Management's (BOEM) Renewable Energy Lease Number OCS-A 0486 (Lease Area) approximately 15 nautical miles (nm) (18 statute miles[1]) southeast of Point Judith, Rhode Island; approximately 13 nm (15 miles) east of Block Island, Rhode Island; approximately 7.5 nm (8.5 miles) south of Nomans Land Island National Wildlife Refuge (NWR) (uninhabited island); and between approximately 10.0 and 12.5 nm (12 and 14 miles) south-southwest of varying points of the Rhode Island and Massachusetts coastlines 15.0 miles east of Block Island, Rhode Island (Figure 1.1-1).

The RWF would include up to 100 wind turbine generators (WTGs or turbines) connected by a network of inter-array cables (IACs), up to two offshore substations (OSSs) connected by one offshore substation-link cable (OSS-link cable), and one onshore logistics or O&M facility. The RWEC would include up to two alternating current (AC) electric cables (export cables) generally co-located within a single corridor; one onshore substation (OnSS); and one interconnection facility (ICF) that would connect the RWF to the existing onshore regional electric transmission grid at The Narragansett Electric Company d/b/a Rhode Island Energy (TNEC) Davisville Substation in North Kingstown, Rhode Island.

This EIS was prepared following the requirements of the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 et seq.) and implementing regulations (40 Code of Federal Regulations [CFR] 1500–1508).[2] Additionally, this EIS was prepared consistent with the U.S. Department of the Interior's (DOI's) NEPA regulations (43 CFR 46), longstanding federal judicial and regulatory interpretations, and U.S. Administration priorities and policies including the Secretary of the Interior's (Secretary's) Order No. 3399 requiring bureaus and offices to not apply any of the provisions of the 2020 changes to CEQ regulations (the "2020 rule") (CEQ 2020) in a manner that would change the application or level of NEPA that would have been applied to a proposed action before the 2020 rule went into effect.

The Final EIS will inform BOEM in deciding whether to approve, approve with modifications, or disapprove the proposed Project. Publication of the Draft EIS initiated a 45-day public comment period. Comments received during the public comment period were assessed and considered by BOEM in preparing the Final EIS.

## 1.1 Background

The history of BOEM's planning and leasing activities offshore Rhode Island is summarized in Table 1.1-1. On March 13, 2020, Revolution Wind (formerly DWW Rev I, LLC) submitted an initial Project COP to

[1] In this EIS, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (miles used specifically for marine navigation). Statute miles are more commonly used and are referred to simply as miles, whereas nautical miles are referred to by name or by the abbreviation *nm*. 1 nautical mile (nm) equals 1.15 statute miles.

[2] This EIS is being prepared using the 2020 CEQ NEPA Regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020, and reviews begun after this date are required to apply the 2020 regulations unless there is a clear and fundamental conflict with an applicable statute (CEQ 2020) (85 *Federal Register* 43372–43373 [40 CFR 1506.13 and 1507.3(a)]). This EIS began on April 30, 2021, and accordingly proceeds under the 2020 regulations.

BOEM. After multiple BOEM reviews and revisions to address BOEM's comments, Revolution Wind submitted an updated COP on April 29, 2021, deemed sufficient to begin the NEPA process, which BOEM initiated on April 30, 2021, with issuance of the notice of intent (NOI) (BOEM 2021a). As described in Appendix A (Required Environmental Permits and Consultations) the initial public scoping period occurred from April 30 through June 1, 2021. On June 4, 2021, BOEM issued a correction to the NOI with a reopening of the public scoping period through June 11, 2021 (BOEM 2021b).

**Table 1.1-1. History of Bureau of Ocean Energy Management Planning and Leasing Offshore Rhode Island Related to Lease OCS-A 0486**

| Year | Milestone |
|---|---|
| 2011 | On August 18, 2011, BOEM published a Call for Information and Nominations (Call) for commercial leasing for wind power on the Outer Continental Shelf (OCS) offshore Rhode Island and Massachusetts in the *Federal Register* (BOEM 2011). The public comment period for the Call closed on October 3, 2011. In conjunction with the Call, BOEM published an NOI to prepare an environmental assessment (EA) on the proposed leasing and on-site characterization and assessment activities in the offshore area under consideration in the Call. BOEM received eight indications of interest to obtain a commercial lease for a wind energy project, 81 comments on the Call, and 24 comments in response to the NOI. |
| 2012 | On February 24, 2012, BOEM announced the Rhode Island/Massachusetts Wind Energy Area[3] (RI/MA WEA) (Figure 1.1-2.), which comprises approximately 164,750 acres within an area of mutual interest identified by Rhode Island and Massachusetts in a memorandum of understanding (MOU) between the two states in 2010 (State of Rhode Island and the Commonwealth of Massachusetts 2010). BOEM published a proposed sale notice in the *Federal Register* on December 3, 2012, for a 60-day public comment period (BOEM 2012). |
| 2013 | On June 4, 2013, BOEM made available a revised EA for the RI/MA WEA. As a result of the analysis in the revised EA, BOEM issued a finding of no significant impact (FONSI), which concluded that reasonably foreseeable environmental effects associated with the commercial wind lease issuance and related activities would not significantly affect the environment.<br>On June 5, 2013, BOEM published a final sale notice to auction two leases in the RI/MA WEA for commercial wind energy development (BOEM 2013a). On July 31, 2013, BOEM auctioned the two lease areas announcing Deepwater Wind New England LLC as the winner of both. BOEM issued Renewable Energy Lease Area OCS-A 0486 (Lease Area) to the applicant on October 1, 2013 (BOEM 2013b). |
| 2016 | A site assessment plan (SAP) for Lease Area OCS-A 0486 was filed on April 1, 2016, with revisions filed in July, September, and November 2016. BOEM determined the SAP was complete on October 7, 2016. |
| 2017 | On October 12, 2017, BOEM approved the SAP for Lease Area OCS-A 0486. |

[3] BOEM works with its federal, state, local, and tribal partners to identify WEAs of the OCS that appear most suitable for commercial wind energy activities, while presenting the fewest apparent environmental and user conflicts (BOEM 2022a). Once WEAs are identified, BOEM conducts EAs under NEPA to determine potential impacts associated with issuing one or more leases within a WEA. BOEM may then move forward with steps to hold a competitive lease sale for commercial wind development within the WEAs. The Project is located in BOEM Lease Area OCS-A 0486, which is located in the Rhode Island/Massachusetts Wind Energy Area (RI/MA WEA). The RI/MA WEA is adjacent to and west of the Massachusetts Wind Energy Area (MA WEA) (see Figure 1.1-2). More information on BOEM WEAs, including maps, are found on the BOEM website: https://www.boem.gov/renewable-energy/state-activities.

| Year | Milestone |
|---|---|
| 2020 | On January 10, 2020, a request was made to BOEM to segregate Lease Area OCS-A 0486 to accommodate both the RWF and RWEC Project and the South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC) Project. The RWF and RWEC Project retained lease number OCS-A 0486, whereas a new lease number was assigned for the SFWF and SFEC Project (OCS-A 0517).<br>Revolution Wind submitted its initial COP to BOEM on March 13, 2020. |
| 2021 | Revolution Wind submitted its updated COP on April 29, 2021. On April 30, 2021, BOEM published in the *Federal Register* an NOI to prepare an EIS for Revolution Wind's proposed wind energy facility offshore Rhode Island (BOEM 2021a). On June 4, 2021, BOEM issued a correction to the NOI with a reopening of the public scoping period (BOEM 2021b). The correction addressed and clarified two statements in the NOI regarding the energy capacity of the proposed wind farm and its distance from shore. In addition, the NOI correction reopened the comment period, allowing for comments to be received by June 11, 2021. Updated versions of the COP were submitted on December 15, 2021. |
| 2022 | Revolution Wind submitted an updated version of the COP on July 21, 2022. On September 2, 2022, BOEM published a notice of availability (NOA) in the *Federal Register* for the Draft EIS for public review and comment (BOEM 2022b). The NOA included times and locations for public hearings and the comment period end date of October 17, 2022. |
| 2023 | Revolution Wind submitted an updated version of the COP on March 1, 2023. BOEM anticipates publishing a notice of availability (NOA) in the *Federal Register* for the Final EIS on July 21, 2023. |

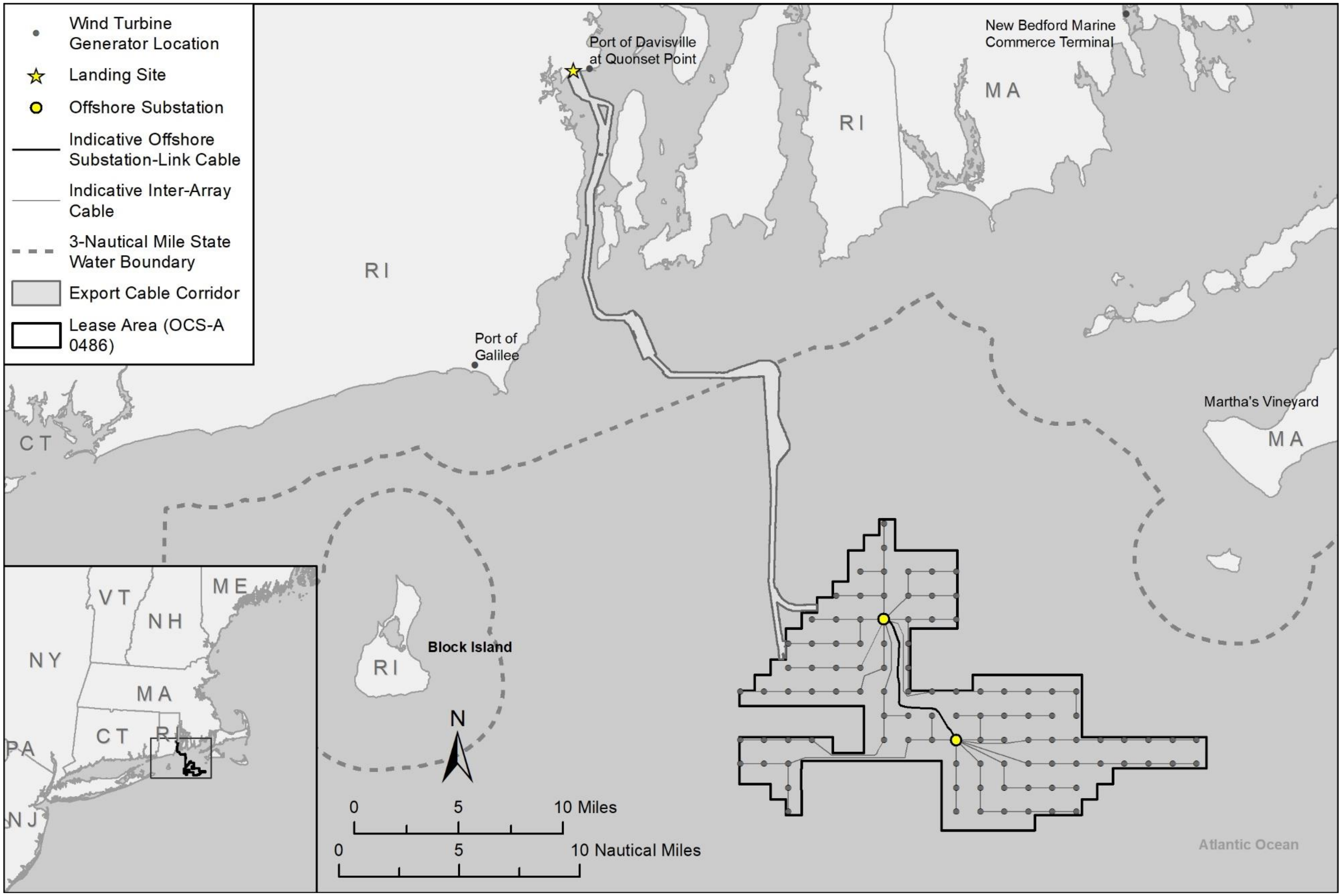


**Figure 1.1-1. Project overview.**

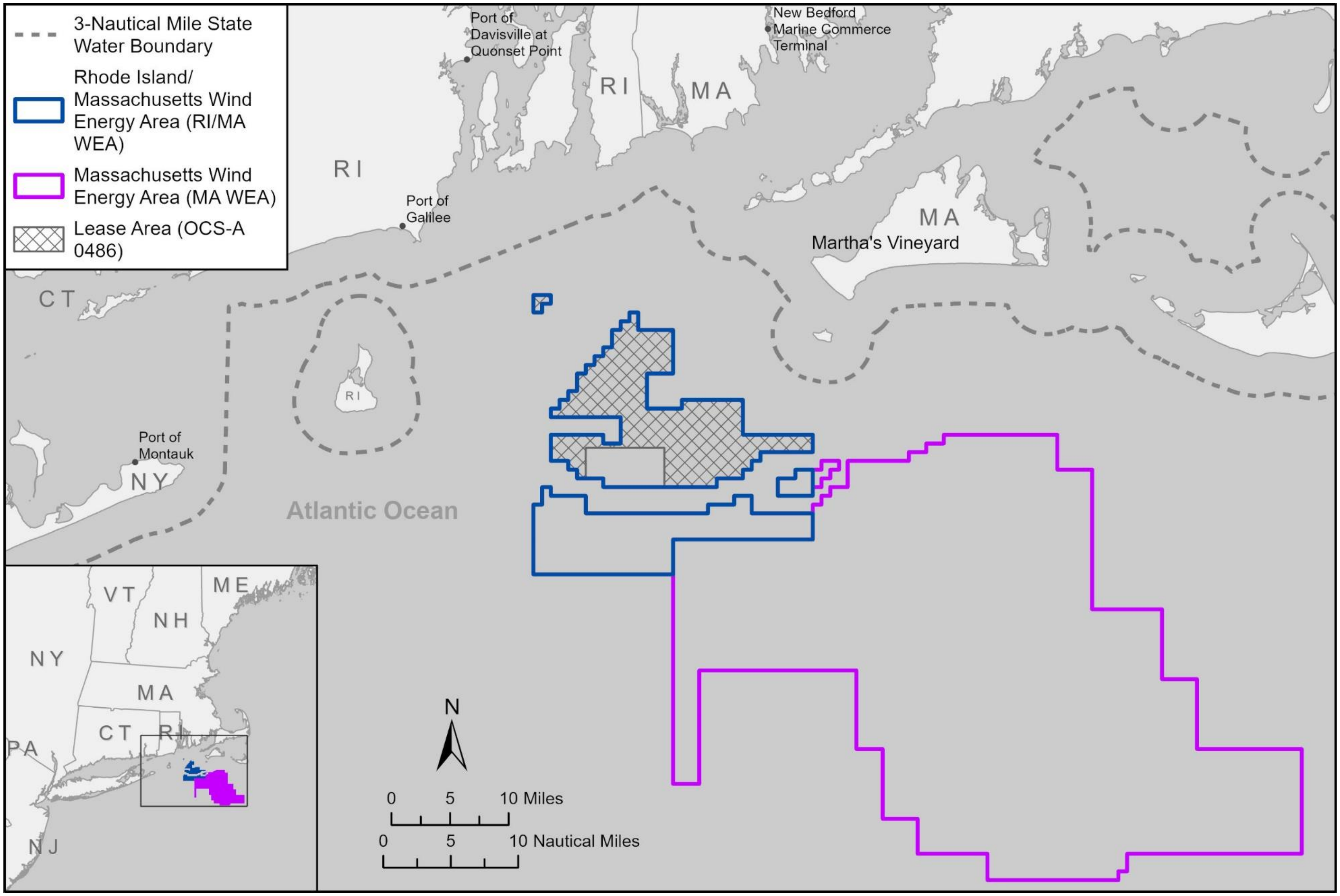


Figure 1.1-2. New England wind energy areas.

## 1.2 Purpose and Need for the Proposed Action

In Executive Order (EO) 14008 (Tackling the Climate Crisis at Home and Abroad), President Joseph Biden states that it is the policy of the United States to

> organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; increases resilience to the impacts of climate change; protects public health; conserves our lands, waters, and biodiversity; delivers environmental justice; and spurs well-paying union jobs and economic growth, especially through innovation, commercialization, and deployment of clean energy technologies and infrastructure.

Through a competitive leasing process under 30 CFR 585.211, Deepwater Wind New England, LLC was awarded commercial Renewable Energy Lease OCS-A 0486 (Lease Area) covering an area offshore Rhode Island (Table 1.1-1). Subsequent to the award of the Lease, BOEM approved an application to assign a portion of the Lease to Deepwater Wind South Fork, LLC, which resulted in the segregation of the Lease and a new lease number, OCS-A 0517, for that portion. Deepwater Wind South Fork, LLC changed its name to South Fork Wind, LLC. The remaining portion of Lease OCS-A 0486 was assigned to DWW Rev I, LLC. DWW Rev I, LLC changed its name to Revolution Wind, LLC (Revolution Wind).

Revolution Wind's goal is to develop a commercial-scale offshore wind energy facility in the Lease Area with WTGs; a network of IACs; up to two OSSs (OSS1 and OSS2); up to two export cables making landfall in North Kingstown, Rhode Island; one OnSS; and one ICF (see Figure 1.1-1). The Project, as described in Section 2.1.2, is the Proposed Action considered by BOEM in this Final EIS. The need for the Project is to contribute to Connecticut's mandate of 2,000 megawatts (MW) of offshore wind energy by 2030, as outlined in Connecticut Public Act 19-71, and to Rhode Island's 100% renewable energy goal by 2030, as outlined in Rhode Island Governor's EO 20-01 of January 2020. The Project would have the capacity to deliver up to 880 MW of power to the New England energy grid, satisfying the current power purchase agreement (PPA) total of 704 MW. Specifically, Revolution Wind's goal to construct and operate a commercial-scale offshore wind energy facility in the Lease Area is intended to fulfill the following three PPAs: a 200-MW contract with the State of Connecticut approved in January 2019, a 400-MW contract with the State of Rhode Island approved in June 2019, and a 104-MW contract with the State of Connecticut approved in December 2019.

Based on BOEM's authority under the Outer Continental Shelf Lands Act (OCSLA) to authorize renewable energy activities on the OCS, and Executive Order 14008; the shared goals of the federal agencies to deploy 30 GW of offshore wind energy capacity in the United States by 2030, while protecting biodiversity and promoting ocean co-use (The White House 2021); and in consideration of the goals of the applicant, the purpose of BOEM's action is to determine whether to approve, approve with modifications, or disapprove Revolution Wind's COP. BOEM will make this determination after weighing the factors in subsection 8(p)(4) of the OCSLA that are applicable to plan decisions and in consideration of the above goals. BOEM's action is needed to fulfill its duties under the Lease, which require BOEM to make a decision on the lessee's (Revolution Wind's) plans to construct and operate a commercial-scale offshore wind energy facility within the Lease Area (the Proposed Action).

The National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) received a request for authorization to take marine mammals incidental to construction activities related to the Project, which NMFS may authorize under the Marine Mammal Protection Act (MMPA). NMFS's issuance of an MMPA incidental take authorization in the form of a Letter of Authorization (LOA) for Incidental Take Regulations (ITRs) is a major federal action and, in relation to BOEM's action, is considered a connected action (40 CFR 1501.9(e)(1)). The purpose of the NMFS action—which is a direct outcome of Revolution Wind's request for authorization to take marine mammals incidental to specified activities associated with the Project (e.g., pile driving)—is to evaluate Revolution Wind's request under requirements of the MMPA (16 USC 1371(a)(5)(A)) and its implementing regulations administered by NMFS and to decide whether to issue the authorization. NMFS needs to render a decision regarding the request for authorization due to NMFS's responsibilities under the MMPA (16 United States Code [USC] 1371(a)(5)(A and D)) and its implementing regulations. If NMFS makes the findings necessary to issue the requested authorization, NMFS intends to adopt, after independent review, BOEM's EIS to support that decision and fulfill its NEPA requirements. The U.S. Army Corps of Engineers (USACE) New England District anticipates requests for authorization of a permit action to be undertaken through authority delegated to the District Engineer by 33 CFR 325.8, pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344). The USACE considers issuance of a permit under these two delegated authorities a major federal action connected to BOEM's Proposed Action (40 CFR 1501.9(e)(1)). The applicant's stated purpose and need for the Project, as indicated above, is to provide a commercially viable offshore wind energy project within Lease OCS-A 0486 to meet New England's need for clean energy. The USACE's basic Project purpose, as determined by the USACE for Section 404(b)(1) guidelines evaluation, is offshore wind energy generation. The USACE'S overall Project purpose for Section 404(b)(1) guidelines evaluation, as determined by the USACE, is the construction and operation of a commercial-scale offshore wind energy project, including associated transmission lines, for renewable energy generation and distribution to the Connecticut and Rhode Island energy grids. The USACE intends to adopt BOEM's EIS to support its decision on any permits requested under Section 10 of the Rivers and Harbors Act or Section 404 of the CWA.

## 1.3 Regulatory Framework

The provisions of the Energy Policy Act of 2005 implemented by BOEM, on behalf of the DOI, provide a framework for issuing renewable energy leases, easements, and rights-of-way (ROWs) for OCS activities. Section 8(p)(1)(C) of the OCSLA authorizes the Secretary to issue leases, easements, and ROWs on the OCS for wind energy development (43 USC 1337(p)(1)(C)). Section 8(p)(4) (43 USC 1337(p)(4)) of the OCSLA specifies requirements applicable to any activity carried out under Section 8(p). These requirements include, for example, that the Secretary shall

> ensure that any activity under this subsection [8(p)] is carried out in a manner that provides for . . . prevention of interference with reasonable uses (as determined by the Secretary) of the exclusive economic zone, the high seas, and the territorial seas . . . [and] consideration of . . . any other use of the sea or seabed, including use for a fishery, a sealane, a potential site of a deepwater port, or navigation. (Section 8(p)(4)(I) and (J)).

Final regulations implementing the authority for renewable energy leasing under the OCSLA (30 CFR 585) were promulgated on April 22, 2009 (Minerals Management Service [MMS] 2009). These regulations prescribe BOEM's responsibility for determining whether to approve, approve with modifications, or disapprove the proposed COP (30 CFR 585.628). Several provisions under 30 CFR 585 are applicable to a decision on a COP, including 30 CFR 585.102 and Subpart F (Plans and Information Requirements). Specifically, 30 CFR 585.102 provides in part that

> BOEM will ensure that any activities authorized in this part are carried out in a manner that provides for . . . [p]rotection of the rights of other authorized users of the OCS; . . . [and] [p]revention of interference with reasonable uses (as determined by the Secretary or Director) of the exclusive economic zone, the high seas, and the territorial seas (30 CFR 585.102(a)(7) and (a)(9)).

In addition, 30 CFR 585.621 provides that a

> COP must demonstrate that [the lessee has] planned and [is] prepared to conduct the proposed activities in a manner that conforms to your responsibilities listed in §585.105(a) and:
>
> (a) conforms to all applicable laws, implementing regulations, lease provisions, and stipulations or conditions of your commercial lease;
>
> (b) is safe;
>
> (c) does not unreasonably interfere with other uses of the OCS, including those involved with national security or defense;
>
> (d) does not cause undue harm or damage to natural resources; life (including human and wildlife); property; the marine, coastal, or human environment; or sites, structures, or objects of historical or archaeological significance;
>
> (e) uses best available and safest technology;
>
> (f) uses best management practices (BMPs); and
>
> (g) uses properly trained personnel.

Consistent with the requirements of the OCSLA and applicable regulations, Section 2 of the Lease provides the lessee with an exclusive right to submit a COP to BOEM for approval. Section 3 of the Lease provides that BOEM will decide whether to approve a COP in accordance with applicable regulations in 30 CFR 585; noting that BOEM retains the right to disapprove a COP based on its determination that the proposed activities would have unacceptable environmental consequences, would conflict with one or more of the requirements set forth in 43 USC 1337(p)(4), or for other reasons provided by BOEM pursuant to 30 CFR 585.613(e)(2) or 585.628(f); that BOEM reserves the right to approve a COP with modifications; and that BOEM reserves the right to authorize other uses within the Lease Area and Project easement that will not unreasonably interfere with activities described in an approved COP pursuant to the Lease. Section 7 of the Lease provides that

> no activities authorized [under it] will be carried out in a manner that: (a) could unreasonably interfere with or endanger activities or operations carried out under any lease or grant issued or maintained pursuant to the Act, or under any other license or approval from any Federal agency; (b) could cause any undue harm or damage to the environment; (c) could create hazardous or unsafe conditions; or (d) could adversely

> affect sites, structures, or objects of historical, cultural, or archaeological significance, without notice to and direction from the Lessor on how to proceed. (BOEM 2013b)

Addendum C of the Lease (BOEM 2013b) provides additional lease-specific terms, conditions, and stipulations that BOEM must consider when reviewing a COP.

## 1.4 Relevant Existing NEPA and Consulting Documents

BOEM developed the NEPA documents in Table 1.4-1 to inform the issues evaluated in this EIS.

**Table 1.4-1. National Environmental Policy Act Documents Used to Inform the Evaluated Environmental Impact Statement Issues**

| Document | Description |
|---|---|
| *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement, October 2007* (OCS EIS/EA MMS 2007-046) (MMS 2007). | This EIS examines the potential environmental consequences of implementing the Renewable Energy Program and establishes initial measures to mitigate environmental consequences. As the program evolves and more is learned, the mitigation measures are modified, or new measures developed for each project, subject to environmental reviews under NEPA and other statutes. |
| *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Rhode Island and Massachusetts, Revised Environmental Assessment* (OCS EIS/EA BOEM 2013-1131) (BOEM 2013c). | This EA analyzes the reasonably foreseeable consequences associated with two distinct BOEM actions in the RI/MA WEA: 1) lease issuance (including reasonably foreseeable consequences associated with shallow hazards, geological, geotechnical, and archaeological resource surveys); and 2) site assessment plan approval (including reasonably foreseeable consequences associated with the installation and operation of meteorological towers and meteorological buoys). Based on the analysis in the EA, BOEM developed several standard operating conditions to reduce or eliminate the potential environmental risks to or conflicts with individual environmental and socioeconomic resources. |
| *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Continental Shelf, May 2019* (OCS Study 2019- 036) (BOEM 2019). | This study identifies the relationships between IPFs associated with specific past, present, and reasonably foreseeable actions and activities in the North Atlantic OCS, which were incorporated into this EIS analysis. If an IPF was not associated with the RWF Project, it was not included in the impacts analysis of planned activities. |

BOEM has elected to incorporate by reference the RWF COP prepared by VHB for Revolution Wind dated March 1, 2023. The COP and its supporting documentation provide a description of the proposed Project activity, Project siting and design development, resources required, site characterization and assessment of potential impacts, and references. The RWF COP is located on the BOEM webpage for the RWF Project at this link: https://www.boem.gov/renewable-energy/state-activities/revolution-wind.

Additional environmental studies conducted to support planning for offshore wind energy development are cited throughout the EIS where applicable, and are available on BOEM's website: https://www.boem.gov/renewable-energy-research-completed-studies.

## 1.5 Methodology for Assessing the Project Design Envelope

Revolution Wind proposes using a project design envelope (PDE) concept, consistent with BOEM's *Draft Guidance Regarding the Use of a Project Design Envelope in a Construction and Operations Plan* (BOEM 2018). This concept allows Revolution Wind to define and bracket proposed Project characteristics for environmental review and permitting while maintaining a reasonable degree of flexibility for selection and purchase of Project components such as WTGs, foundations, submarine cables, and OSSs.

This EIS assesses the impacts of the PDE that is described in the Revolution Wind COP and presented in Appendix D (Project Design Envelope and Maximum-Case Scenario) by using the "maximum-case scenario" process. Through the maximum-case scenario process, BOEM analyzes the aspects of each design parameter or combination of parameters that would result in the greatest impact for each physical, biological, and socioeconomic resource. Through consultation with its own engineers and outside industry experts, BOEM verified that the maximum-case scenario analyzed in the EIS could reasonably occur.

## 1.6 Methodology for Assessing Impacts from Past, Present, and Planned Actions

This EIS assesses past, present (ongoing), and reasonably foreseeable future (planned) actions that could occur during the life of the Project. Ongoing and planned actions occurring within the geographic analysis areas (GAAs) include 1) other offshore wind energy development activities; 2) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); 3) tidal energy projects; 4) marine minerals use and ocean-dredged material disposal; 5) military use; 6) marine transportation (commercial, recreational, and research-related); 7) fisheries use, management, and monitoring surveys; 8) global climate change; 9) oil and gas activities; and 10) onshore development activities. Appendix E (Planned Activities Scenario and Reasonably Foreseeable Future Activities and Projects) describes the past and ongoing actions that BOEM has identified as potentially contributing to the existing condition, and the planned actions potentially contributing to cumulative impacts when combined with impacts from the alternatives over the specified spatial and temporal scales.

In 2019, BOEM released a study of IPFs from renewable energy projects on the North Atlantic OCS (BOEM 2019). As noted, in addition to the general planned action analysis associated with onshore and offshore non-wind activities, this EIS specifically discloses the impacts from planned actions of relevant IPFs from offshore wind by resource (Appendix E1 [Description and Screening of Relevant Offshore Wind and Non–Offshore Wind Impact Producing Factors and Negligible Impact Determinations]). Where possible, BOEM quantitatively estimates these offshore wind impacts. However, readers of the EIS should not consider these results as absolute values or predictions of actual future conditions. Although BOEM estimates represent the best tool currently available to inform the impact analysis in the EIS, it is not possible to precisely predict future conditions. Estimates are based on past experience and trends and represent reasonable assumptions about future behaviors.

### 1.6.1 Past and Ongoing Activities and Trends (No Action Alternative)

Each resource-specific Environmental Consequences section for the No Action Alternative in Chapter 3 of this EIS discloses past and present activities in the GAA, including those related to offshore wind projects with an approved COP (e.g., Vineyard Wind 1 and South Fork Wind Farm [SFWF]), approved past and ongoing site assessment surveys, and other non-wind activities (e.g., Navy military training, existing vessel traffic, climate change). This disclosure of past and present activities in the GAA is the existing condition of the affected environment. Other factors currently impacting the resource, including climate change, are also acknowledged for that resource and are included in the impact-level conclusion.

### 1.6.2 Planned Activities

It is reasonable to predict that future activities may occur over time, and that cumulatively, those activities would impact the affected environment. Future planned activities are disclosed in Appendix E. Cumulative impacts based on future planned activities are analyzed and concluded separately in each resource-specific Environmental Consequences section in Chapter 3 of this EIS. The impacts of future planned offshore wind projects are predicted using information from, and assumptions based on, COPs submitted to BOEM that are currently undergoing independent review.

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# 2 Alternatives Including the Proposed Action

## 2.1 Alternatives

Sections 2.1.1 through 2.1.7 of this chapter describe six action alternatives and a no action alternative for the Project, which are summarized in Table 2.1-1. Section 2.1.8 addresses alternatives not carried forward for analysis, Section 2.2 addresses non-routine activities and low-probability events associated with the Project, and Section 2.3 provides a summary and comparison of impacts by alternative (see Table 2.3-1). More detailed comparisons of impacts by environmental resource and alternative, to include incremental impacts between alternatives, are provided in Chapter 3.

These alternatives were developed using BOEM’s screening criteria for determining a range of reasonable alternatives, extensive coordination with cooperating and participating agencies (federal, state, local, and tribal agencies), and input from the public and potentially affected stakeholders throughout the scoping process (BOEM 2022a). The alternatives described below are not mutually exclusive. If the COP is approved or approved with modifications, BOEM could “mix and match” multiple listed alternatives or components thereof to result in a preferred alternative so long as crucial design parameters are compatible and otherwise meet the purpose of and need for the Proposed Action.

After carefully considering the EIS alternatives and input from the public, cooperating agencies, and Project proponent, BOEM has identified Alternative G as the Preferred Alternative, as described in Section 2.1.7. A preferred alternative informs the public of which alternative BOEM, as the lead agency, is leaning toward before an alternative is selected in a ROD. No final agency action is being taken by the identification of the Preferred Alternative, and BOEM is not obligated to select the Preferred Alternative. Appendix K (Supplemental Information on Alternatives Development) has more detail for the development of all alternatives and feasibility considerations, including the Preferred Alternative.

### Table 2.1-1. Alternative Descriptions

| Alternative | Description |
|---|---|
| A: No Action Alternative | Under the No Action Alternative, BOEM would not approve the COP. Project construction and installation, O&M, and decommissioning would not occur, and no additional permits or authorizations for the Project would be required. Any potential environmental and socioeconomic impacts, including benefits, associated with the Project as described under the Proposed Action or the Preferred Alternative, would not occur. However, all other past and ongoing impact-producing activities, including approved offshore wind projects (SFWF and Vineyard Wind), would continue. Under the No Action Alternative, impacts to marine mammals incidental to construction activities would not occur. Therefore, NMFS would not issue the requested authorization under the MMPA to the applicant. The current resource condition, trends, and impacts from ongoing activities under the No Action Alternative serve as the baseline against which the direct and indirect impacts of all action alternatives are evaluated.<br>Over the life of the Project, other reasonably foreseeable future impact-producing offshore wind and non–offshore wind activities would be implemented, which would cause changes to the affected environment even in the absence of the Proposed Action or the Preferred Alternative. The continuation of all other existing and reasonably foreseeable future activities described in Appendix E without the Proposed Action or the Preferred Alternative serves as the baseline against which the cumulative impacts of all alternatives are evaluated. |
| B: Proposed Action Alternative (Proposed Action) | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and implementation of applicable environmental protection measures (EPMs), as described in the COP. The Proposed Action would include up to 100 WTGs ranging in nameplate capacity of 8 to 12 MW sufficient to fulfill at a minimum the existing PPAs (total of 704 MW) up to 880 MW, the maximum capacity identified in the PDE. The WTGs would be connected by a network of IACs; up to two OSSs[4] connected by one OSS-link cable; up to two submarine export cables co-located within a single corridor; up to two underground transmission circuits located onshore; one onshore ICF; and one OnSS inclusive of up to two interconnection circuits connecting to the existing Davisville Substation in North Kingstown, Rhode Island. The Proposed Action includes the burial of offshore export cables below the seafloor in both the OCS and Rhode Island state waters and a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs.[5] |
| C: Habitat Impact Minimization Alternative | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and implementation of applicable EPMs, as described in the COP. To reduce impacts to complex fisheries habitats most vulnerable to permanent and long-term impacts from the Proposed Action, however, certain WTG positions would be eliminated while maintaining a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs. The placement of WTGs would be supported by location-specific benthic and habitat characterizations conducted in close coordination with NMFS. Under |

[4] Each OSS has a maximum nominal capacity of 440 MW; therefore, two OSSs are required to achieve the PPA obligations of 704 MW.

[5] In accordance with 30 CFR 585.634(C)(6), micrositing of WTG foundations may occur within 500 feet from each proposed WTG location. WTG micrositing would be performed on a case-by-case basis to avoid significant seafloor hazards such as surface and subsurface boulders (see COP Section 2.2.1.1).

| **Alternative** | **Description** |
|---|---|
| | Alternative C, fewer WTG locations (and potentially fewer miles of IACs) than the Proposed Action would be approved by BOEM. Under this alternative, there would be five “spare” WTGs:<br>• Alternative C1: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations to maintain a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 35 WTGs and associated IACs would be removed from consideration, resulting in up to 65 WTGs and associated IACs being approved.<br>• Alternative C2: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations to maintain a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 36 WTGs and associated IACs would be removed from consideration, resulting in up to 64 WTGs and associated IACs being approved.<br>Refer to Appendix K for background information on the development of the Alternative C1 and C2 layouts. |
| D: No Surface Occupancy in One or More Outermost Portions of the Project Area Alternative | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and implementation of applicable EPMs, as described in the COP. However, to reduce conflicts with other competing space-use vessels, WTGs adjacent to or overlapping transit lanes proposed by stakeholders or the Buzzard’s Bay Traffic Separation Scheme Inbound Lane would be eliminated while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs. Under Alternative D, BOEM could select one, all, or a combination of the following three alternatives, while still allowing for the fulfillment of existing PPAs and up to the maximum capacity identified in the PDE (i.e., 880 MW). Under this alternative, fewer WTG locations (and potentially fewer miles of IACs) than the Proposed Action would be approved by BOEM. Under this alternative, there would be up to six “spare” WTGs:<br>• Alternative D1: Removal of the southernmost row of WTGs that overlap the 4-nm east-west transit lane proposed by the Responsible Offshore Development Alliance (RODA), as well as portions of Cox Ledge. Under this alternative, up to seven WTGs and associated IACs would be removed from consideration, resulting in up to 93 WTGs and associated IACs being approved.<br>• Alternative D2: Removal of the eight easternmost WTGs that overlap the 4-nm north-south transit lane proposed by RODA. Under this alternative, up to eight WTGs and associated IACs would be removed from consideration, resulting in up to 92 WTGs and associated IACs being approved.<br>• Alternative D3: Removal of the northwest row of WTGs adjacent to the Inbound Buzzards Bay Traffic Lane. Under this alternative, up to seven WTGs and associated IACs would be removed from consideration, resulting in up to 93 WTGs and associated IACs being approved.<br>The selection of all three alternatives (i.e., D1, D2, and D3) would eliminate up to 22 WTG locations and associated IACs, resulting in up to 78 WTGs and associated IACs being approved while maintaining the 1 × 1–nm grid spacing proposed in the COP and as described in Alternative B. Based on the design parameters outlined in the COP, allowing for the placement of 78 to 93 |

| Alternative | Description |
|---|---|
| | WTGs and two OSSs would still allow for the fulfillment of up to the maximum capacity identified in the PDE (e.g., 880 MW = 74 WTGs needed if 12-MW WTGs are used). |
| E: Reduction of Surface Occupancy to Reduce Impacts to Culturally-Significant Resources Alternative | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and implementation of applicable EPMs, as described in the COP. However, to reduce the visual impacts on culturally important resources on Martha's Vineyard and in Rhode Island, some WTG positions would be eliminated while maintaining the uniform east–west and north–south 1 × 1–nm grid spacing between WTGs. Under Alternative E, fewer WTG locations (and potentially fewer miles of IACs) than the Proposed Action would be approved by BOEM. Under this alternative, there would be up to five "spare" WTGs:<br>• Alternative E1: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 36 WTGs and associated IACs would be removed from consideration, resulting in up to 64 WTGs and associated IACs being approved.<br>• Alternative E2: Allows for a power output delivery identified in the PDE of up to 880 MW while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 19 WTGs and associated IACs would be removed from consideration, resulting in up to 81 WTGs and associated IACs being approved.<br>Refer to Appendix K for background information on the development of the Alternative E1 and E2 layouts. |
| F: Selection of a Higher Capacity Wind Turbine Generator | The construction and installation, O&M, and eventual decommissioning of a wind energy facility implementing a higher nameplate capacity WTG (up to 14 MW) than what is proposed in the COP. This higher capacity WTG must fall within the physical design parameters of the PDE and be commercially available to the Project proponent within the time frame for the construction and installation schedule proposed in the COP. The number of WTG locations under Alternative F would be sufficient to fulfill the minimum existing PPAs (total of 704 MW and 56 WTGs, including up to five "spare" WTG locations). Using a higher capacity WTG would potentially reduce the number of foundations constructed to meet the purpose and need and thereby potentially reduce impacts to marine habitats and culturally significant resources and potentially reduce navigation risks. |
| G: Preferred Alternative | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the range of the design parameters outlined in the COP, subject to applicable mitigation measures. Alternative G (the Preferred Alternative) was designed to reduce impacts to visual resources and benthic habitat. This alternative would include up to 79 possible positions for the installation of 65 WTGs, which would range in nameplate capacity of 8 to 12 MW sufficient to fulfill at a minimum the existing PPAs (total of 704 MW) while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs. Under this alternative, there would be up to 14 "spare" WTG positions available for use if unforeseen siting conditions occur necessitating relocation of any of the 65 WTGs from the possible positions. Two of the 65 WTGs could be located in three different spots within the 79 WTG possible positions. As a result, Alternative G includes the analysis of three alternatives for installation of the 65 WTGs, Alternatives G1–G3. This flexibility in design could allow for further refinement for visual resources impact reduction on Martha's Vineyard and Rhode Island, or for habitat impact reduction in the NMFS Priority 1 area. |

| Alternative | Description |
|---|---|
| | • Alternative G1: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while relocating two WTG locations from a NMFS Priority 1 area to reduce fishery and EFH impacts. Under this alternative, 35 WTGs and associated IACs would be removed from consideration, resulting in 65 WTGs and associated IACs being installed in the positions identified under this alternative.<br>• Alternative G2: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while relocating two WTG locations to reduce visual impacts on the horizon from the Aquinnah Overlook, a culturally important resource. Under this alternative, 35 WTGs and associated IACs would be removed from consideration, resulting in 65 WTGs and associated IACs being installed in the positions identified under this alternative.<br>• Alternative G3: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while relocating two WTG locations closest to the shore of Martha’s Vineyard to reduce visual impacts to this culturally important resource. Under this alternative, 35 WTGs and associated IACs would be removed from consideration, resulting in 65 WTGs and associated IACs being installed in the positions identified under this alternative.<br>All other components of Alternative G are the same as the Proposed Action: two OSSs connected by an OSS-link cable; up to two submarine export cables co-located within a single corridor; up to two underground transmission circuits located onshore within a single corridor; and an onshore substation inclusive of up to two interconnection circuits within a single corridor connecting to the existing Davisville Substation in North Kingstown, Rhode Island.<br>Refer to Appendix K for background information on the development of the Alternative G and Alternative G1, G2 and G3. |

### 2.1.1 Alternative A: No Action Alternative

Under Alternative A, hereafter referred to as the No Action Alternative, BOEM would not approve the RWF COP, and the Project construction and installation, O&M, and decommissioning would not occur.[6] Likewise, no additional permits or authorizations would be required. Any potential environmental and socioeconomic impacts, including beneficial impacts, associated with the Project, as described under the Proposed Action, would not occur. However, all other past and ongoing impact-producing activities would continue. Under the No Action Alternative, NMFS would not issue the requested authorization under the MMPA, and therefore impacts to marine mammals incidental to Project activities would not occur. The current resource condition, trends, and impacts from ongoing activities under the No Action Alternative serve as the existing condition against which the direct and indirect impacts of all action alternatives are evaluated.

The continuation of all other existing and reasonably foreseeable future activities described in Appendix E, without the Proposed Action, serves as the future condition against which the cumulative impacts of the action alternatives are evaluated.

### 2.1.2 Alternative B: Proposed Action Alternative

Alternative B, hereafter referred to as the Proposed Action, would comprise the construction and installation, O&M, and eventual decommissioning of the Project, as described in the COP and in Table 2.1-1.

The RWF and RWEC are the two primary components of the Project (Figures 2.1-1 and 2.1-2). The RWF consists of WTGs, up to two OSSs (OSS1 and OSS2), a network of IACs, and one OSS-link cable (see Table 2.1-1). The RWEC would comprise offshore segments and onshore segments. The RWEC offshore segment would include up to two submarine export cables co-located within a single corridor up to 42 miles in length (up to 19 miles of which would be in federal waters and 23 miles of which would be in state waters). The RWEC onshore segment consists of the landfall work area, where the offshore and onshore cables are joined; the onshore transmission cable; the OnSS; and the ICF. The onshore elements of the Proposed Action are included in BOEM's analysis in the EIS to support analysis of a complete Project; however, BOEM's authority under the OCSLA only extends to the activities on the OCS.

#### 2.1.2.1 Revolution Wind Farm Components

As presented in Table 2.1-2, the RWF components and their construction and operation footprints include up to 100 WTGs, up to two OSSs (OSS1 and OSS2), a network of IACs, and one OSS-link cable. The PDE allows for a range of WTGs between 8 and 12 MW in capacity. Additional information on WTG and OSS layout within the Lease Area is provided in Appendix D, Table D-2 and Figure D-1.

[6] Under the No Action Alternative, NMFS would not issue the requested authorization under the MMPA to the applicant. NMFS's action alternative is to issue the requested Incidental Take Regulation (ITR) and subsequent Letter of Authorization (LOA) to the applicant to authorize incidental take for the activities specified in its application and that are being analyzed by BOEM in the reasonable range of alternatives described here.

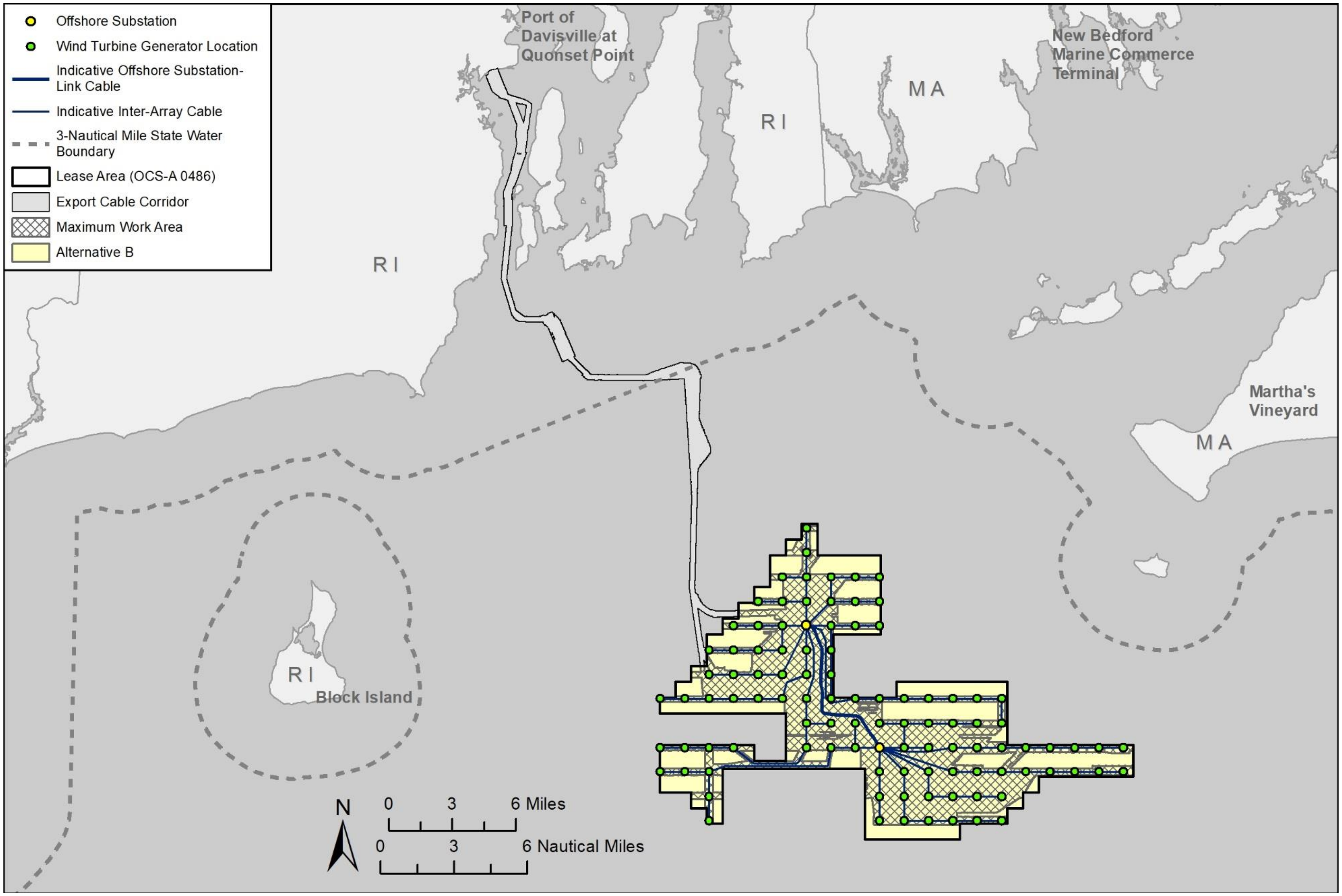



**Figure 2.1-1. Offshore Project location and components under the Proposed Action (Alternative B).**

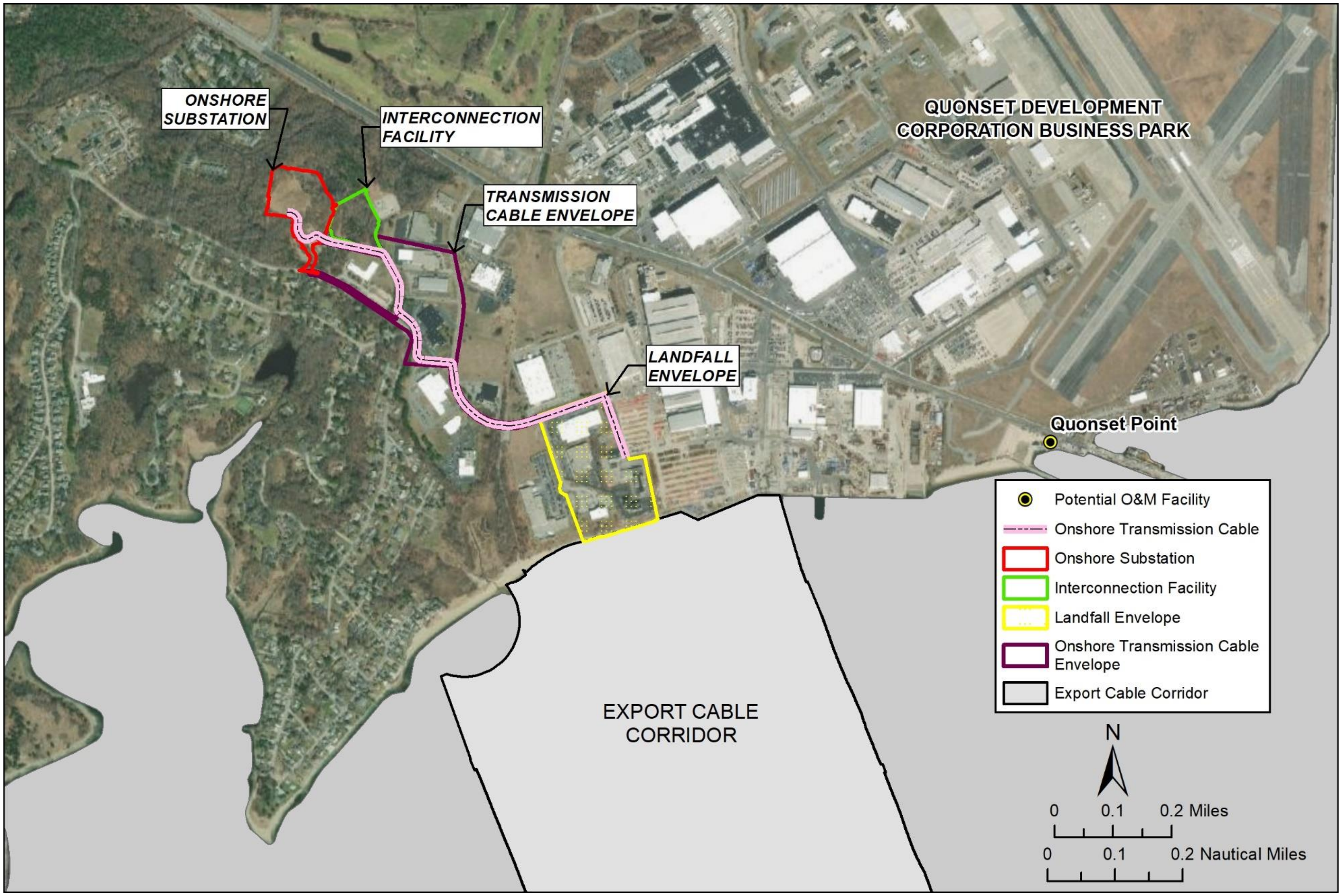



**Figure 2.1-2. Onshore Project location and components under the Proposed Action (Alternative B).**

**Table 2.1-2. Revolution Wind Farm Components and Footprint under the Proposed Action (Alternative B)**

| Project Component | Location | Project Envelope Characteristics | Construction and Installation Footprint | Operation Footprint |
|---|---|---|---|---|
| WTGs<br>WTG monopile foundation<br>WTG monopile scour protection | Offshore in the OCS | WTGs: Up to 100 WTGs with a nameplate capacity of 8 to 12 MW, rotor diameter of 538 to 722 feet, hub height of 377 to 512 feet above mean sea level (amsl), and upper blade tip height up to 873 feet amsl<br>WTG monopile foundation: A diameter of 20 to 39 feet and a target burial depth of 98 to 164 feet<br>WTG monopile scour protection: Rock placement, mattress protection, sandbags, and/or stone bags placed prior to foundation installation* | WTG monopile foundation:<br>31.1 acres x 100 WTG = 3,110 acres<br>Jack-up disturbance per WTG installation:<br>0.18 acre x 100 WTG x 1.15 = 20.7 acres¶<br>Total WTG disturbance:<br>3,131 acres | WTG monopile foundation:<br>0.027 acre x 100 WTG = 2.7 acres<br>WTG monopile scour protection:<br>0.67 acre x 100 WTG = 67 acres<br>Cable protection system stabilization for WTG and OSS (102) foundations combined:<br>7.1 acres |
| OSS<br>OSS monopile foundation<br>OSS monopile scour protection | Offshore in the OCS | OSS: Up to two OSSs (OSS1 and OSS2) and up to 262 feet amsl (with lightning protection)<br>OSS monopile foundation: A diameter of 20 to 49 feet and a maximum embedment depth of 164 feet<br>OSS monopile scour protection: Rock placement, mattress protection, sandbags, and/or stone bags placed prior to foundation installation* | OSS monopile foundation:<br>31.1 acres x 2 OSS = 62.2 acres<br>Jack-up disturbance per OSS installation:<br>0.18 acre x 2 OSS = 0.36 acre<br>Total OSS disturbance:<br>62.6 acres | OSS monopile foundation:<br>0.043 acre x 2 OSS = 0.086 acre<br>OSS monopile scour protection:<br>0.66 acre x 2 OSS = 1.3 acres |
| IAC<br>IAC protection | Offshore in the OCS | IAC: Up to a 155-mile total length with a 72-kilovolt (kV) AC cable with a diameter of 8 inches connecting WTGs and OSSs | IAC: 2,471 acres | IAC protection:<br>74.1 acres§ |

| Project Component | Location | Project Envelope Characteristics | Construction and Installation Footprint | Operation Footprint |
|---|---|---|---|---|
| | | IAC protection: Rock berms, concrete mattresses, fronded mattresses, and/or rock bags constituting up to 10% of the route for each cable | | |
| OSS-link cable†<br>OSS-link cable protection | Offshore in the OCS | OSS-link cable: Up to a 9-mile-long 275-kV high-voltage AC OSS-link cable with a diameter of 11.8 inches connecting OSS1 and OSS2<br>OSS-link cable protection: Rock berms, concrete mattresses, fronded mattresses, and/or rock bags constituting up to 10% of route for each cable | 148 acres | 4.4 acres |
| Vessel anchoring and mooring | Offshore in the OCS, state waters, along the RWEC offshore route, and at the cable landfall | Vessels for cable laying may anchor within the 1,640-foot-wide Project easement.<br>Anchors for cable laying vessels have a maximum penetration depth of 15 feet.<br>Jack-up vessels for foundation and WTG installation would include up to four spudcans with a maximum penetration depth of 52 feet and would occur within the 656-foot radius around foundation locations. | Not provided<br>Although the COP does not specify individual anchor locations, it indicates that vessel anchoring and mooring may occur at any location in the construction and installation footprint | N/A |

Source: VHB (2023)

Note: COP Tables 1.2-1, 3.3.4-1, 3.3.4-2, 3.3.5-1, 3.3.6-1, 3.3.6-2, 3.3.7-1, 3.3.7-2, and 4.1.1-1 provide assumptions used to develop the footprint estimates.

* As described in COP Section 3.3.4.2, scour protection would be installed around foundations. Several types of scour protection may be considered, including rock placement, mattress protection, sandbags, and stone bags. However, rock placement is the most frequently used solution. The design typically includes a sloped outer edge that meets the natural grade of the seafloor to the extent practicable. Depending on the nature of the rock used, the size would vary, but the average diameter would be approximately 8 inches (20 centimeters [cm]). Scour protection depth at monopile foundations would be approximately 2.2 to 4.6 feet above the seafloor. Additional details for the engineering specifications for the rock required for use as scour protection at the RWF are provided in the COP. Any rock used for scour protection would meet these specifications. COP Appendix H, Supplemental Project Information and Conceptual Project Engineering Design Drawings (BOEM 2021a), also includes a conceptual drawing for cable/scour protection at foundations. Engineering specifications for rock, a naturally occurring material, are as follows:

- Rock class: LMA5/40
- Particle density: 165 pounds per cubic foot
- Armor stone rock class
- Rock material must have been produced from blasted rock faces and may not be sourced from riverbed mining/extraction or equivalent.
- Mudstone, shale, and slate rock or similar rock likely to cleave during handling are not acceptable.

- The armor stone may not in general be flaky or elongated.

† The OSS-link cable would have similar design and construction parameters as the RWEC (see Section 2.1.2.3.1).

‡ COP Section 3.3.10.2 states that seafloor impacts from general construction vessel anchoring may occur anywhere within the identified APE centered on cable routes. The total amount of seafloor disturbance due to vessel anchorage cannot be estimated but is considered a temporary impact and not to occur outside of the surveyed area.

§ The general disturbance corridor width for the IAC is 131 feet (40 meters). IAC protection is calculated by multiplying a portion (10%) of the cable route by the disturbance corridor.

¶ Revolution Wind assumes that 15% of the WTG foundations would need an additional jack-up.

#### 2.1.2.1.1 Wind Turbine Generators

Each WTG would comprise the following major components: a tower, a nacelle (a cover housing the generator, gear box, drive train, and brake assembly), and a rotor that includes three blades. Figure 2.1-3 and Table 2.1-3 provide typical dimensions for different WTG size classes that fall within the PDE. Control, lighting, marking, and safety systems would be installed on each WTG.[7] The WTG lighting scheme is detailed in Figure 2.1-4. If needed, the WTGs could be powered by a permanent battery backup power solution with integrated energy harvest from the rotor or by a temporary diesel generator. The WTGs could be accessed from either the use of the Get Up Safe system, a motion-compensated hoist system allowing vessel-to-foundation personnel transfers without a boat landing), or a gangway launched from the service operations vessel (SOV) Edison Chouest Offshore (ECO Edison) (COP Section 3.3.4.1). Additional information on WTG layout within the Lease Area is provided in Appendix D, Table D-2 and Figure D-1.

[7] The WTGs would each be lit, individually marked, and maintained as private aids to navigation in accordance with the guidance provided in *Aids to Navigation Manual Administration* (U.S. Coast Guard [USCG] 2015) and would also comply with recommendations in *IALA Recommendation RO139 (O-139) The Marking of Man-Made Offshore Structures* (International Association of Marine Aids to Navigation and Lighthouse Authorities 2013) and recently proposed BOEM guidance on the marking and lighting of offshore wind farms (BOEM 2021b). Revolution Wind would also light and mark all WTGs in accordance with Federal Aviation Administration (FAA) Advisory Circular 70/7460-1L (FAA 2018), as recommended by BOEM (84 *Federal Register* 57471).

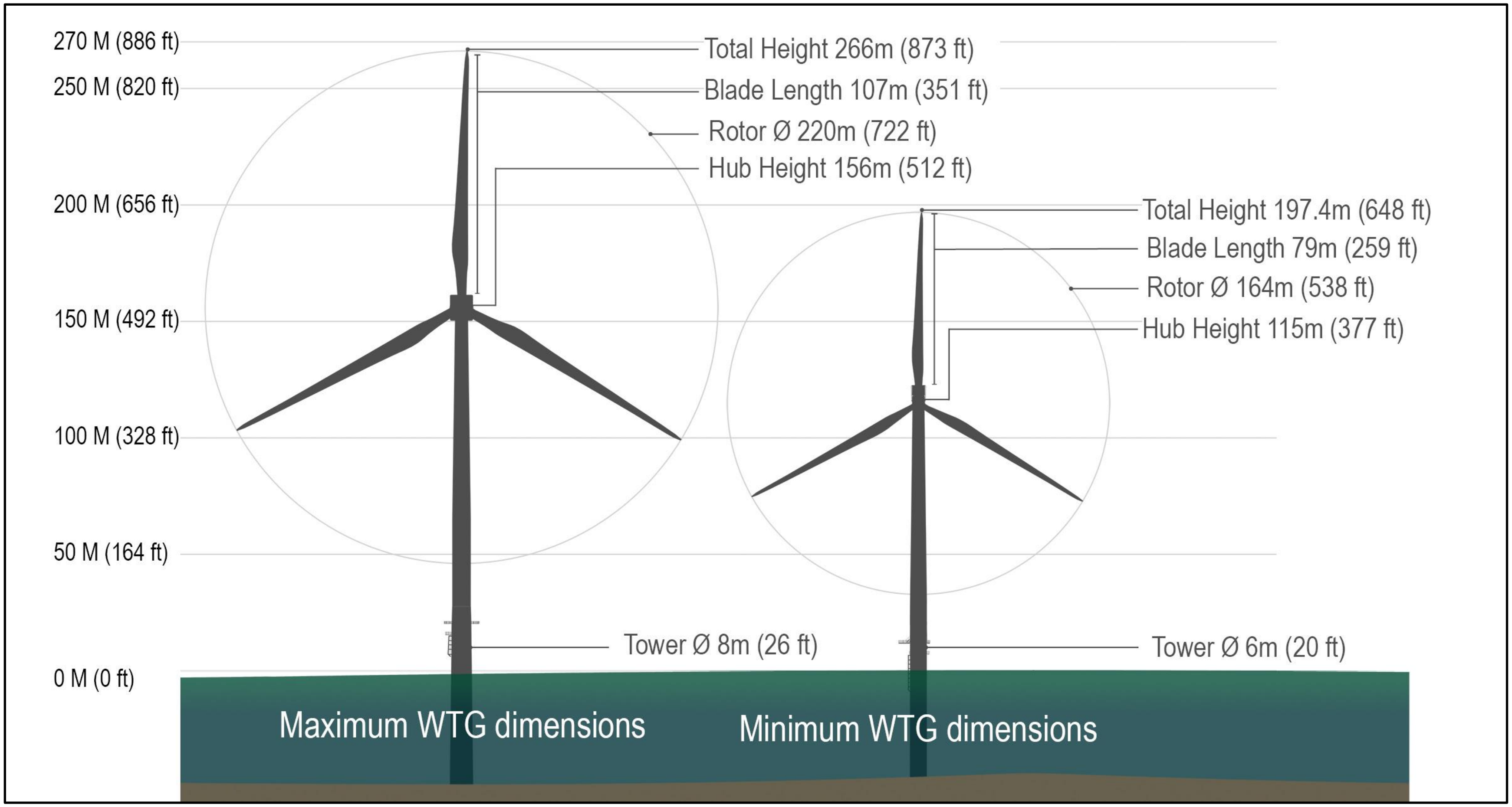



**Figure 2.1-3. Wind turbine generator design envelope characteristics (VHB 2023:108).**

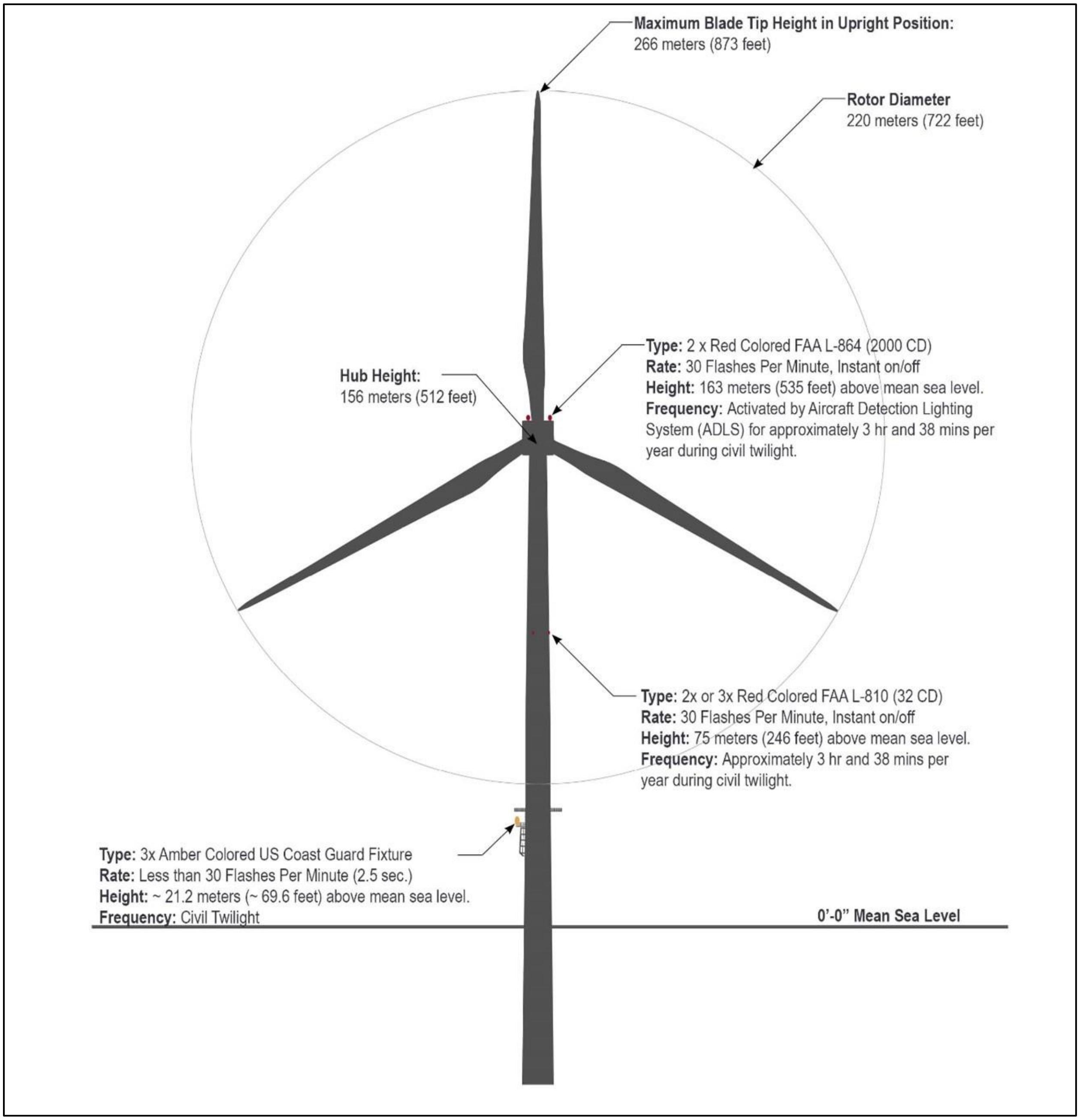



**Figure 2.1-4. Wind turbine generator lighting scheme (Revolution Wind 2022).**

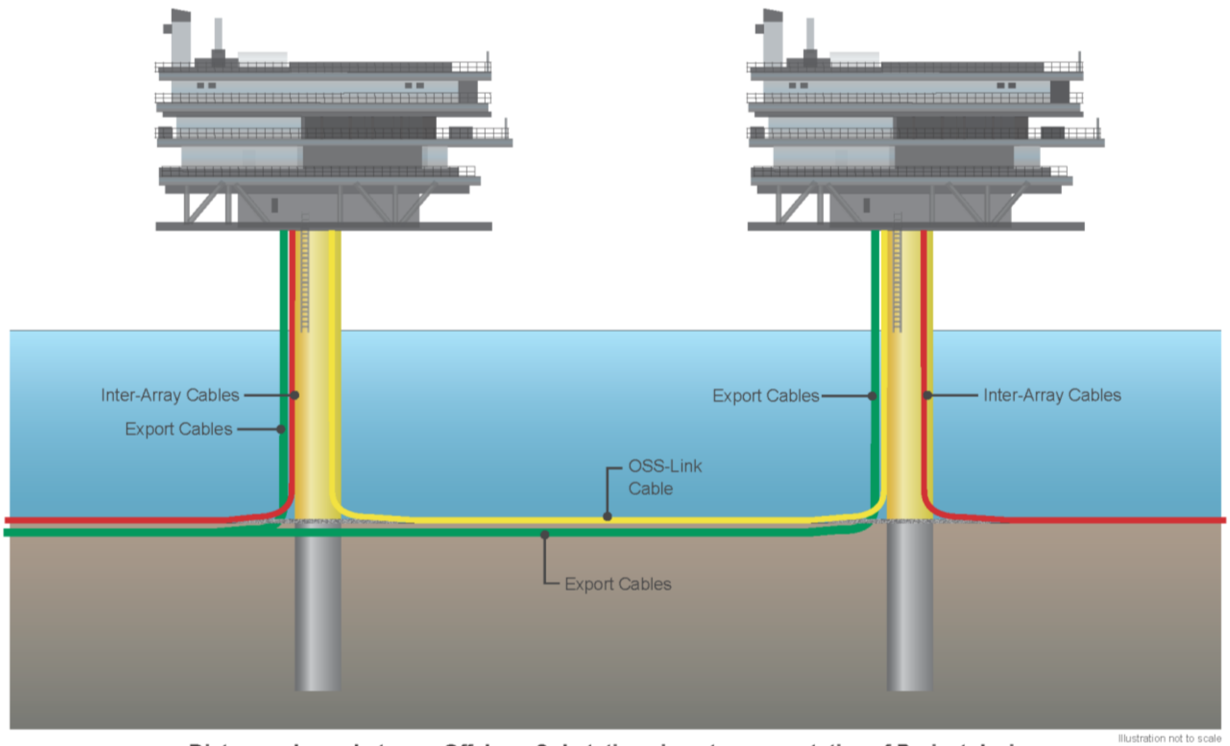
**Table 2.1-3. Wind Turbine Generator Project Design Envelope Characteristics**

| WTG Characteristic | Minimum | Maximum |
|---|---|---|
| Hub height (from mean sea level) | 377 feet | 512 feet |
| Turbine height (from mean sea level) | 646 feet | 873 feet |
| Air gap (mean sea level to the bottom of the blade tip) | 93.5 feet | 151 feet |
| Base height (foundation height to top of transition piece) | 82 feet | 128 feet |
| Base (tower) width (at the bottom) | 19.7 feet | 26 feet |
| Base (tower) width (at the top) | 13 feet | 21 feet |
| Nacelle dimensions (length × width × height) | 46 × 23 × 20 feet | 72 × 33 × 39 feet |
| Blade length | 259 feet | 351 feet |
| Maximum blade width | 16 feet | 26 feet |
| Rotor diameter | 538 feet | 722 feet |
| Operation cut-in wind speed | 7 to 11 miles per hour | |
| Operational cut-out wind speed | 55 to 80 miles per hour | |

Source: VHB (2023).

#### 2.1.2.1.2 Offshore Substations

Up to two OSSs, each with a maximum nominal capacity of 440 MW, would be required to support the maximum design capacity (880 MW) of the Project. The OSS would be unmanned but could contain additional facilities such as breakrooms, locker facilities, and general storage for staff and equipment. The OSS would be installed on monopile foundations (Figure 2.1-5). The OSSs could be accessed from either the use of the Get Up Safe system or the use of a gangway launched from the SOV ECO Edison (Revolution Wind 2022). The OSS lighting scheme is detailed in Figure 2.1-6.




Distance shown between Offshore Substations is not representative of Project design

Note: Piled jacket foundations have been removed from the COP.

**Figure 2.1-5. Indicative offshore substation co-location with associated cabling (VHB 2023:99).**

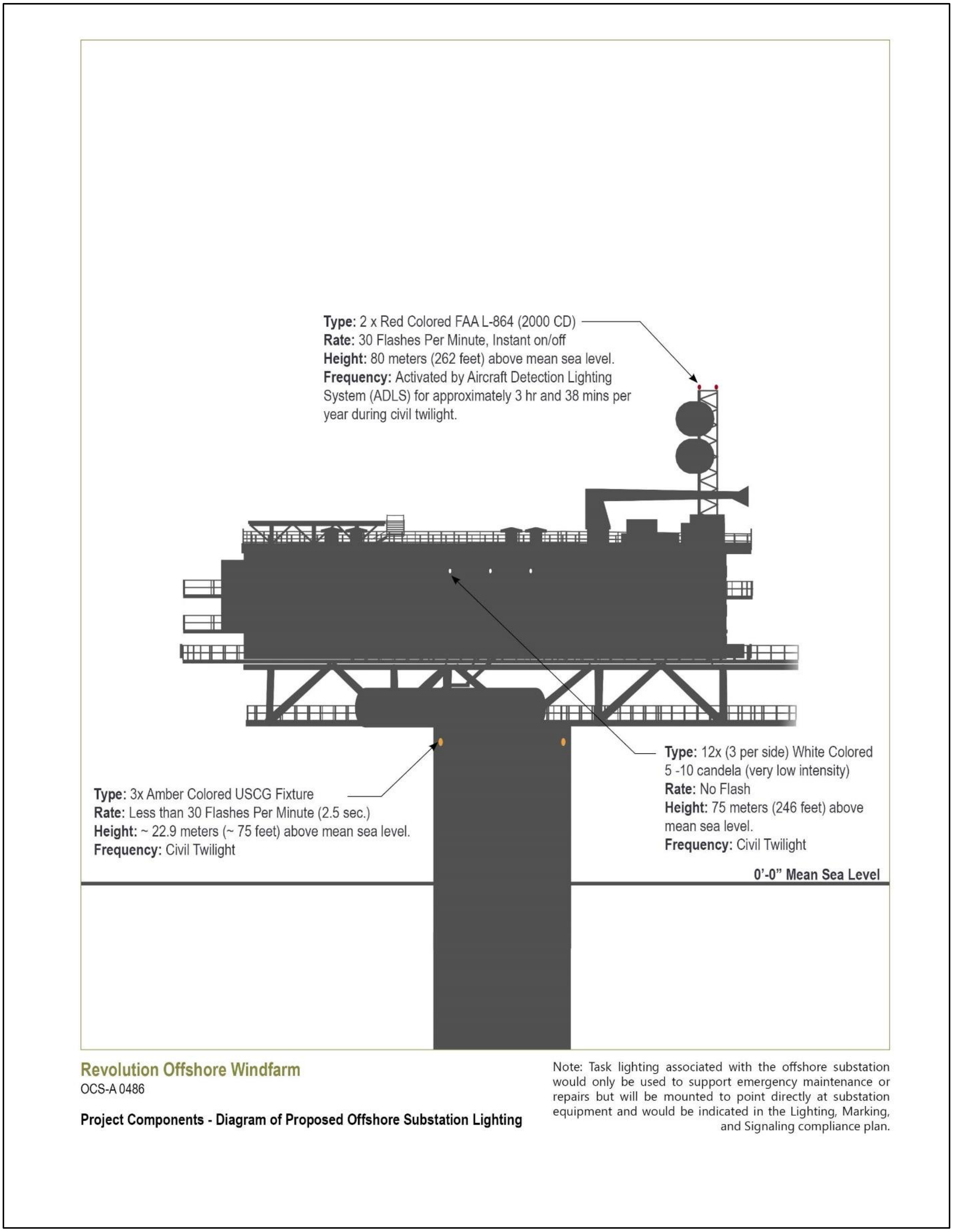



**Figure 2.1-6. Offshore substation lighting scheme (Revolution Wind 2022).**

#### 2.1.2.1.3 Wind Turbine Generator Foundations and Offshore Substation Foundations

In the COP, monopile foundations are proposed as the preferred design option for WTGs and OSSs (COP Section 2.2.2.2). Monopile foundation types require tubular steel piles to be driven into the seafloor to a target depth of embedment (98–164 feet). Additional information on the foundation dimensions is provided in COP Tables 3.3.4-1, 3.3.4-2, and 4.1.1-1, and conceptual examples are depicted in COP Figure 2.2.2-1.

#### 2.1.2.1.4 Wind Turbine Generator Scour Protection and Offshore Substation Foundation Scour Protection

Final engineering design at the facility design report/facility installation report stage could indicate that scour protection is necessary for the WTG and OSS foundations (see Table 2.1-2 and Section 2.1.2.1). Scour protection is designed to prevent foundation structures from being undermined by hydrodynamic and sedimentary processes, resulting in seafloor erosion and subsequent scour hole formation. Several types of scour protection could be considered, including rock placement, mattress protection, sandbags, and stone bags. Rock placement, which involves the use of large quantities of crushed rock placed around the base of the foundation structure, is most frequently used (VHB 2023). Depending on the nature of the rock used, the rock size would vary, but the average diameter would be approximately 8 inches. The footprint with scour protection would be a maximum of 0.7 acre for monopile foundations. Additional details for the engineering specifications and sourcing requirements for the rock use as scour protection for the Project are provided in COP Section 3.3.4.2.

#### 2.1.2.1.5 Inter-Array Cables

A network of IACs would connect individual WTGs and would transfer power from the WTGs to the OSSs. The network of IACs would be 72-kV AC, 8 inches in diameter, and up to 155 miles in length. Each IAC would consist of three bundled copper or aluminum conductor cores surrounded by insulation and various protective armoring and sheathing to shield the cable from damage. A fiber-optic cable would also be included between the three conductors to transmit data from each of the WTGs to the SCADA system for continuous monitoring. The target burial depth for the IACs is 4 to 6 feet. The IACs would be installed within a 131-foot-wide corridor.

#### 2.1.2.1.6 Offshore Substation-Link Cable

The two OSSs would be connected by one 275-kV high-voltage AC submarine transmission cable (OSS-link cable) up to 9 miles long. The maximum design scenario for the OSS-link cable and maximum seafloor disturbances are provided in Tables 2.1-4 and 2.1-5, respectively (also see COP Table 3.3.6-1 and Table 3.3.6-2).

**Table 2.1-4. Offshore Substation-Link Cable Characteristics**

| OSS-Link Cable Characteristic | Maximum Design Scenario |
|---|---|
| Number of cables | 1 |
| Voltage | 275 kV |
| Cable diameter | 11.8 inches |

| OSS-Link Cable Characteristic | Maximum Design Scenario |
|---|---|
| Target burial depth (below seafloor) | 4 to 6 feet* |
| Maximum disturbance depth | 10 feet |
| Disturbance corridor (total width)† | Up to 131 feet |

Source: VHB (2023).

* Burial of the OSS-link cable would typically target a depth of 4 to 6 feet below the seafloor. The target burial depth for the OSS-link cable would be determined based on an assessment of seafloor conditions, seafloor mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific cable burial risk assessment.

† The disturbance corridor reflects the maximum area that would be subject to seafloor preparation prior to cable installation.

**Table 2.1-5. Maximum Seafloor Disturbances for Offshore Substation-Link Cable Installation**

| OSS-Link Cable Disturbance | Construction Footprint | Operation Footprint |
|---|---|---|
| General disturbance corridor* | 148 acres | – |
| Boulder clearance (60% of total length) | 89 acres | – |
| Secondary cable protection (10% of total length) | – | 4.4 acres |

Source: VHB (2023).

Notes: Disturbance estimates presented in this table are not additive because disturbance types may overlap (e.g., cable protection placed in areas where boulders were cleared). Vessel anchoring disturbances are not included; if anchoring (or a pull ahead anchor) is necessary during cable installation, it would occur within the APE and be centered on cable routes. The maximum depth of disturbance associated with anchoring is 15 feet (4.6 m), except between Kilometer Post 0 and 10.5 where it is 18 feet (5.5 m). It is estimated that up to 390 pull-ahead anchoring events would occur, 200 of which would occur in the RWEC-RI corridor, 150 would occur in the RWEC-OCS corridor, and 40 would occur for OSS-link installation, accounting for approximately 16 acres of seafloor disturbance within the 131-foot-wide (40-m-wide) disturbance corridor.

* The general disturbance corridor width for the OSS-link cable is 131 feet. Boulder clearance and secondary cable protection would not extend beyond this corridor. Also, if performed along the OSS-link cable route, boulder clearance and cable lay and burial trials would occur within this general disturbance corridor.

#### 2.1.2.1.7 Inter-Array Cable Protection and Offshore Substation-Link Cable Protection

Cable protection in the form of rock berms, rock bags, and/or mattresses would be installed on the IAC and OSS-link cable where burial cannot occur, where sufficient burial depth cannot be achieved because of seafloor conditions, or to avoid risk of interaction with external hazards as determined necessary by the cable burial risk assessment, and where the cables cross existing submarine assets.[8] Cable protection would be installed from an anchored or dynamic positioning support vessel that would place the protection material over the designated area or areas. BOEM has not identified a preferred or required form of scour protection; however, proposed mitigation measures outlined in Appendix F (Environmental Protection Measures, Mitigation, and Monitoring) (see Table F-2) include requirements to the types of cable protection used consistent with *BOEM's Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR Part 585* (BOEM 2022b).

The COP estimates up to 10% of the route for each IAC would require cable protection. Rock berm or concrete mattress separation layers would be installed over existing submarine assets prior to installing a

[8] Submarine assets include infrastructure such as pipelines, tunnels, or cables (transmission, fiber optic, telecommunication, etc.) that are buried below the seafloor.

crossing cable, whereas additional rock berm or concrete mattress cover layers would be installed over the crossing cable after cable installation. Similar to the IAC, the COP estimates up to 10% of the OSS-link cable route would require cable protection in areas where burial cannot occur, where sufficient burial depth cannot be achieved due to seafloor conditions, or to avoid risk of interaction with external hazards. Rock would also be used as a stabilizer for the IAC and OSS-link cable at the point of cable entry to the WTG and OSS foundations. Details on the anticipated seafloor disturbance and secondary cable protection information is outlined in Table 4-1 of COP Appendix X2 (Inspire Environmental 2023).

Cable protection at cable crossings would be applied for both in-service assets as well as out-of-service submarine assets (i.e., assets not currently in use or abandoned in place) that cannot be safely removed and pose a risk to the IAC. Up to 1,640 feet of cable protection would be required per crossing. However, final crossing designs would be completed in coordination with submarine asset owners and formalized in crossing and proximity agreements, in line with International Cable Protection Committee recommendations (COP Section 3.3.3.2). No cable crossings are anticipated for the IAC or OSS-link cable.

Revolution Wind would provide the location of all cables and associated cable protection to NOAA's Office of Coast Survey after installation for inclusion on nautical charts (COP Section 3.3.3.2).

#### 2.1.2.1.8 Operations and Maintenance Facilities

Revolution Wind is evaluating five sites for the location of the O&M facility or facilities that would support the Project. The five sites under consideration are located at existing ports listed in Table 2.1-6 (also see COP Section 3.5.6 and COP Table 3.3.10-1). Revolution Wind could use one or more of these sites to fulfill the Project O&M facility requirements. Any potential modifications at the ports to establish an O&M facility or O&M facilities are outlined in Table 2.1-6.

**Table 2.1-6. Potential Operations and Maintenance Facility Locations and Descriptions**

| Potential O&M Facility Sites | Description of Site-Specific O&M Facilities |
|---|---|
| Port of Brooklyn (New York) | There are no plans to construct new O&M buildings at, or otherwise implement improvements to, the Port of Brooklyn, and use of this port as an O&M facility is assumed to be limited to use of existing facilities maintained by the port. |
| Port of Davisville at Quonset Point (Rhode Island) | As described and evaluated in the South Fork Wind Farm COP (Jacobs Engineering Group [Jacobs] 2021), new O&M building(s) with up to 1,000 square feet of office space and up to 11,000 square feet of equipment storage space would be constructed at the Port of Davisville at Quonset Point. This building may serve as an O&M base for multiple offshore wind projects. |
| Cashman Shipyard (Massachusetts) | There are no plans to construct new O&M buildings at, or otherwise implement improvements to, the Cashman Shipyard, and use of this port as an O&M facility is assumed to be limited to existing facilities maintained by the port. |

| Potential O&M Facility Sites | Description of Site-Specific O&M Facilities |
|---|---|
| Port Jefferson (New York) | There are no plans to expand or construct new O&M buildings at Port Jefferson. An existing upland building within an office park (Research Way) that includes other businesses would serve as a regional O&M hub and headquarters for Orsted and multiple offshore wind projects. There are plans to conduct internal upgrades to the building to establish O&M office and warehouse space that would similarly support multiple offshore wind projects. |
| Port of Montauk (New York) | New O&M building(s) with up to 1,000 square feet of office space and up to 6,000 square feet of equipment storage space would be constructed at the Port of Montauk. |

Source: VHB (2023)

Note: O&M buildings at/near some or all of these ports will be used for wind farm monitoring and equipment storage for multiple offshore wind projects including the RWF, SFWF, and Sunrise Wind Farm, and as such have utility that is independent of the Project.

#### 2.1.2.1.9 Port Facilities

The Project would use a combination of existing port facilities located in Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Virginia, and Maryland for offshore construction, assembly, and fabrication, and/or crew transfer and logistics support. Modifications of these ports are specifically not included in the Proposed Action because no expansions or modifications to the ports are needed to support vessels, helicopters, equipment, or supplies associated with Project activities. Final port selection has not been determined at this time; Table 2.1-7 provides a summary of the potential ports that could be used to support the Project.

**Table 2.1-7. Potential Port Facilities and Summary of Potential Activities**

| State | Port | City/Town, County | WTG Tower, Nacelle, and Blade Storage, Pre-Commissioning and Marshalling | Foundation Marshalling and Advanced Foundation Component Fabrication | Construction Hub and/or O&M Activities | Electrical Activities and Support |
|---|---|---|---|---|---|---|
| New York | Port of Montauk | Montauk, Suffolk County | | | X | |
| | Port Jefferson | Port Jefferson Village, Suffolk County | | | X | |
| | Port of Brooklyn | Brooklyn, Kings County | | | X | |
| Rhode Island | Port of Providence | Providence, Providence County | X | X | X | X |
| | Port of Davisville at Quonset Point | North Kingstown, Washington County | | | X | |
| Connecticut | Port of New London | New London, New London County | X | | | |
| Virginia | Port of Norfolk | Norfolk City, Norfolk County | X | | | |
| Massachusetts | New Bedford Marine Commerce Terminal | New Bedford, Bristol County | X | | | |
| | Cashman Shipyard | Quincy, Norfolk County | | | X | |
| Maryland | Sparrow’s Point | Sparrow’s Point, Baltimore County | | X | | |
| New Jersey | Paulsboro Marine Terminal | Paulsboro, Gloucester County | | X | | |

### 2.1.2.2 Revolution Wind Export Cable Components

Power from the RWF would be delivered to the electric grid by two distinct transmission cable segments: the RWEC (offshore component) and the onshore transmission cable (onshore component). The RWEC corridor traverses both federal and Rhode Island state waters before reaching landfall (see Figure 1.1-1). Table 2.1-8 summarizes the RWEC components, which are described in more detail in the sections that follow. Additional information is provided in Appendix D (Project Design Envelope and Maximum-Case Scenario). Figure 2.1-7 (COP Figure 1.1-2) provides a simplified Project schematic showing the components of the RWEC that deliver electricity from the OSS to the existing Davisville Substation.

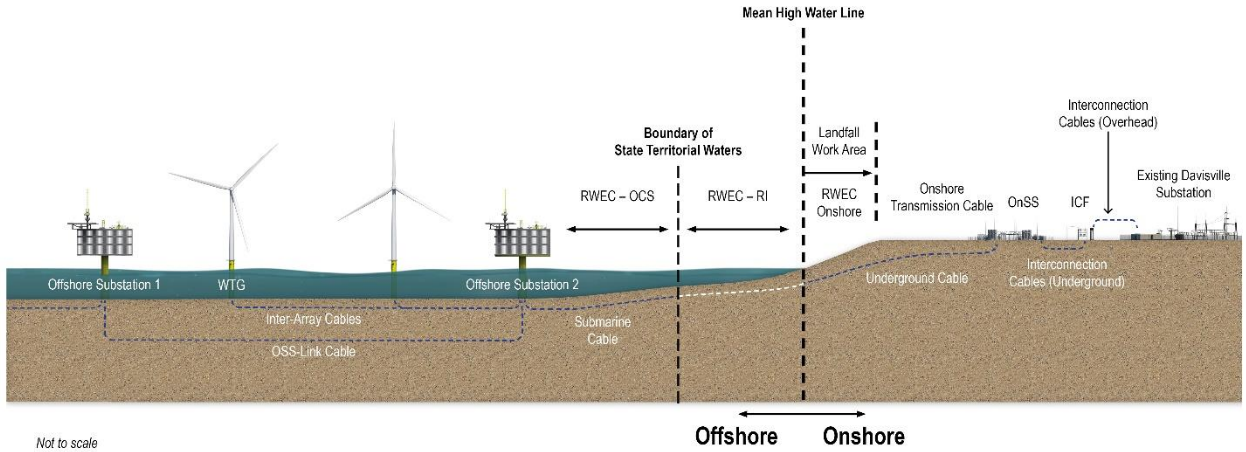



**Figure 2.1-7. Simplified Project schematic (VHB 2023).**

**Table 2.1-8. Revolution Wind Export Cable Components and Footprints**

| Project Component | Location | Project Envelope Characteristic | Construction and Installation Footprint (temporary) | Operation Footprint (permanent) |
|---|---|---|---|---|
| RWEC | RWEC offshore segment in federal waters (RWEC-OCS) and RWEC offshore segment in state waters (RWEC-RI) | Up to two 275-kV cables (one for each OSS) with a diameter of 11.8 inches and a target burial depth of 4 to 6 feet, a maximum disturbance depth of 13 feet, and a maximum disturbance corridor width of 131 feet per cable<br>Total cable length up to 42 miles per cable with the RWEC-OCS segment totaling up to 19 miles and the RWEC-RI segment totaling up to 23 miles of each cable in Rhode Island state waters and extending to landfall<br>The RWECs would be located within the same corridor. Offshore and based on site-specific conditions (e.g., water depth and seabed constraints), each cable would typically be spaced greater than 164 feet apart; spacing between each cable would be less at landfall (e.g., approximately 23–49 feet). | RWEC-OCS:*<br>Cable lay and burial trials (5 per cable estimate) = 12.4 acres<br>General disturbance corridor = 593.1 acres<br>Omega joint installation (2 per cable) = 20.4 acres<br>Boulder clearance (40% of route for two cables) = 237.2 acres<br>RWEC-RI:*<br>Cable lay and burial trials (5 per cable estimate) = 12.4 acres<br>General disturbance corridor = 731.4 acres<br>Omega joint installation (2 per cable) = 20.4 acres<br>Boulder clearance (70% of route for two cables) = 512 acres | RWEC-OCS (10% would require secondary protection) = 17.8 acres<br>RWEC-RI (5% would require secondary protection) = 11.0 acres |
| RWEC cable protection | RWEC-OCS and RWEC-RI | In the form of rock berms, concrete mattresses, fronded mattresses, and/or rock bags, as follows:<br>Cable protection for RWEC-OCS for 10% of OCS route length and 5% of RWEC-RI route length, up to 39.4 feet wide<br>Cable protection for existing submarine assets (seven identified) anticipated to | RWEC-OCS (10% of route) = 17.8 acres<br>RWEC-RI (5% of route) = 11 acres<br>Existing submarine assets (seven identified) anticipated to be crossed by RWEC-RI = 21.9 acres | RWEC-OCS = 17.8 acres<br>RWEC-RI = 11.0 acres<br>Existing submarine assets = 21.9 acres |

| Project Component | Location | Project Envelope Characteristic | Construction and Installation Footprint (temporary) | Operation Footprint (permanent) |
|---|---|---|---|---|
| | | be crossed by RWEC: up to 4.4 miles in length, up to 39.4 feet wide | | |
| RWEC (onshore transmission cable) | Onshore | Two 275-kV cables spliced into two 275-kV transmission circuits with three cables each (total of six cables in two circuits)<br>Diameter of 5.1 inches with a target burial depth of 3 to 6 feet, a maximum disturbance depth of 13 feet, and an approximate disturbance corridor width of 25 to 30 feet<br>Two splice vaults per cable with maximum disturbance depth of 16 feet, and a disturbance area of 30 × 70 feet<br>Trench width within this disturbance corridor of approximately 8 feet<br>Cable length up to 1.0 mile | Temporary ground disturbance:<br>3 acres | RWEC operational ROW:<br>20 feet wide centered on the cable approximately 1 mile in length = 2.4 acres |
| Landfall work area | RWEC-RI and onshore Quonset Point North Kingstown, Rhode Island | Landfall work area (includes transition joint bays, with horizontal directional drilling (HDD) exit pits and cofferdams)† | 3.1 acres‡ | N/A |
| Landfall work area | RWEC-RI and onshore Quonset Point North Kingstown, Rhode Island | Transition joint bay | 1,340 square feet | N/A |
| Landfall work area | RWEC-RI and onshore Quonset Point North | HDD exit pits and temporary cofferdams | 0.24–0.94 acre | N/A |

| Project Component | Location | Project Envelope Characteristic | Construction and Installation Footprint (temporary) | Operation Footprint (permanent) |
|---|---|---|---|---|
| | Kingstown, Rhode Island | | | |
| OnSS | Onshore | Two 275-kV onshore transmission circuits transitioning to aboveground and terminating at the OnSS at two aboveground circuit terminals<br>OnSS nominal operating capacity ranging between 704 and 880 MW, connecting to the ICF with two 115-kV underground transmission cables<br>Maximum height of OnSS equipment up to 45 feet and shielding masts up to 65 feet | Up to 7.1 acres with maximum depth of disturbance of 60 feet | OnSS equipment:<br>3.8 acres<br>OnSS facility:<br>7.1 acres§<br>Underground transmission cable (connecting to ICF) operational ROW:<br>20 feet wide centered on the cable approximately 527 feet in length = 0.24 acre |
| ICF | Onshore | ICF nominal operating capacity of up to six 115-kV breakers, connecting to the Davisville Substation with two 115-kV overhead transmission circuits<br>Maximum height of ICF equipment up to 45 feet and shielding masts up to 55 feet<br>Maximum height of overhead transmission circuit structures (ICF to Davisville Substation) up to 60 feet<br>Maximum height of overhead transmission circuit structures (ICF to rebuilt Davisville Transmission Tap line) up to 80 feet | Approximately 4.0 acres with a maximum depth of disturbance of 60 feet | Up to 1.6 acres<br>Overhead transmission circuit (ICF to Davisville Substation) ROW:<br>Up to 120-foot-wide cleared ROW centered on the circuit for two circuits approximately 474 feet in length = 1.3 acres<br>Overhead transmission circuit (ICF to rebuilt Davisville Transmission Tap line) ROW:<br>Up to 120-foot-wide cleared ROW centered on the circuit for approximately 712 feet in length = 1.9 acres |

Source: VHB (2023).

Note: For a detailed description of assumptions used to develop the footprint estimates, see COP Tables 3.3.1-3, 3.3.2-1, 3.3.3-1, 3.3.3-3, 3.3.3-5, 3.3.4-1, 3.3.4-2, 3.3.5-1, 3.3.6-1, 3.3.6-2, 3.3.7-1, and 3.3.7-2.

* Disturbance estimates are not additive because disturbance types may overlap.

† A cofferdam is a watertight enclosure pumped dry to permit construction work below the waterline.

‡ Transition joint bays and HDD exit pits with cofferdams would occur within the landfall work area. The PDE includes four HDD construction methods that vary in area of disturbance from 0.12 to 0.47 acre. Both export cables would use one of the HDD methods, for a combined area of disturbance at the landfall work area of 0.24 to 0.94 acre.

§ The OnSS facility would include a compacted gravel driveway, stormwater management features, and associated landscaped or managed vegetated areas totaling up to 7.1 acres inclusive of the OnSS equipment.

#### 2.1.2.2.1 Offshore Segments

The RWEC would consist of up to two 275-kV high-voltage AC submarine cables, each originating at a respective OSS in the Lease Area but eventually located within a 1,640 foot-wide Project easement and extending to the landfall site in Quonset Point, Rhode Island. (see Figure 1.1-1). Offshore, based on site-specific conditions (e.g., water depth and seafloor constraints), each cable of the RWEC would be spaced, where practical, greater than 164 feet apart; spacing between each cable would be less at landfall (e.g., approximately 23 to 49 feet). Similar to the IAC (see Section 2.1.2.5), each cable of the RWEC would consist of three bundled copper or aluminum conductor cores surrounded by layers of insulation and various protective armoring and sheathing to protect the cable from external damage. Fiber-optic cables would also be included in the interstitial space between the three conductors for continuous monitoring of the RWF (i.e., one fiber-optic cable per RWEC cable bundle). A cross section of a typical submarine cable is provided in COP Figure 3.3.3-2. The maximum design scenario for the RWEC is provided in COP Table 3.3.3-1 and included in Appendix D of this EIS. Target burial depth below the seafloor for the RWEC would be 4 to 6 feet with a maximum disturbance depth of 13 feet. Cable installation surveys would be required, including pre- and post-installation surveys, to determine the actual cable burial depth.

#### 2.1.2.2.2 Offshore Cable Protection

The COP estimates that up to 10% of the route for each offshore cable type (RWEC-OCS, OSS-link cable, IAC) would require cable protection, except for the RWEC-RI, which is estimated to require cable protection for 5% of the route. Seven known submarine assets exist along the RWEC (refer to Appendix E for discussion and Figure 3.17-1 in Other Marine Uses). See Figure 1.1-1 for a depiction of the potential grid layout of WTGs and OSSs with OSS-link cable and IACs.

The amount of cable protection for existing submarine assets would be as required for suitable coverage and technical agreements with respective asset owners. See Section 2.1.2.1.7 for a discussion of cable protection measures and when they are deployed.

Revolution Wind would provide the location of all cables and associated cable protection to NOAA's Office of Coast Survey after installation for inclusion on nautical charts (COP Section 3.3.3.2).

#### 2.1.2.2.3 Onshore Segments

The onshore segment of the RWEC (the onshore transmission cable) originates where the offshore segment of the RWEC comes ashore in the landfall work area, transitions from two larger diameter cables to six smaller diameter cables, running in two parallel circuits in the same trench, and proceeds underground to the OnSS and the ICF. Two fiber-optic cables would also be included in the interstitial space between the six cables for the length of the onshore transmission cable for monitoring. Up to two splice vaults would be required for each circuit (up to four total) of the onshore transmission cable between landfall and the OnSS. See COP Figure 3.3.2-2 and Figure 3.3.2-1 for illustrations of the onshore transmission cable cross section and circuit configuration. See Figure 2.1-2 (COP Figure 2.2.1-3) for the proposed location of the onshore transmission cable path, OnSS, ICF, and onshore work areas. Additional details of the onshore transmission cable design are found in Section 3.3.2 of the COP.

### Landfall Work Area

There are different locations within the approximate 20-acre landfall envelope that are being evaluated for the landfall work area (see Figure 2.1-2). The landfall envelope is a roughly rectangular polygon bounded by Whitecap Drive on the west, Circuit Drive on the north, the Electric Boat property on the east, and Narragansett Bay on the south.

Installation of the RWEC at the landfall work area would be accomplished using a horizontal directional drilling (HDD) methodology originating onshore to the seaward exit pit in Rhode Island state waters and may incorporate a temporary cofferdam or a temporary surface casing with supporting goal posts (see Table 2.1-8). If needed, based on site conditions at the landfall work area, a cofferdam would be used to create a dry environment during construction and to manage sediment, contaminated soils, and bentonite (for HDD operations). The cofferdam, measuring up to 164 × 33 × 10 feet to align with HDD exit pits, could be installed as either a sheet piled structure into the seafloor or a gravity cell structure placed on the seafloor using ballast weight, and installation would be conducted from an offshore work barge anchored near the cofferdam. A barge could be required to anchor at or near the exit point of the HDD duct during construction, regardless of whether a cofferdam is used or not. One cofferdam would be needed for each of the two cables that make up the RWEC. Alternatively, instead of a cofferdam, an exit pit with or without the use of surface casing pipe and goal posts measuring up to 182 x 113 x 10 feet would be deployed. The area of ground and seafloor disturbance estimated for construction at the RWEC landfall location is 3.1 acres. See COP Section 3.3.3.2 for further details on the construction methods available under the PDE for use with HDD operations.

Whether or not a cofferdam is necessary for cable installation (via HDD operations), vessel anchoring could be required for cable installation at the landfall. If needed, anchoring would occur within a 1,640-foot-wide Project easement centered on the cable routes (see COP Section 3.3.9.2 for additional information on vessel anchoring).

As the RWEC is brought onshore, the intersection of the RWEC and onshore transmission cable would occur at up to two co-located transition joint bays (one for each cable of the incoming RWEC) constructed in the landfall work area. A conceptual schematic of the transition joint bays is provided in COP Figure 3.3.3-1. Transition joint bays comprise pits that are dug in the soil and lined with concrete. The purpose of a transition joint bay is to provide a clean, dry environment for the jointing of the RWEC and onshore transmission cable as well as to protect the joint once the jointing is completed. Each of the co-located transition joint bays would be up to 67 × 10 × 10 feet.

Within each transition joint bay, the incoming RWEC (offshore) cable would be spliced into three onshore cables. The sheaths from the RWEC and the onshore transmission cable would be terminated into the link box via the cable joints. The fiber-optic cables from the RWEC and onshore transmission cable would be joined inside the fiber-optic joint box. In total, there would be two transition joint bays, each with one link box and one fiber-optic cable joint box (Figure 2.1-8 [COP Figure 3.3.3-1]).

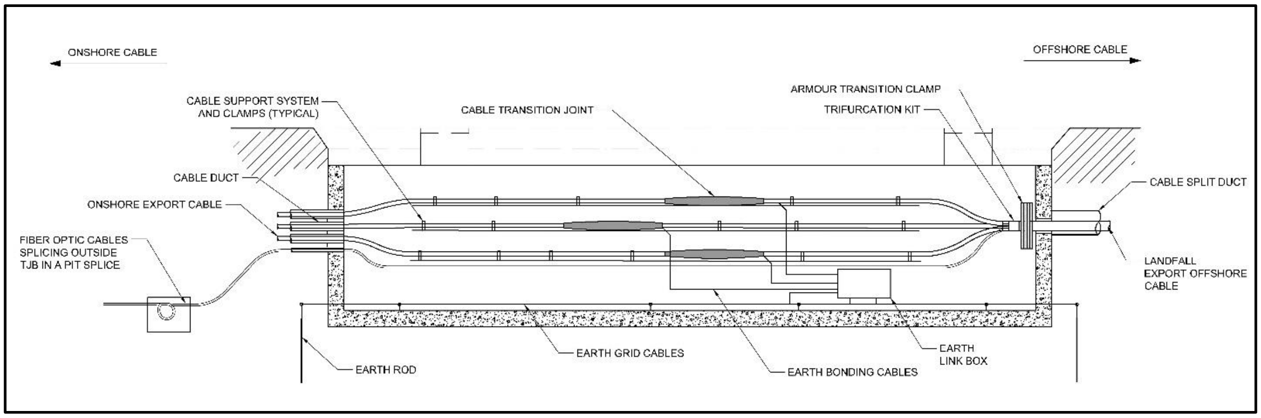



**Figure 2.1-8. Transition joint bay and link box schematic (VHB 2023).**

Access to the fiber-optic handhole and link box handhole near the transition joint bays during the operational phase would be via manhole covers. A precast splice vault could also be used as an alternative to transition joint bays. The precast splice vault would consist of dimensions similar to the transition joint bays; however, the splices would be housed in a precast enclosure on all sides, with manhole risers and covers for access from grade. The amount of ground disturbance would be similar between the two options.

### Onshore Transmission Cable

Regardless of the specific landfall site selected, the onshore transmission cable would travel from the landfall work area approximately 1 mile to the OnSS, trending northwest to the OnSS via Circuit Drive. Refer to Figure 2.1-2 (COP Figure 2.2.1-3) for an illustration of the landfall location and onshore cable route.

### Onshore Substation and Interconnection Facility

A new OnSS and ICF adjacent to the existing Davisville Substation would be constructed to support interconnection of the Project to the existing electrical grid. The OnSS would be equipped with two aboveground circuit terminals that are connected to the 275-kV substation equipment. The onshore transmission cable would terminate at these steel structures, transitioning them from underground to above ground and thereby completing the connection to the OnSS.

Circuit connections would include an interconnection ROW between the OnSS and the ICF and the TNEC ROW, thus bridging the ROW gap between the ICF and the existing Davisville Substation. The OnSS would connect to the ICF with up to two 115-kV underground transmission cables located within the interconnection ROW that are each up to 527 feet long. The TNEC ROW would require an up to 120-foot-wide cleared ROW centered on each circuit to be maintained free of woody vegetation that exceeds 20 feet in height.

#### *Onshore Substation*

The OnSS would have a nominal operating capacity between 704 and 880 MW. The maximum height of the OnSS equipment would be up to 45 feet, with shielding masts measuring up to 65 feet tall. The OnSS would be located on two adjacent parcels totaling 15.7 acres, both owned by the Rhode Island Commerce Corporation and include a compacted gravel driveway, stormwater management features, and associated landscaped or managed vegetation areas totaling up to 7.1 acres inclusive of the up to 4-acre operational footprint of the facility. Backup power for the OnSS would be provided via a 50-kW generator fed by portable propane tanks.

#### *Interconnection Facility*

The ICF would be located on a 6.1-acre parcel (owned by TNEC) adjacent to the OnSS and occupy an operational footprint of up to 1.6 acres. The maximum height of ICF equipment would be up to 45 feet, with shielding masts measuring up to 55 feet tall. Additionally, the ICF would include an asphalt paved driveway, stormwater management features, and associated landscaped or managed vegetated areas. The limit of work associated with development of the ICF totals up to 4.0 acres.

The Davisville Substation would serve as the point of interconnection for the Project. The ICF would connect to the Davisville Substation with two 115-kV overhead transmission circuits located within the TNEC ROW. The transmission lines from the ICF to the Davisville Substation would be up to 474 feet long and would be supported on single-circuit structures measuring up to 60 feet tall. A short segment of the existing 115-kV Davisville Transmission Tap line would also be rebuilt as part of ICF construction. The transmission line from the ICF to the Davisville Transmission Tap line would be up to 712 feet long. The two circuits would be supported on a combination of single- and double-circuit structures measuring up to 80 feet tall.

As part of the Project, the 115-kV side of the Davisville Substation would be expanded to a 115-kV six-breaker ring bus to enable a more reliable connection between the Project (two 115-kV underground duct bank connections), the existing Davisville Substation, and the ISO New England transmission system. The six-breaker ring bus would include an air-insulated system consisting of circuit breakers, disconnect switches, structural steel, instrument and station service transformers, and associated miscellaneous equipment (i.e., insulators, surge arresters, electrical fittings, and hardware). To support more timely cutovers, a new prefabricated control house would also be installed. Major equipment associated with the ICF is summarized in COP Table 3.3.1-3.

The ICF would contain small amounts of oils, fuels, and lubricants to support operations. Sulfur hexafluoride gas could be used for electrical insulation in some switchgear components, such as in the ICF. Appendix E, Table E4-1 (and COP Table 3.3.1-4) provides a summary of maximum potential quantities of oils, fuels, lubricants, and sulfur hexafluoride gas located in the ICF during operations.

### 2.1.2.3 Construction and Installation

Construction and installation of the RWF and RWEC are scheduled to take place over 2 years within applicable seasonal work windows. Construction could begin as early as the third quarter of 2023 with the installation of onshore components and initiation of seafloor preparation activities. Approximate construction durations for the different Project components are provided in Figure 2.1-9, with some expected to overlap.


**Figure 2.1-9. Revolution Wind Farm indicative construction schedule (VHB 2023).**

#### 2.1.2.3.1 Offshore Activities and Facilities

#### Vessels and Vehicles

Construction of the Project would require the support of offshore construction equipment, various vessels, and helicopters that are identified by port in Table 2.1-9 and Table 2.1-10. Equipment, vehicle, and vessel types, and quantity needed for offshore and onshore construction, are identified by Project components in Table 2.1-11 and Table 2.1-12. See COP Section 3.3.10-2 for a discussion of the number and type of vessels and vehicle trips by various onshore and offshore construction tasks.

**Table 2.1-9. Summary of Revolution Wind Farm Marine Vessel Type and Usage for Offshore Construction and Operations and Maintenance by Port**

| Project Phase | Project Component | Port Used | Vessels (counts) |
|---|---|---|---|
| Installation | WTGs | Port of Providence, Rhode Island, or<br>Port of New London, Connecticut, or<br>Port of Norfolk, Virginia, or<br>New Bedford Marine Commerce Terminal, Massachusetts | Jack-up installation vessel (1)<br>Jack-up feeder vessel (2)<br>SOV (1)<br>CTV (3)<br>Feeder barge (6)<br>Tow tug (6) |
| Installation | Foundations | Port of Providence, Rhode Island, or<br>Sparrow's Point, Maryland, or<br>Paulsboro Marine Terminal, New Jersey, or<br>from Europe | Jack-up installation vessel (1)<br>Foundation supply vessel (7)<br>Material barge (6)<br>Feeder barge (6)<br>Tow tug (6)<br>Anchor handling tug (4)<br>CTV (4)<br>Support vessel – inflatable (2)<br>Rock installation vessel (1)<br>Bunkering vessel (1) |
| Installation | OSS | Port of Providence, Rhode Island, or<br>Sparrow's Point, Maryland, or<br>Paulsboro Marine Terminal, NewJersey | Foundation installation vessel (1)<br>Heavy transportvessel (1)<br>CTV (3) |
| Installation | IAC | Port of Providence, Rhode Island | Cable laying vessel – array (1)<br>Array cable burial vessel (1)<br>Transport freighter (1)<br>CTV (1)<br>SOV (1)<br>Pre-lay grapnel run vessel (1) |

| Project Phase | Project Component | Port Used | Vessels (counts) |
|---|---|---|---|
| | | | Survey vessel (1)<br>Support tug (1) |
| Installation | OSS-LinkCable | Port of Providence, Rhode Island | CTV (1)<br>SOV (1)<br>Pre-lay grapnel run vessel (1)<br>Survey vessel (1)<br>Cable laying vessel – export (1)<br>Support tug (1)<br>Anchor handling tug (1) |
| O&M | O&M | Port of Montauk, New York, or<br>Port Jefferson, New York, or<br>Port of Brooklyn, New York, or<br>Port of Davisville at Quonset Point, Rhode Island, or Cashman Shipyard, Massachusetts | SOV (2)<br>SOV daughter craft (2)<br>CTV (5)<br>WTG installation vessel (1)<br>Cable laying vessel – array (1) |

Source: Tech Environmental (2023).

**Table 2.1-10. Summary of Revolution Wind Farm Helicopter Type and Usage for Offshore Construction and Operations and Maintenance by Port**

| Project Phase | Project Component | Port Used | Helicopter Types (counts) |
|---|---|---|---|
| Installation | Foundations | Port of Davisville at Quonset Point, Rhode Island | Twin medium (2) |
| O&M | O&M | Port of Davisville at Quonset Point, Rhode Island or Cashman Shipyard, Massachusetts | Twin medium (1) |

Source: Tech Environmental (2021).

**Table 2.1-11. Summary of Revolution Wind Farm Marine Vessel Type and Usage for Offshore Construction and Operations and Maintenance by Project Component**

| Vessel Type | No. of Vessels | Foundations | OSS | RWEC | IAC | OSS-Link Cable | WTGs | No. of Return Trips |
|---|---|---|---|---|---|---|---|---|
| Anchor handling tug | 2 | X | | X | | X | | 50 |
| Boulder clearance vessel | 2 | X | X | X | X | X | | 13 |
| Bubble curtain vessel | 1 | X | | | | | | 20 |
| Cable burial vessel | 1 | | | | X | X | | 6 |
| Cable burial vessel – remedial | 1 | | | X | | | | 1 |
| Cable lay & burial vessel (export) | 1 | | | X | | | | 5 |
| Cable lay vessel (barge) | 1 | | | X | | | | 3 |
| Cable laying vessel | 1 | | | | X | X | | 6 |
| Crew transfer vessel (CTV) | 6 | X | X | X | X | X | X | 870 |
| Dp2 construction vessel | 2 | | | X | X | X | | 7 |
| Fall pipe vessel | 1 | X | | | | | | 6 |
| Fuel bunkering vessel | 1 | | | | | | X | 8 |
| Guard vessel/scout vessel | 6 | X | X | X | X | X | | 8 |
| Heavy lift installation vessel | 1 | X | | | | | | 1 |
| Heavy lift installation vessel (secondary steel) | 1 | X | | | | | | 1 |
| Heavy transport vessel | 5 | X | X | | | | | 26 |
| Helicopter | 1-2 | X | X | | | | X | 76 |
| Jack-up installation vessel | 1 | | | | | | X | 20 |
| Life boat – jack-up accommodation vessel | 1 | X | X | X | X | X | X | 1 |

| Vessel Type | No. of Vessels | Foundations | OSS | RWEC | IAC | OSS-Link Cable | WTGs | No. of Return Trips |
|---|---|---|---|---|---|---|---|---|
| Platform supply vessel | 3 | X | | | | | | 85 |
| Pre-lay grapnel run vessel | 2 | | | X | X | X | | 6 |
| Protected species observer noise monitoring vessel | 4 | X | | | | | | 80 |
| Safety vessel | 2 | X | X | X | X | X | X | 100 |
| SOV | 2 | X | X | X | X | X | X | 7 |
| Supply barge | 1 | X | | X | X | X | | 4 |
| Supply vessel | 1 | X | X | X | X | X | X | 30 |
| Survey vessel | 1 | | | X | X | X | | 11 |
| Tow tug | 5 | X | | | | | X | 29 |

Source: VHB (2023).

**Table 2.1-12. Summary of Revolution Wind Farm Vehicle and Equipment Type and Quantity for Onshore Construction and Operations and Maintenance by Project Component**

| Equipment Type | Number of Units |
|---|---|
| **OnSS** | |
| Large bulldozer | 2 |
| Small bulldozer | 1 |
| Backhoe | 2 |
| Front end loader | 3 |
| Small crane | 1 |
| Medium excavator | 3 |
| Compactors | 5 |
| Concrete saws | 4 |
| Pumps | 6 |
| AC units | 4 |
| Compressors | 2 |
| Semi-truck | 40 |
| Refuse truck | 2 |
| Dump truck | 50 |
| Concrete truck | 200 |
| Bucket truck | 2 |
| Light commercial truck | 51 |
| Passenger truck | 25 |
| **Landfall – HDD Installation** | |
| Generator/powerpack (1,305 kw) | 1 |
| Crane (205 kw) | 1 |
| Dump truck | 1 |
| Excavator (132 kw) | 1 |
| **Onshore Transmission Cable** | |
| All-terrain forklift | 3 |
| Large excavator | 2 |
| Concrete vibrator | 4 |
| Generator | 5 |
| Welder | 1 |
| **WTG Assembly** | |

| Equipment Type | Number of Units |
|---|---|
| Crane (641 kw) | 3 |
| Crane (241 kw) | 1 |
| Self-propelled modular trailer | 2 |
| Forklift (130 kw) | 2 |
| Forklift (60 kw) | 1 |
| Cherry picker | 2 |
| Reach stacker | 2 |
| Generator | 2 |
| Blade movers | 2 |
| Site vehicles | 3 |

For each vessel type, the route plan for the vessel operation area would be developed to meet industry guidelines and best practices in accordance with International Chamber of Shipping guidance. Revolution Wind would require operational automatic identification systems (AIS) onboard all vessels associated with the construction of the Project. AIS would be used to monitor the number of vessels and traffic patterns for analysis and to ensure compliance with vessel speed requirements as appropriate in accordance with NOAA requirements. All vessels would operate in accordance with applicable rules and regulations for maritime operation within state and federal waters. Similarly, all aviation operations, including flying routes and altitude, would be coordinated with relevant stakeholders (e.g., the FAA). Project vessels would employ a variety of anchoring systems, which include a range of sizes, weights, mooring systems, and penetration depths. Although dynamic positioning support vessels would be used for cable laying, vessels could anchor within a 1,640-foot-wide Project easement centered on cable routes. Anchors associated with cable laying vessels would have a maximum penetration depth of 15 feet. Jack-up vessels for foundation and WTG installation would include up to four spudcans with a maximum penetration depth of 52 feet. Jack up would occur within the 656-foot radius cleared around foundation locations during seafloor preparation activities (see Appendix D for additional design details).

Some large Project components, as well as secondary equipment, supplies, and crew, would be transported to and from the RWF from existing ports. Helicopters could be used for crew changes during installation of the WTGs.

Construction and installation lighting would be limited to the minimum necessary to ensure safety and compliance with applicable FAA and U.S. Coast Guard (USCG) requirements while using lighting technology (e.g., low-intensity strobe lights) that minimizes impacts on sensitive receptors. USCG-approved navigation lighting is required for all vessels during construction and decommissioning of the Project. All vessels operating between dusk and dawn are required to turn on navigation lights. Cable laying may occur 24 hours a day during certain periods. Additionally, adequate lighting would be used on vessels to ensure worker safety throughout construction, including for foundation, WTG, OSS, and cable installation. As is required under International Maritime Organization (IMO) requirements for vessels over 500 gross tonnage, the deck area of vessels would be illuminated for the safety of operations and personnel during installation and as needed during transit to facilitate ongoing work on deck. Vessel lighting would be sufficient to meet IMO convention requirements, but the use of any unnecessary or excess lighting would be avoided.

### Transportation and Installation of Foundations

Revolution Wind would transport large Project components, including the WTGs, the foundations, OSSs, and export cables, to an existing port for pre-assembly or storage prior to being delivered to the RWF, or they could be delivered directly from off-site fabrication and manufacturing facilities.

Before the foundations are installed, geophysical and geotechnical (G&G) surveys and munitions, explosives of concern, and unexploded ordnance (UXO) surveys would be conducted in addition to seafloor debris clearance. At the time of preparation of the Final EIS, Revolution Wind conducted final G&G surveys and UXO surveys of the RWF and RWEC. No UXOs were identified in the RWF. Sixteen UXOs were identified along the RWEC; however, Revolution Wind determined that all 16 UXOs would be avoided without the need for detonation (Orsted 2023). Figure 2.1-10 shows locations of the 16 UXOs as identified and numbered by Revolution Wind. Monopile foundations would be driven to target embedment depths (98 to 168 feet below the seafloor) using impact pile driving and/or vibratory pile driving.

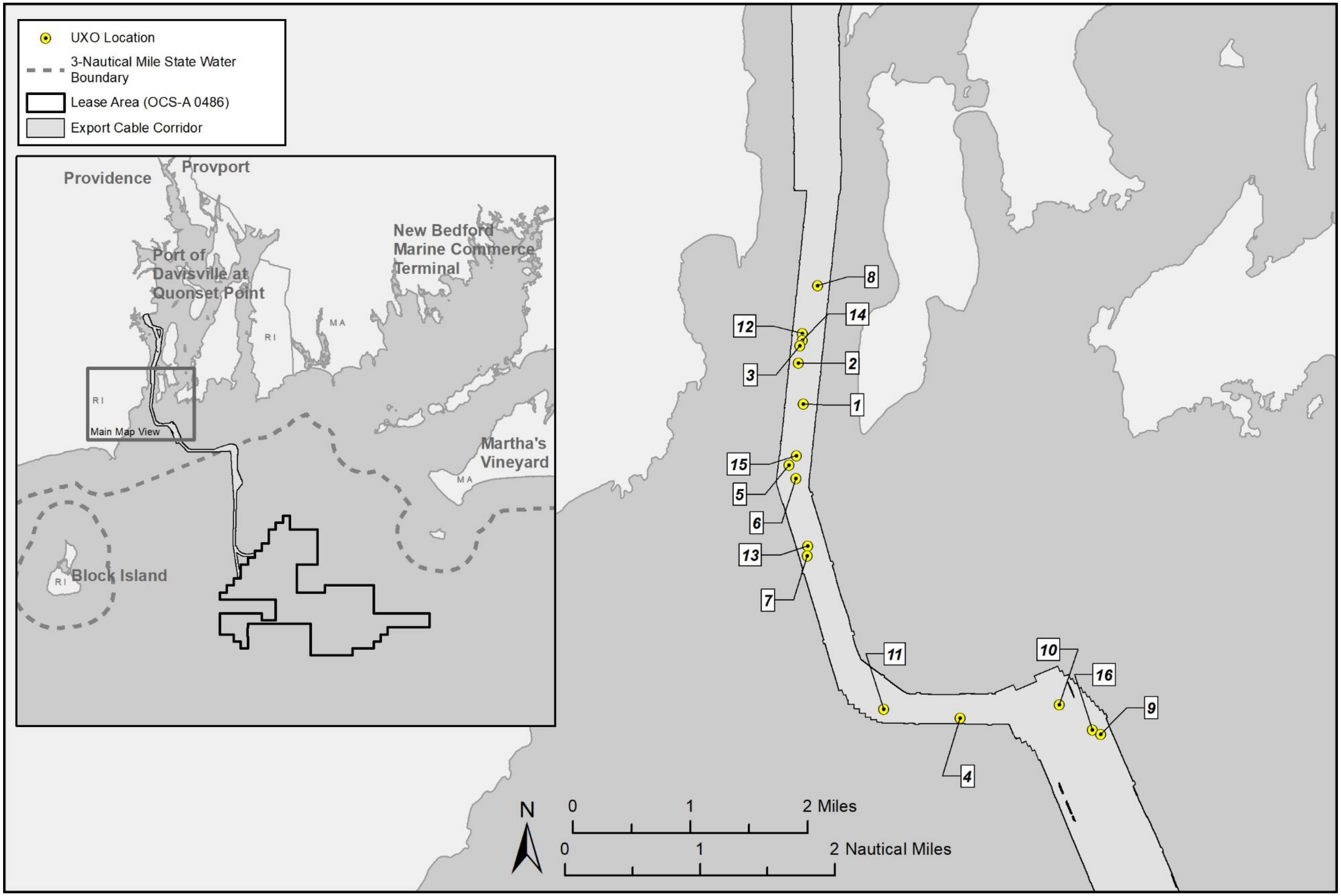



**Figure 2.1-10. Unexploded ordinance identified in the Revolution Wind Export Cable corridor.**

Typical installation sequence for monopile foundations would include foundation delivery, foundation setup, pile driving, and transition piece installation or secondary structure installation (COP Table 3.3.4-3). Installation of a single monopile foundation is estimated to require 1 to 4 hours (6 to 12 hours maximum) of pile driving with a maximum hydraulic hammer energy at 4,000 kilojoules (kJ). Up to three monopile foundations would be installed in a 24-hour period. The WTG monopile installation is expected to be completed in a single 5-month period (see Appendix D for additional design details).

Scour protection would be installed prior to installation of the foundations. If rock placement scour protection is used, a rock armor layer resting on a filter layer would be installed. The filter layer can either be installed before the foundation is installed (pre-installed) or afterward (post-installed). Alternatively, by using heavier rock material with a wider gradation, it is possible to avoid using a filter layer and pre- or post-install a single layer of scour protection. The amount of scour protection required would be based on local site conditions. The final choice and design of a scour protection solution for the Project would be made after detailed design of the foundation structure, taking into account a range of aspects, including geotechnical data, metocean data, water depth, foundation type, maintenance strategy, agency coordination, stakeholder concerns, and cost. However, the maximum anticipated area of scour protection per foundation is accounted for in permanent disturbance estimates provided in COP Table 3.3.4-1.

#### Wind Turbine Generators

WTG components would be transported to the laydown construction port to prepare components for loading and installation. Activities include pre-assembling tower sections as well as preparing the nacelles, blades, and equipment necessary for WTG installation. The WTGs would then be transported to the Lease Area by either an installation vessel or feeder vessel. The installation vessel would install the tower as a single lift, if preassembled, or in multiple lifts for separate sections. The tower would be bolted to the foundation. The nacelle would then be installed on top of the tower and bolted in place. The blades would be installed as a pre-assembled full rotor or in single lifts. Once the WTG installation is complete, the installation vessel would move on to the next WTG installation location. Commissioning of the turbine would be executed by commissioning technicians working from separate commissioning vessels. Installation of a WTG is estimated to take up to 36 hours, allowing for vessel positioning and completion of all lifts; however, to allow time for vessel maneuvering between WTG locations, as well as weather down time, the total duration of the installation campaign for the WTGs is expected to be approximately 5 months. Short-term construction-related seafloor disturbance for WTGs and OSSs would include boulder clearance. Vessel anchoring would also result in short-term seafloor disturbance and would occur within a 656-foot radius around WTG and OSS foundation locations. Additional WTG details are described in Section 2.1.2.1.1 and Appendix D.

#### Offshore Substations

Installation and commissioning of OSSs would occur within an 8-month window, including cable pull-in, which must be completed prior to OSS commissioning. Construction sequence for an OSS would include monopile foundation delivery and installation followed by topside installation and commissioning. The foundation delivery and installation process is discussed in Section 2.1.2.1.2. The topside platform, including the transformer module and switchgear, would be assembled as a single unit prior to being transported to the Lease Area via a heavy transport vessel or barge. After installation of the OSS foundation, the lift would commence using an installation vessel, and the topside platform would be lowered onto the foundation. The topside platform would then be secured into position by use of a grouted, bolted, or welded connection. Once the OSS topside is secured to the foundation, the RWEC, OSS-link cable, and IAC would be connected. Communication systems would also be set up with the shore as well as lighting, the firefighting system, etc. Once all systems are enabled, the electrical system would be commissioned using back-feed (i.e., electricity would be fed to the OSS from the onshore grid via the export cables).

### Cable Systems

The IACs and the RWEC would be laid and buried using industry standard submarine cable lay and burial methods. The installation process for each cable system is described below. The methodologies for installation of the RWEC offshore and at the landfall work area are presented separately below.

#### *Inter-Array Cables*

The IACs would be installed within a 131-foot-wide disturbance corridor. Prior to main cable installation activities, cable lay and burial trials could occur within the disturbance corridor. The target burial depth for the IACs would be determined based on an assessment of seafloor conditions, seafloor mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific cable burial risk assessment. Prior to installation, seafloor preparation would include boulder clearance. The COP assumes that a boulder plow could be used in all areas of higher boulder concentrations where boulders are up to 1 m in diameter. For the IACs, the COP anticipates the use of a boulder grab for seafloor preparation, with contingency for a work-class, remotely operated vehicle with a boulder-pushing skid. A cable laying vessel would be preloaded with the IACs. Prior to the first end-pull, the cable would be fitted with a cable protection system, and the cable would be pulled into the WTG or OSS. The vessel would then move toward the next WTG (or OSS).

Cable laying and burial could occur simultaneously using a lay and bury tool, or the cable could be laid on the seafloor and then trenched post-lay. Alternatively, a trench could be precut prior to cable installation. The pull and lay operation, inclusive of fitting the cable with a cable protection system, would then be repeated for the remaining IAC lengths, connecting the WTGs and OSSs together. Burial of the IACs would target a depth of 4 to 6 feet below seafloor. During cable installation, scenarios could exist where installation to the target burial depth is not achievable using the primary installation methodologies due to mechanical problems with the trencher, adverse weather conditions, and/or unforeseen soil conditions. As a result, controlled flow excavation could be used and would involve using a stream of water to fluidize the sands around the cable, which allows the cable to settle into the trench under its own weight. No in-field joints would be used for IAC construction; however, they could be used in the case of cable repair. COP Section 3.3.7 provides design and construction details for the IACs. Refer to Section 2.1.2.3.7 for a discussion of IAC protection. The final installation methods and target burial depths would be determined by the final engineering design process, informed by detailed geotechnical data, discussion with the chosen installation contractor, and coordination with regulatory agencies and stakeholders. Detailed information on the final technique(s) selected would be submitted to and approved by BOEM through the facility design report/facility installation report review processes prior to construction.

Each IAC would typically take 1 day to lay and bury. Installation of the entire IAC network would be completed within a single approximately 5-month period (see Appendix D for additional design details).

### Revolution Wind Export Cable Offshore Segments

Construction staging and installation for the offshore RWEC would generally be as described for the IACs. One exception would include methods used for removal or relocation of boulders along the RWEC. For the RWEC, the COP anticipates the use of a boulder grab for seafloor preparation with two approximately 10-km (6.2-mile) sections that would use a boulder plow. Dynamic positioning support vessels would be used for cable burial activities. Anchoring would occur within the Project easement, if used. Refer to Section 2.1.2.2 and Table 2.1-3 for details on the RWEC component construction and operational methods and footprints and Project easements.

Burial of the RWEC would target a depth of 4 to 6 feet below seafloor and would be determined based on an assessment of seafloor conditions, seafloor mobility, and the risk of interaction with external hazards such as fishing gear and vessel anchors, as described in Section 2.1.2.2.2. Cable protection methods, as described above, would be implemented where burial cannot occur. Installation of the RWEC would consist of a sequence of events, including pre-lay cable surveys, seafloor preparation, cable installation, joint construction, cable installation surveys, cable protection, and connection to the OSSs (summarized in COP Table 3.3.3-3). Installation of the RWEC would require offshore submarine joints (up to two per cable: one on the RWEC-OCS portion and one on the RWEC-RI portion). The joints would require a seafloor preparation corridor that is 820 × 673 feet. As a result, the anticipated disturbance corridor at the submarine joints of 673 feet wide would extend beyond the 131-foot-wide (40-m-wide) general disturbance corridor of the RWEC. The joints would be protected by housing approximately four times the cross-sectional diameter of the cable using similar methods as those described for cable protection. In case of the need for repair, additional joints may be required during construction. Construction of the RWEC would be completed within approximately 8 months (see Appendix D for additional design details).

### Landfall Construction

As discussed in Section 2.1.2.2.3, installation of the RWEC at landfall would be conducted using an HDD methodology.

A drilling rig would be required for landfall construction and would be located within the landfall work area (COP Section 3.3.3.2). The HDD process would use drilling heads and reaming tools of various sizes controlled from the rig to create a passage that is wide enough to accommodate the cable duct. Drilling fluid, comprising bentonite, drilling additives, and water, would be pumped to the drilling head to stabilize the hole, prevent collapse, and return the cuttings to the rig site where the cuttings would be separated from the drilling fluids. A temporary sheet pile anchor wall could be installed to provide stability of the HDD rig while conducting drilling activities. The temporary anchor wall is driven to a depth of approximately 20 feet to secure the anchor. In addition to the anchor wall, the workspace could also require the installation of other temporary sheet piles to aid in the anchoring of the rig and/or to provide soil stabilization of the excavated area (VHB 2023).

Once the reaming has taken place, the duct (assembled off-site) would be floated to the site by tugs, connected to the drill string, and pulled into the prepared hole toward the drilling rig located at the landfall work area. The drilling rig would be repositioned, and the process would be repeated for drilling and installing the second duct. A pull winch attached to either a piled anchor or a gravity anchor (e.g., a large bulldozer) would then be used to pull the cable through the conduit.

Each of the two HDD cable ducts would have a diameter of 3 feet, and the maximum length of the cable ducts would be 0.6 mile. A barge or jack-up vessel could be used to assist the drilling process; handle the duct for pull-in; and help transport the drilling fluids and mud back to an appropriate site for treatment, disposal, and/or reuse. The jack-up vessel could also use a casing installed from the HDD exit pit to the jack-up vessel. Revolution Wind would develop an HDD contingency plan prior to construction to minimize potential risks associated with the inadvertent release of drilling fluids (see Appendix D for additional design details).

#### Offshore Substation-Link Cable

Installation of the OSS-link cable would require similar methods described above for construction of the RWEC offshore segments. The target burial depth for the OSS-link cable would typically be 4 to 6 feet below seafloor and would be determined based on an assessment of seafloor conditions, seafloor mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific cable burial risk assessment (see COP Sections 3.5.2 and 4.1.1). As discussed in Section 2.1.2.1.6, Revolution Wind assumes that up to 10% of the OSS-link cable route would require cable protection in areas where burial cannot occur, where sufficient burial depth cannot be achieved due to seafloor conditions, or to avoid risk of interaction with external hazards. As stated in the COP, Revolution Wind assumes that up to 60% of the total OSS-link cable route would require boulder clearance prior to installation of the cables. The location of the OSS-link cable and associated cable protection would be provided to NOAA’s Office of Coast Survey after installation for inclusion on NOAA’s nautical charts. The duration for installation of the OSS-link cable is included in the approximate 8-month window for OSS installation and commissioning.

### 2.1.2.3.2 Onshore Activities and Facilities

#### Vehicles

Construction of the Project would require the support of onshore construction equipment and vehicles provided in Table 2.1-13. See COP Section 3.3.10.2 for a discussion and listing of the number of vehicle trips by various construction tasks.

**Table 2.1-13. Summary of Onshore Equipment Emission Sources**

| Project Phase | Project Component | Equipment Types (counts) | |
|---|---|---|---|
| Pre-installation | WTGs | Crane – like LH 11350 (1)<br>Crane (1)<br>Crane (1)<br>Crane (1)<br>Self-propelled modular transporter on-site (1)<br>Self-propelled modular transporter on-site (1)<br>Forklift (2) | Forklift (1)<br>Cherry picker (2)<br>Reach stacker (2)<br>Generator (2)<br>Blade mover (2)<br>Site vehicle (3) |

Source: Tech Environmental (2023)

### Onshore Transmission Cable

Construction of the onshore transmission cable would involve site preparation, duct bank installation, cable installation, cable jointing, final testing, and final restoration (described in greater detail in COP Table 3.3.2-2). Installation would generally require excavation of an approximate 6-foot-wide trench within a 25- to 30-foot-wide temporary disturbance corridor; however, the disturbance area at the splice vaults would be 30 feet wide × 70 feet long. The approximately 1-mile-long onshore transmission cable ROW would be maintained free of vegetation that exceeds 15 feet in height.

COP Section 3.3.2 provides design and construction details for the onshore transmission cable. Refer to Section 2.1.2.2.3 for a discussion of onshore segments of the Proposed Action.

As stated in Section 2.1.2.2.3, the onshore transmission cable would be installed within a duct bank, buried to a target depth of 3 to 6 feet to the top of the duct bank, and be consistent with local utility standards. The conduits would be encased in a concrete duct bank and installed in an open trench for most of the Project. Once excavated, the open trench would be supported by a shoring system to allow for installation of the conduits inside the trench. The conduits would be held in place using conduit spacers to allow the concrete to be poured and set between each duct without allowing the formation of any air pockets or voids. This would be repeated until all conduits and concrete have been installed to the specified jointing locations (manholes, termination structures, etc.). At the completion of the installation, all conduits would be proofed and mandreled[9] to verify continuity of the raceway for cable installation. The cable would be pulled through the raceway and cut, leaving a sufficient amount of slack to perform the jointing operations. After pulling, the integrity of each cable jacket would be tested, and the cables would be sealed to prevent moisture ingress until the cables are spliced/jointed. Splicing would occur after all the cables for a specific section have been pulled into the jointing bay or termination section. Two splice vaults per circuit (four total) would be required along the onshore transmission cable route. Each splice vault measures 30 × 8 × 8 feet (see Table 2.1-3). The maximum trench depth for splice vault installation is 16 feet. The entire temporary disturbance corridor would be restored to preconstruction conditions following installation of the onshore transmission cable. Construction of the onshore transmission cable from the transition joint bays at landfall to the OnSS would result in up to 3.1 acres of temporary ground disturbance, with no permanent disturbance anticipated (see Table 2.1-3). Construction of the onshore transmission cable would take approximately 12 months.

### Onshore Substation and Interconnection Facility

The maximum area of land disturbance associated with the construction of the OnSS and ICF is depicted in COP Figure 3.3.1-1. Table 2.1-3 and Section 2.1.2.2.3 provide construction and operation disturbance acreage for the OnSS and ICF. Contingency staging and laydown areas also include previously disturbed areas owned by the Quonset Development Corporation; staging and laydown in these areas would not require grading but could require graveling, erosion control, fencing, etc. Temporary disturbances would be associated with temporary work areas and staging and laydown areas. OnSS and ICF equipment and steel support structures would be supported by reinforced concrete foundations on drilled shafts suitable

[9] Mandrels are used to test the integrity of the conduit runs and remove small amounts of debris. Refer to Table 3.3.2-2 of the COP.

for existing soil conditions and coastal storm events and flood events. The maximum depth of disturbance associated with construction of the OnSS and ICF is 60 feet.

Preconstruction activities for the OnSS and ICF would involve surveying (including surveys for munitions, explosives of concern, and unexploded ordnance), staking, and protection of sensitive areas. The work site would also be cleared of vegetation, and temporary erosion controls would be installed and maintained until the site is restored and stabilized. Grading would be required to level the ground in preparation of construction, and disturbed areas outside the OnSS and ICF footprint would be restored. Installation of foundations would require excavation to support construction of stormwater management components and installation of other equipment. Blasting is not expected; however, if required, blasting plans and approvals would be obtained before blasting. All major equipment would be installed upon completion of concrete foundations and cable duct banks. The equipment would be rigged and placed on the concrete foundations, alignment checking would be performed, and anchoring and temporary protection from weather would be applied. The OnSS control center would be tested, and once the upgrades at the Davisville Substation are completed and put into service, the commissioning of the OnSS and ICF would begin.

The OnSS and ICF would include other improvements outside the operational footprint, including driveways and maintained landscaping (up to 7.1 acres for the OnSS and 4.0 acres for the ICF). Once construction is complete, temporary disturbance areas beyond the operational footprint of both the OnSS and ICF would be restored to preconstruction conditions. Construction of the OnSS and ICF would take up to 18 months. Construction of the OnSS and ICF would generate approximately 3,000 cubic yards (cy) of solid waste, which would be disposed of in a landfill and/or recycling center.

#### 2.1.2.4 Operations and Maintenance

The proposed Project is anticipated to have an operating period of 35 years.[10] Revolution Wind would use a variety of vessels to support O&M, including SOVs with deployable work boats (daughter craft[11]), crew transfer vessels, jack-up vessels, and cable laying vessels. To support O&M, the Project would be controlled 24 hours a day/7 days a week via a remote surveillance system (i.e., SCADA). As stated in Section 2.1.2.1.8, Revolution Wind is evaluating five ports (Port of Brooklyn, Port of Davisville at Quonset Point, Port of Galilee, Port Jefferson, and Port of Montauk) to support O&M for the Project.

##### 2.1.2.4.1 Offshore Activities and Facilities

During O&M, Revolution Wind would employ a proprietary state-of-the-art asset management system to inspect offshore transmission assets, including the OSS (electrical components), RWEC, IACs, and OSS-link cable, which would provide a data-driven assessment of the asset condition and would allow for prediction and assessment of whether inspections and/or maintenance activities should be accelerated or

[10] For analysis purposes, BOEM assumes in this EIS that the Project would have an operating period of up to 35 years. Revolution Wind's lease with BOEM (Lease OCS-A 0486) has an operations term of 25 years that commences on the date of COP approval (see 30 CFR 585.235(a)(3)). Revolution Wind would need to request and be granted an extension of its operations term from BOEM, 30 CFR 585.425-585.429, in order to operate the Project for 35 years. Although Revolution Wind has not made such a request, this EIS uses the longer period in order to avoid possibly underestimating any potential effects.

[11] Daughter craft are crafts/vessels (e.g., deployable work boats) that are launched and operated from a mother ship and recovered to it when not operational.

postponed. The RWEC, IACs, and OSS-link cable typically have no maintenance requirements unless a fault or failure occurs.

Cable protection placed during installation could require replacement or remediation over the lifetime of the Project. These maintenance activities are considered non-routine. Additional non-routine maintenance activities would include repair-replacement of portions of the RWEC, IAC, and OSS-link cable. If cable repair or replacement or remedial cable protection is required, Revolution Wind would obtain necessary approvals. These activities would be limited to the disturbance corridors previously defined for construction, as stated in Tables 2.1-1 and 2.1-3. Further details on transmission cable maintenance are outlined in Section 3.5.2 of the COP. Routine transmission cable maintenance and survey activities are applicable to all cable types.

WTGs and the OSS would be maintained and equipped with safety devices and FAA- and USCG-recommended marking and lighting. For planned maintenance activities, personnel access would be provided using crew transfer vessels during low wind periods. Revolution Wind would also conduct annual inspections of blades (internal and external visual inspection), routine service and safety surveys, and oil and high voltage maintenance. Certain O&M activities could require the use of jack-up or crane barges if repairs to equipment such as power transformers, reactors, or switchgear are necessary.

Lighting during O&M for WTGs and OSSs is detailed in Figure 2.1-4 and Figure 2.1-6, respectively. Lighting that would be visible for viewers on the shore (refer to Section 3.19 Visual Resources) would be primarily limited to lighting required under FAA and USCG regulation and would include lighting on OSS signboards and maintenance lighting. Signboard lighting is limited to three low-intensity white lights illuminating each of the four sides of the OSS (see Figure 2.1-6). Maintenance lighting would be in place on WTG and OSS platforms and would be used in the rare instance that maintenance during the night is required and for additional worker safety. These working lights would be diffuse and pointed down toward the platform and would similarly cast little light in other directions.

A summary of offshore transmission facility (e.g., RWEC, IACs, OSS-link cable, and OSS electrical components) routine maintenance and survey activities, including all cable types, and the indicative frequency at which they could occur is provided in COP Table 3.5.2-1.

Each WTG and OSS would contain small amounts of oils, fuels, and lubricants to support operations. Sulfur hexafluoride gas could be used for electrical insulation in some switchgear components, such as on the WTG. Appendix E, Table E4-1 provides a summary of maximum potential quantities of hazardous materials consisting of oils, fuels, lubricants, and sulfur hexafluoride gas per WTG and OSS during operations.

### Vessels and Vehicles

O&M of the offshore Project components would require the use of a variety of vessels as well as helicopters (see COP Table 3.5.7-2). Vessels to support O&M would include SOVs with deployable work boats (daughter craft), crew transfer vessels, jack-up vessels, and cable laying vessels. See COP Section 3.3.10.2 for a list of the number of vessel and vehicle trips by various operations-related tasks.

#### 2.1.2.4.2 Onshore Activities and Facilities

Revolution Wind is evaluating five ports to support O&M for the Project. See Section 2.1.2.1.8 and Appendix D for a discussion of the construction plans at those ports.

Revolution Wind would monitor the OnSS remotely on a continuous basis. The ICF would be managed and operated by TNEC. The equipment in the OnSS would also be configured with systems (i.e., SCADA) that would alarm upon detecting equipment problems, unintended shutdowns, or other issues. In addition, the OnSS would be inspected periodically, in accordance with manufacturer recommendations. Revolution Wind would develop an established and documented program for the maintenance of all equipment critical to reliable operation.

Preventive maintenance would be performed on the OnSS, ICF, and line equipment; planned outages would be conducted in accordance with the North American Electric Reliability Corporation/Northeast Power Coordinating Council, Inc. Standard-TOP-003-1; and protective system maintenance would be performed in accordance with the Northeast Power Coordinating Council, Inc. PRC 005-2 standard. ICF equipment would be maintained in accordance with Rhode Island Energy standards. Maintenance would be completed by qualified personnel in accordance with applicable industry standards and good utility practice to provide maximum operating performance and reliability.

Vegetation management would also occur on the OnSS and ICF properties. The landfall work area and onshore transmission cable route would not require vegetative management and would be fully restored once construction is complete. The OnSS would have a 30-foot-wide perimeter around the outside of the OnSS facility fence line that would be maintained, and the ICF would have a 10-foot-wide perimeter around the outside of the ICF fence line that would be maintained. Similarly, the transmission cables connecting the OnSS and the ICF would have a 20-foot ROW centered on the cables, and the transmission circuits connecting the ICF to the Davisville Substation and tap line would have a 120-foot-wide ROW centered on the circuits.

##### Vehicles

O&M of the onshore Project components would require the use of typical fleet and/or employee vehicles to access the OSS, ICF, ROWs, O&M facility, and port areas where crew transfers would take place. See COP Section 3.3.10.2 for a list of the number of vehicle trips by various construction tasks.

### 2.1.2.5 Decommissioning

Pursuant to 30 CFR 585, Revolution Wind would be required to remove or decommission all offshore and onshore installations and clear the seafloor of all obstructions created by the Project. If the COP is approved or approved with modifications, Revolution Wind would have to submit a bond that would be held by the U.S. government to cover the cost of decommissioning the entire facility. In accordance with applicable regulations and a BOEM-approved decommissioning plan, Revolution Wind would have up to 2 years to decommission the Project following termination of the lease (up to 35 years postconstruction). Decommissioning would return the area to preconstruction conditions, as feasible, barring the replacement of naturally occurring seafloor obstructions such as boulders. All facilities would be removed to a depth of 15 feet below the mudline, unless otherwise authorized by the Bureau of Safety and Environmental Enforcement (30 CFR 285.910(a)).

Revolution Wind would submit a decommissioning application prior to any decommissioning activities and BOEM would conduct a determination of NEPA adequacy at that time, which could result in the preparation of additional NEPA analyses. Revolution Wind would develop a decommissioning plan for the facility that complies with all relevant permitting requirements. This plan would account for changing circumstances during the operational phase of the Project and would reflect new discoveries, particularly in the areas of marine environment, technological change, and any relevant amended legislation.

Future decommissioning may not occur for all Project components; however, for the purposes of this EIS, all analyses assume that decommissioning would occur as described in this section. WTG components and the OSSs would be disconnected and removed using a jack-up lift vessel or a derrick barge. Cables would be removed in accordance with BOEM regulations (30 CFR 585, Subpart I). A material barge would transport components to a recycling yard. The foundations would be cut by an internal abrasive water jet cutting tool at 15 feet below the seafloor and returned to shore for recycling. Revolution Wind would clear the area after all components have been decommissioned to ensure that no unauthorized debris remains on the seafloor. Onshore decommissioning requirements would be subject to state/local authorizations and permits.

#### 2.1.2.6 Environmental Protection Measures and Additional Authorizations

Revolution Wind has committed to environmental protection measures (EPMs) as part of its Project to avoid or minimize impacts to physical, biological, socioeconomic, and cultural resources. These measures are listed in the COP and described in Table F-1 in Appendix F and are analyzed as part of the Proposed Action in the EIS. During the development of the EIS, BOEM considered potential additional mitigation measures that could further avoid, minimize, or mitigate impacts on the physical, biological, socioeconomic, and cultural resources assessed in this EIS. Table F-2 and Table F-3 in Appendix F describe these potential additional mitigation measures, and the subsequent Chapter 3 sections analyze them separately by resource. As noted in Section 1.3, Revolution Wind would also obtain all other necessary state and federal permits and authorizations under applicable statutes prior to Project construction. These other permits and authorizations could include additional measures.

#### 2.1.2.7 Survey and Monitoring Activities

As part of the Proposed Action, Revolution Wind has committed to conducting preconstruction, during construction, and postconstruction surveys and monitoring. Revolution Wind is conducting the surveys and monitoring under existing permits, where appropriate, prior to approval of the COP. These survey and monitoring efforts are included in Table 2.1-14 and in Tables F-1 and F-2 in Appendix F and could be required by BOEM in the ROD.

**Table 2.1-14. Revolution Wind Survey Monitoring Activities**

| Survey Type | Location | Status/Time Frame | Duration | General Notes |
|---|---|---|---|---|
| Trawl survey (asymmetrical before-and-after-control-impact [BACI] survey) | RWF and nearby reference areas | Preconstruction: To begin in winter 2021, during construction, and postconstruction | 2 years of preconstruction sampling, to continue during construction, and a minimum of 2 years of postconstruction monitoring | Using a Northeast Area Monitoring and Assessment Program survey trawl net towed on the bottom behind vessel and carried out on a seasonal basis, with four surveys planned a year |
| RWF ventless trap survey - lobsters and crabs (asymmetrical BACI survey, gradient survey) | RWF and nearby reference areas | Preconstruction: To begin May or June of 2022, during construction, and postconstruction | 2 years of preconstruction sampling, to continue during construction, and a minimum of 2 years of postconstruction monitoring | BACI survey: Using weak-link buoy lines (< 1,700-pound breaking strength) that are recommended by NMFS with sinking groundline between pots<br>Postconstruction gradient survey: Using only ventless traps for monitoring |
| Acoustic telemetry - highly migratory species | RWF and adjacent Orsted lease sites | Preconstruction: Started in July 2020, during construction, and postconstruction | July 2020 through 2026 | Researchers will use VR2AR acoustic release receivers; no vertical lines in the water for the acoustic receivers to mitigate entanglement risk. Receivers will have a low vertical profile (< 6 feet) off the bottom.<br>Receiver array to be expanded in spring or summer of 2022 |
| State water ventless trap survey - export cable (before-after-gradient design) | RWEC route in Rhode Island state waters | Preconstruction, during construction, and postconstruction | 2 years of preconstruction sampling, to continue during construction, and a minimum of 2 years of postconstruction monitoring | Sampling to occur twice a month, all 12 months of the year.<br>Using six-pot trawls laid parallel to the cable; includes acoustic receivers attached to lobster pots |

| Survey Type | Location | Status/Time Frame | Duration | General Notes |
|---|---|---|---|---|
| Benthic monitoring - hard and soft bottom | RWF and RWEC | Preconstruction and postconstruction | Hard bottom monitoring 12 months prior to construction and 1 month after seafloor preparation, with postconstruction monitoring at intervals of 1, 2, 3, and 5 years<br>Soft bottom monitoring 6 months prior to seafloor preparation and subsequent surveys at 1 year intervals for 3 years and 5 years postconstruction | Hard bottom monitoring will use remotely operated vehicle video and audio collection, with multibeam echosounder and side-scan sonar surveys to map hard bottom habitat.<br>Soft bottom monitoring will use sediment profile and plan view imaging field data collection. |

Sources: Roll (2021); VHB (2023).

### 2.1.3 Alternative C: Habitat Alternative

Alternative C (Habitat Impact Minimization Alternative [Habitat Alternative]) would comprise the construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and implementation of applicable EPMs, as described in the RWF COP. In order to reduce impacts to complex habitats that support commercial and recreational fisheries species such as Atlantic cod (i.e., spawning adults) from the Proposed Action, certain WTG positions would be omitted while maintaining a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs (Figures 2.1-10 and 2.1-11). The placement of WTGs would be supported by location-specific benthic and habitat characterizations. Under this alternative, fewer WTG locations (and potentially fewer miles of IACs) than proposed by Revolution Wind would be approved by BOEM. Under this alternative, BOEM could select one of the alternatives in Table 2.1-15.

**Table 2.1-15. Alternative C Alternatives**

| Alternative | Descriptions |
|---|---|
| C1 | This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations to maintain a uniform east-west and north-south grid of 1 × 1–nm grid spacing between WTGs. Under this alternative, up to 65 WTGs would be approved. |
| C2 | This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations to maintain a uniform east-west and north-south grid of 1 × 1–nm grid spacing between WTGs. Under this alternative, up to 64 WTGs would be approved. |

For both Alternatives C1 and C2, the largest-capacity WTG in the PDE was assumed (12 MW), in which case, the number of WTG positions remaining would provide at least five "spare" WTG locations to allow for flexibility during installation.

Alternative C1 reduces development in areas of contiguous complex habitat slightly more than Alternative C2. Alternative C2 shifts exclusion of three WTG positions from the southeastern portion to areas further north to reduce development in or adjacent to known cod spawning areas, however, resulting in slightly less complex habitat avoided when compared to Alternative C1. See Section 3.6.2.4 for more information on differences in impacts to complex habitats. BOEM, in coordination with NMFS, considered a total of four alternatives to Alternative C prior to narrowing the selection to the two alternatives illustrated in Figures 2.1-11 and 2.1-12. Appendix K provides additional rationale on the evolution of Alternatives C1 and C2.[12]

[12] BOEM received information from the Project proponent indicating that there were technical difficulties associated with installing turbines at 21 of the positions and that some of these positions would be needed to fully implement Alternatives C, D, and E. BOEM independently evaluated this information and that information was part of the basis of developing Alternative G.

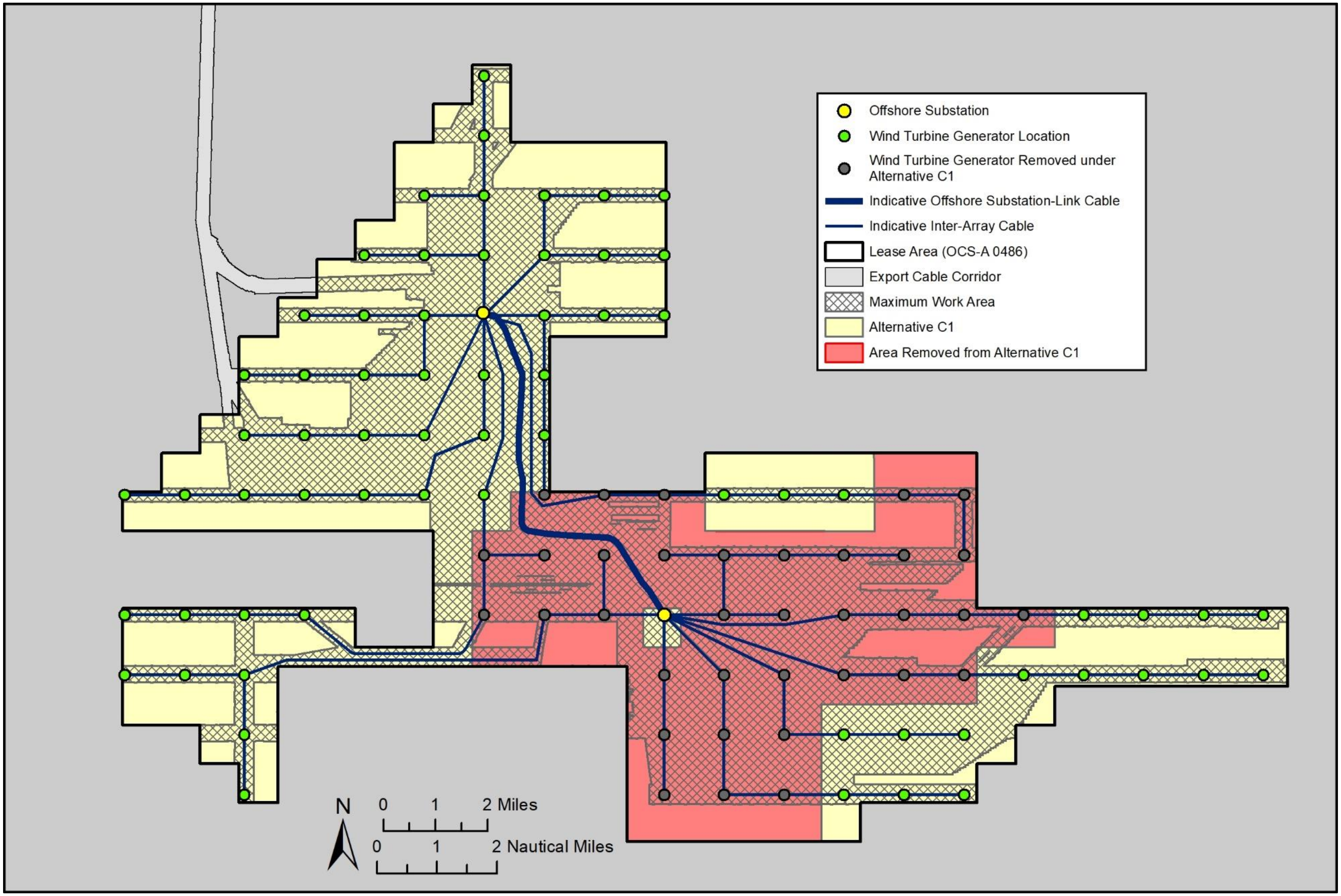



**Figure 2.1-11. Project location and components under the Alternative C1.**

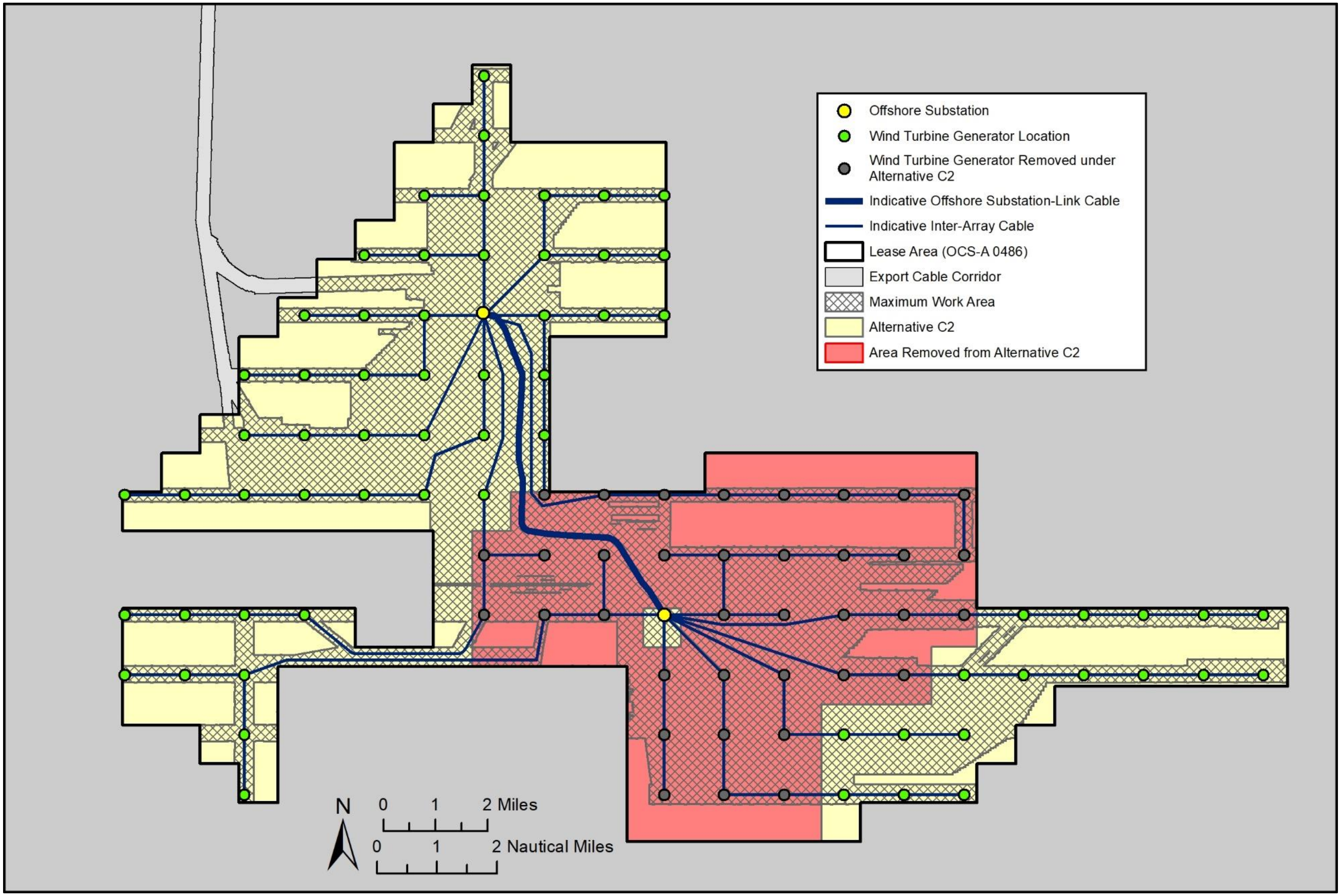



**Figure 2.1-12. Project location and components under the Alternative C2.**

### 2.1.4 Alternative D: Transit Alternative

Alternative D (No Surface Occupancy in One or More Outermost Portions of the Project Area Alternative [Transit Alternative]) would comprise the construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and implementation of applicable EPMs, as described in the RWF COP. However, to reduce navigation risks and conflicts with other competing space uses, WTGs adjacent to the Buzzard's Bay Traffic Separation Scheme Inbound Lane or overlapping transit lanes proposed by stakeholders, and areas of Cox Ledge, would be eliminated while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs (Figures 2.1-13, 2.1-14, and 2.1-15). Under this alternative, fewer WTG locations (and probably fewer miles of IACs) than proposed by Revolution Wind would be approved by BOEM while still allowing for the fulfillment of existing PPAs up to the maximum capacity identified in the PDE (i.e., 880 MW). Under this alternative, BOEM could select one of the alternatives in Table 2.1-16.

**Table 2.1-16. Alternative D Alternatives**

| Alternative | Descriptions |
|---|---|
| D1 | Removal of the southernmost row of WTGs, which overlap the 4-nm east-west transit lane proposed by the Responsible Offshore Development Alliance (RODA)[13] (Figure 2.1-13). Selecting this alternative would remove up to seven WTGs and associated IACs from consideration while maintaining the east-west and north-south 1 × 1–nm grid spacing. |
| D2 | Removal of the eight easternmost WTGs, which overlap the 4-nm north-south transit lane proposed by RODA (Figure 2.1-14). Selecting this alternative would remove up to eight WTGs and associated IACs from consideration while maintaining the east-west and north-south 1 × 1–nm grid spacing. |
| D3 | Removal of the northwest row of WTGs adjacent to the Buzzard's Bay Traffic Separation Scheme Inbound Lane (i.e., traffic separation scheme; Figure 2.1-15). Selecting this alternative would remove up to seven WTGs and associated IACs while maintaining the east-west and north-south 1 × 1–nm grid spacing. |

The seven possible combinations of the three alternatives to Alternative D that are analyzed in this EIS are listed in Table 2.1-17 and are illustrated in Figures 2.1-13 through 2.1-19.

**Table 2.1-17. Alternative D Alternatives Combinations**

| Alternative Combinations | Descriptions |
|---|---|
| D1 | Removal of up to seven WTGs and associated IACs |
| D2 | Removal of up to eight WTGs and associated IACs |
| D3 | Removal of up to seven WTGs and associated IACs |
| D1+D2 | Removal of up to 15 WTGs and associated IACs |

[13] On January 3, 2020, RODA submitted a proposed layout to the USCG, BOEM, and NMFS for analysis of its relative impacts to safety and the human environment under NEPA for the New England Wind Energy Area Lease Block (which includes the RI/MA WEA and MA WEA) (Hawkins 2020). The proposed layout includes six transit lanes at least 4-nm wide overlaid onto the 1 × 1–nm grid.

| Alternative Combinations | Descriptions |
|---|---|
| D1+D3 | Removal of up to 14 WTGs and associated IACs |
| D2+D3 | Removal of up to 15 WTGs and the associated IACs |
| D1+D2+D3 | Removal of up to 22 WTGs and associated IACs |

The selection of all three alternatives (i.e., Alternative D1+D2+D3) would eliminate a total of 22 WTG locations while maintaining the 1 × 1–nm grid spacing proposed in the COP and as described under the Proposed Action. Based on the design parameters outlined in the COP, allowing for the placement of up to 78 WTGs and two OSSs would maintain some flexibility for siting while still allowing for the fulfillment of existing PPAs up to the maximum capacity identified in the PDE (e.g., 880 MW = 74 WTGs needed if 12-MW WTGs are used, providing up to six "spare" WTG locations for siting flexibility).

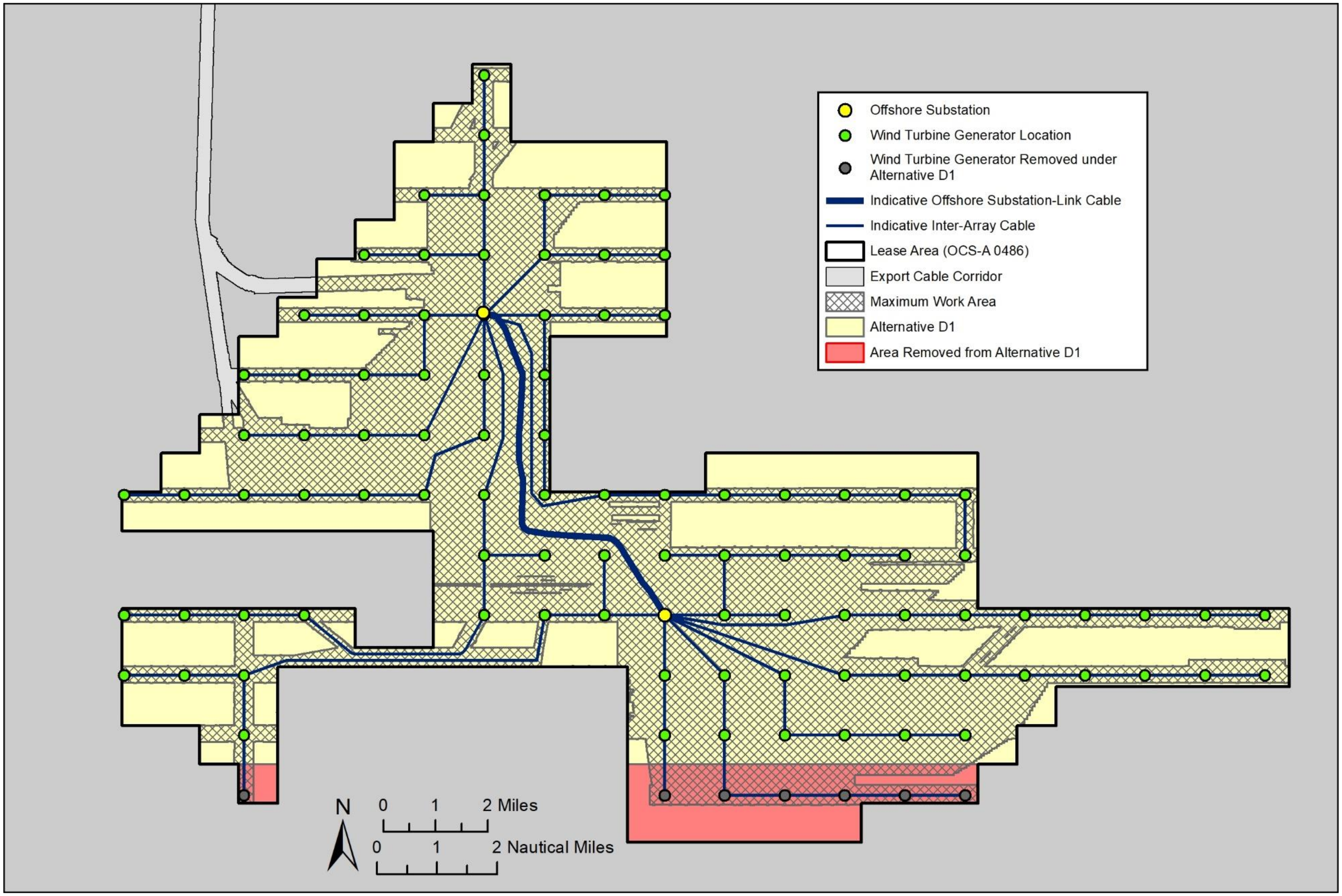



**Figure 2.1-13. Project location and components under the Alternative D1.**

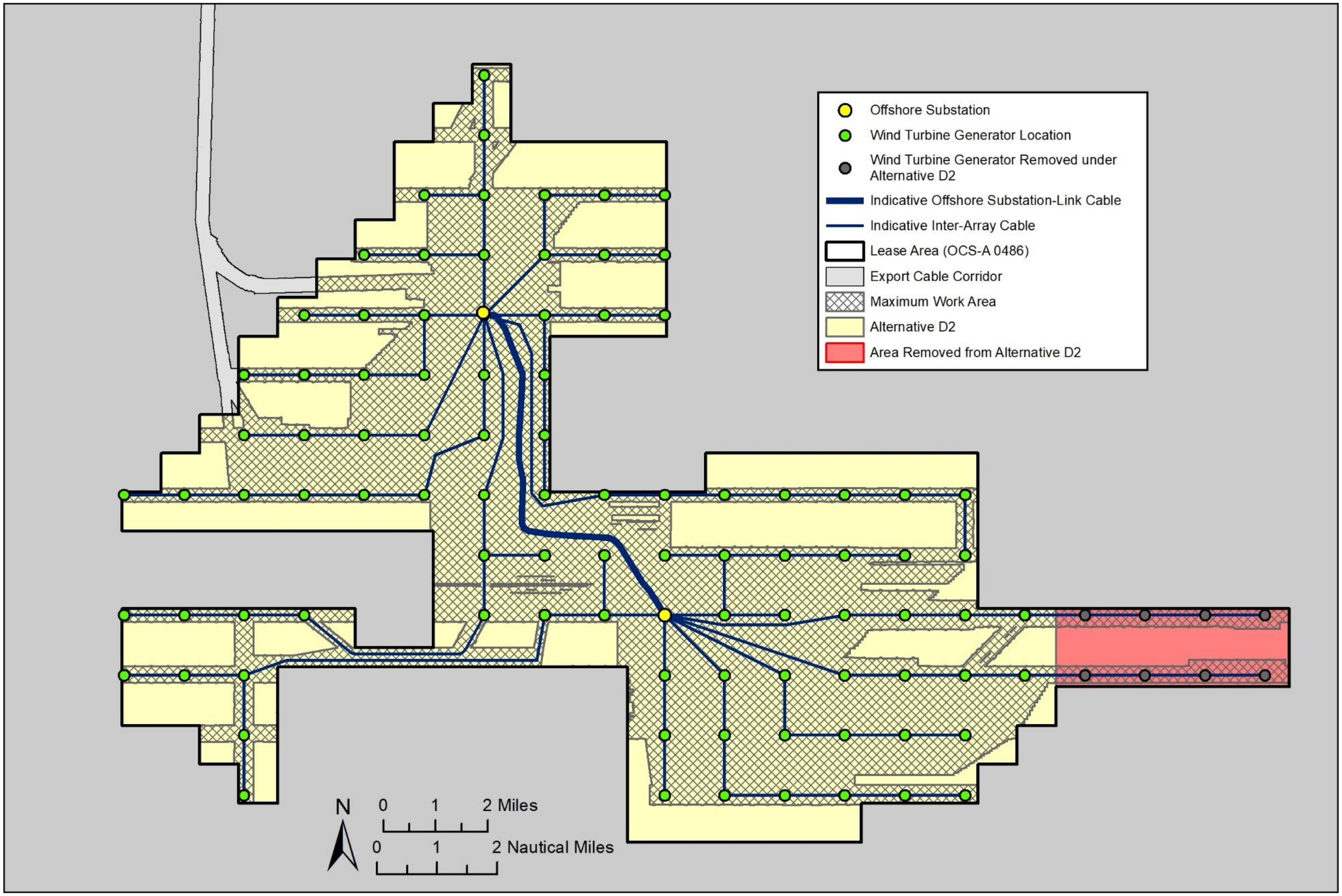



**Figure 2.1-14. Project location and components under the Alternative D2.**

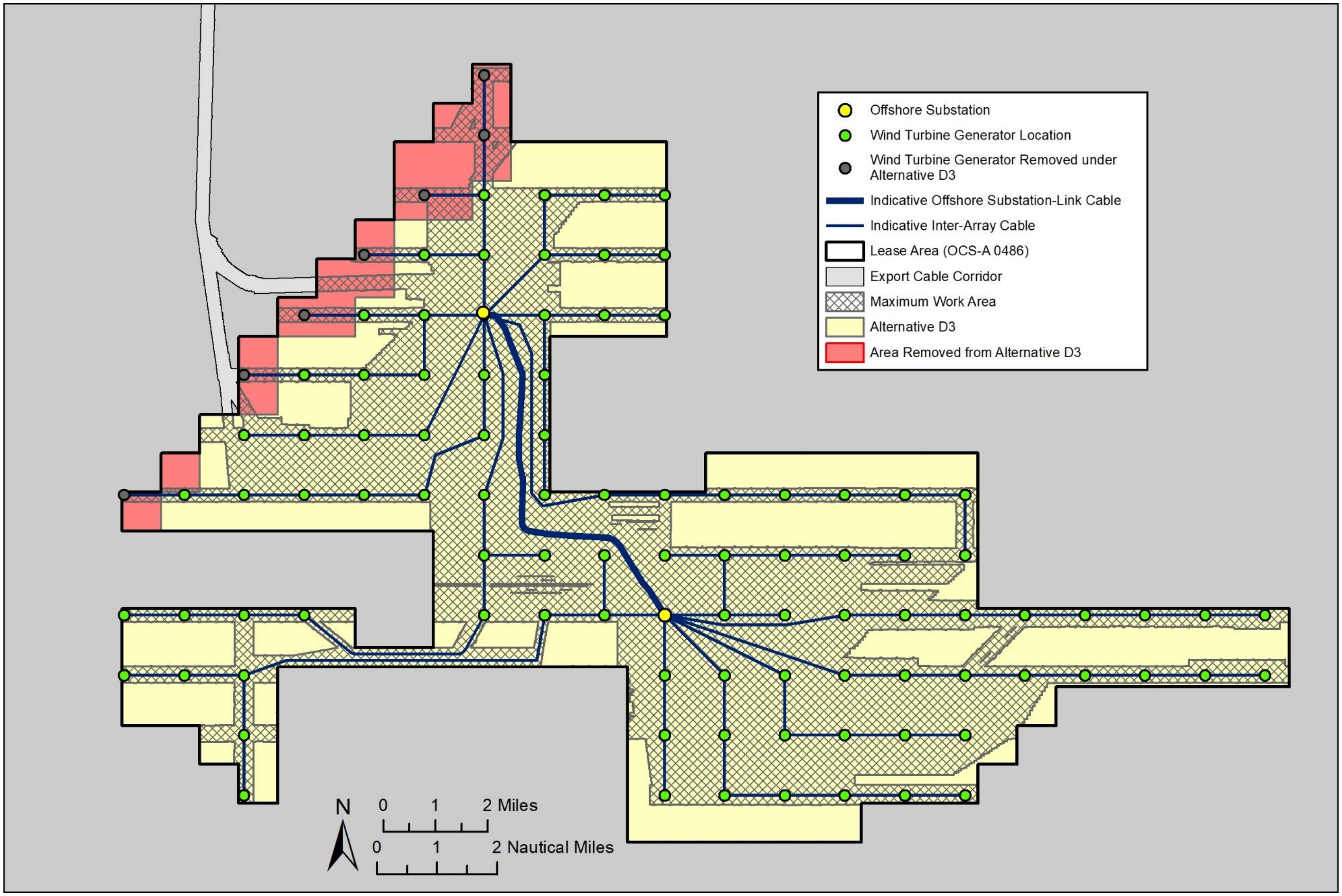



**Figure 2.1-15. Project location and components under the Alternative D3.**

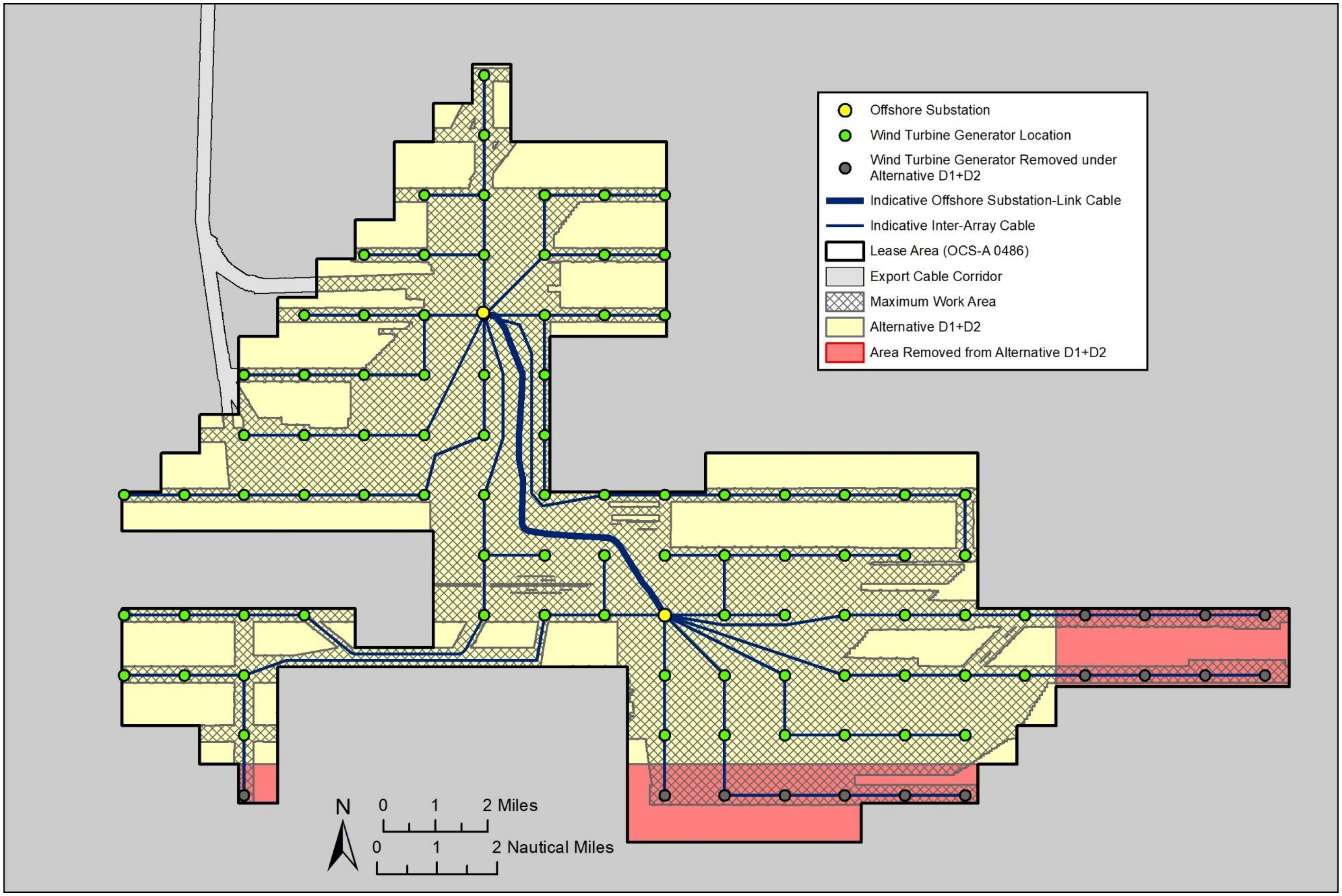



**Figure 2.1-16. Project location and components under the Alternative D1+D2.**

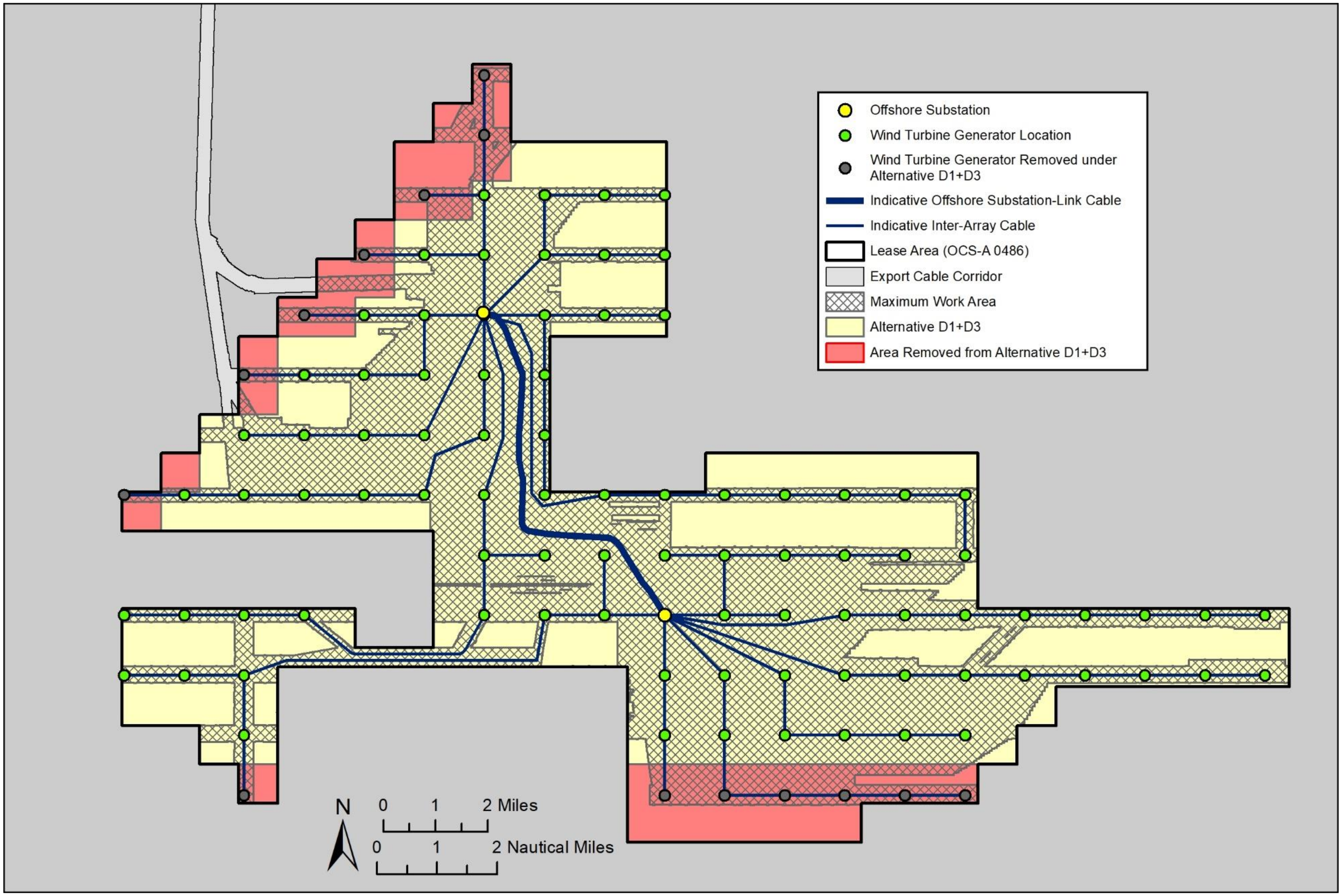



**Figure 2.1-17. Project location and components under the Alternative D1+D3.**

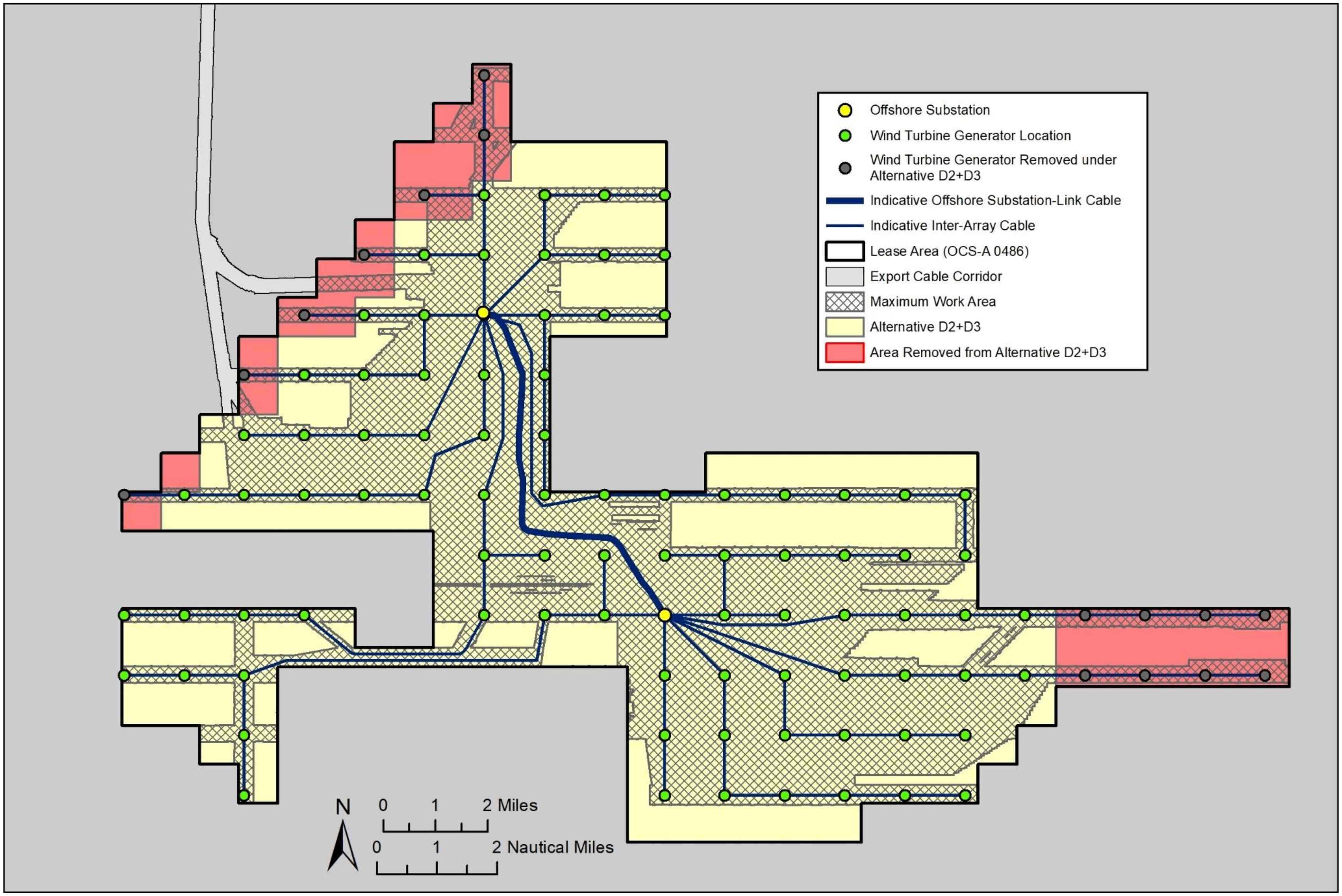



**Figure 2.1-18. Project location and components under the Alternative D2+D3.**

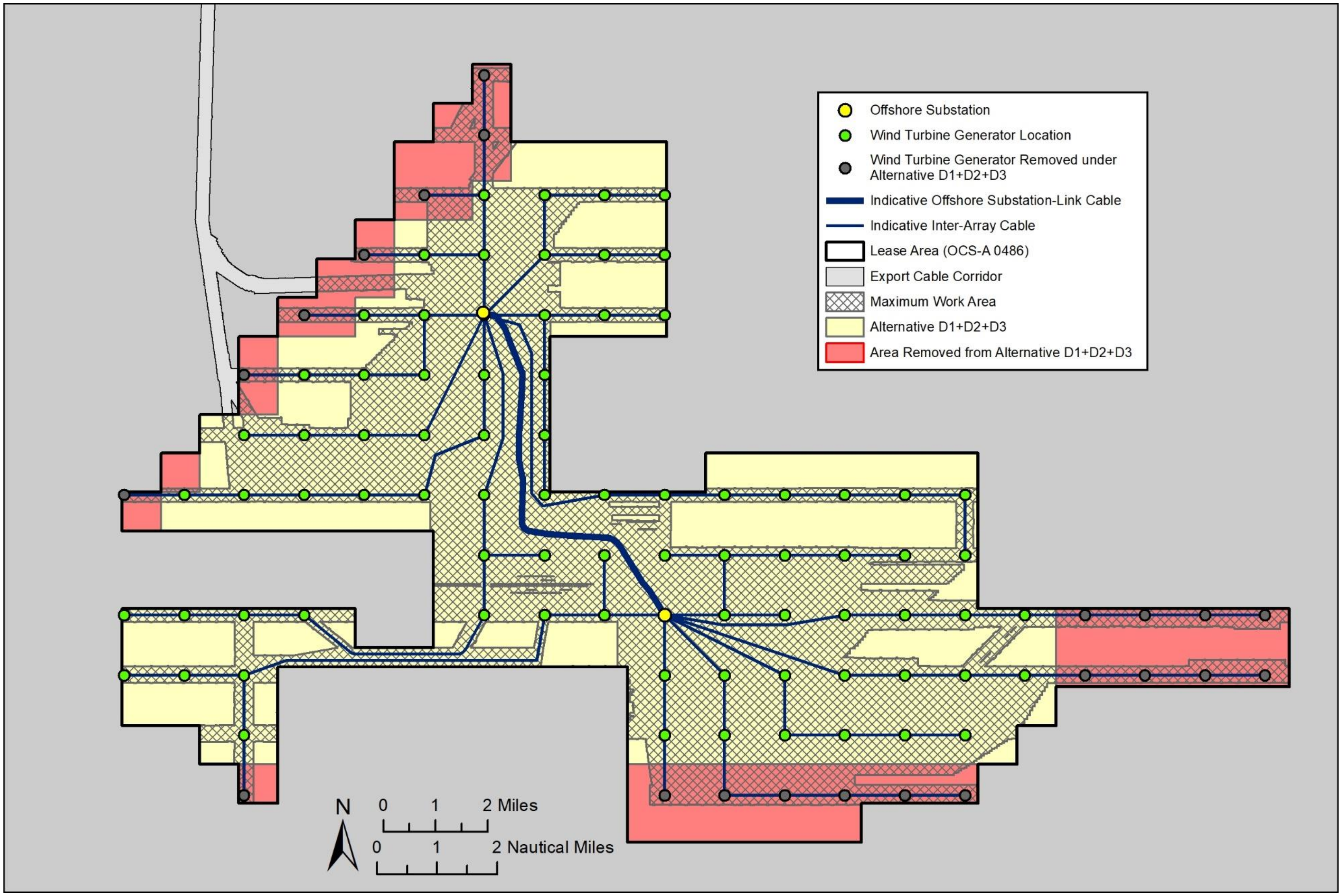



**Figure 2.1-19. Project location and components under the Alternative D1+D2+D3.**

### 2.1.5 Alternative E: Viewshed Alternative

Alternative E (Reduction of Surface Occupancy to Reduce Impacts to Culturally-Significant Resources Alternative [Viewshed Alternative]) would comprise the construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and implementation of applicable EPMs, as described in the RWF COP. However, to reduce the visual impacts on culturally important resources on Martha's Vineyard (and likely several other National Historic Landmarks (NHLs) in Rhode Island and Massachusetts), some WTGs would be eliminated while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs (Figures 2.1-20 and 2.1-21). Under this alternative, fewer WTG locations (and probably fewer miles of IACs) than proposed by Revolution Wind would be approved by BOEM. Under this alternative, BOEM could select one of the alternatives in Table 2.1-18.

**Table 2.1-18. Alternative E Alternatives**

| Alternative | Descriptions |
|---|---|
| E1 | Allows for the fulfillment of the existing three PPAs, for a total of 704 MW, while eliminating WTG locations to reduce visual impacts to culturally important viewsheds and resources. Under this alternative, up to 64 WTG positions would be approved.* |
| E2 | Allows for a power output delivery identified in the PDE of up to 880 MW, while eliminating WTG locations to reduce visual impacts to culturally important viewsheds and resources. Under this alternative, up to 81 WTG positions would be approved. |

* For Alternative E1, the range of WTGs only allows for the selection of an 11-MW or greater capacity WTG to achieve 704-MW output. Assuming the use of the largest-capacity turbine within the PDE would allow for up to five "spare" locations, while no spare positions would be available if an 11-MW turbine is used.

BOEM considered seven alternatives for Alternative E before selecting Alternatives E1 and E2, which are illustrated in Figures 2.1-20 and 2.1-21. Appendix K provides additional rationale on the evolution of Alternative E1 and E2.

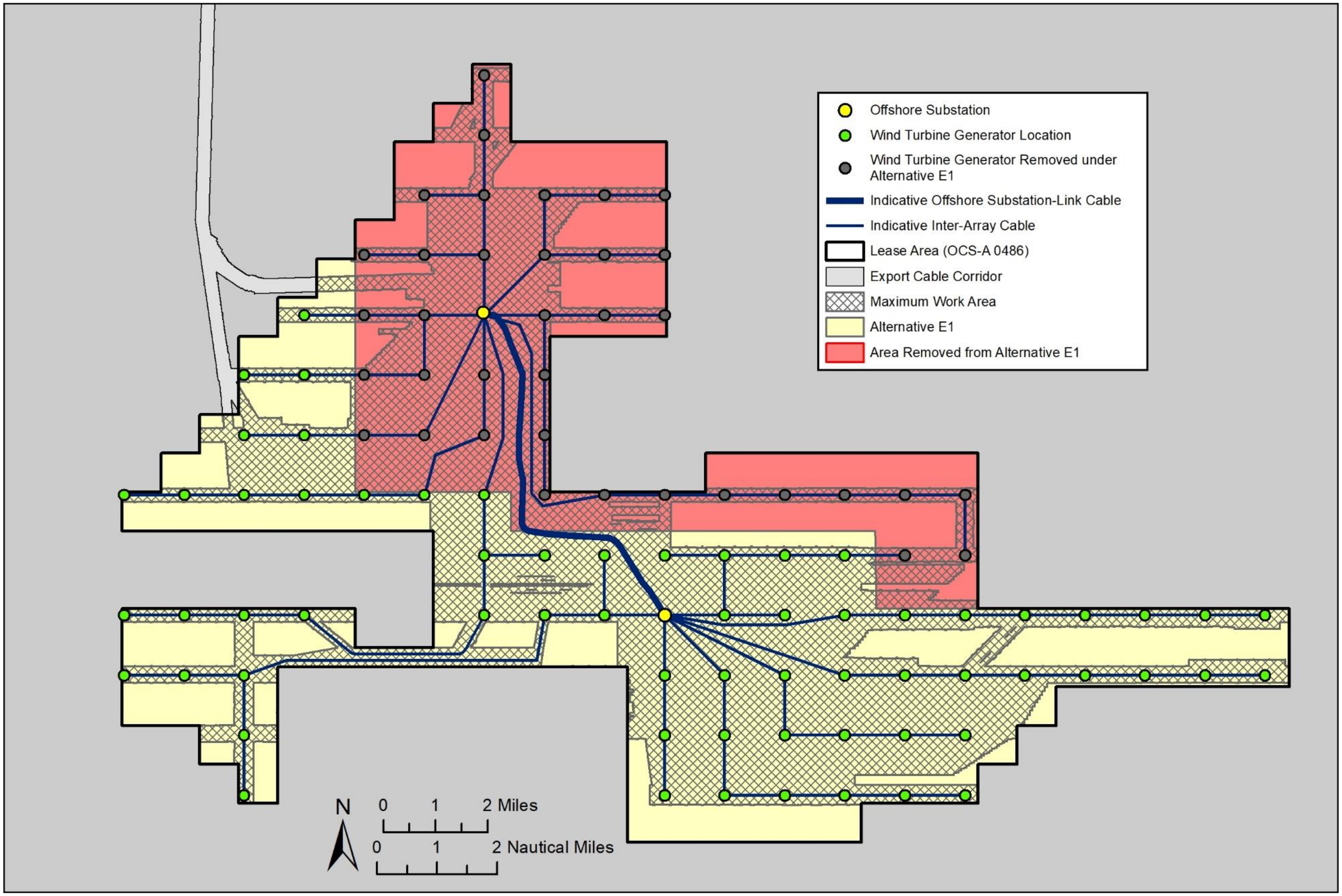



**Figure 2.1-20. Project location and components under the Alternative E1.**

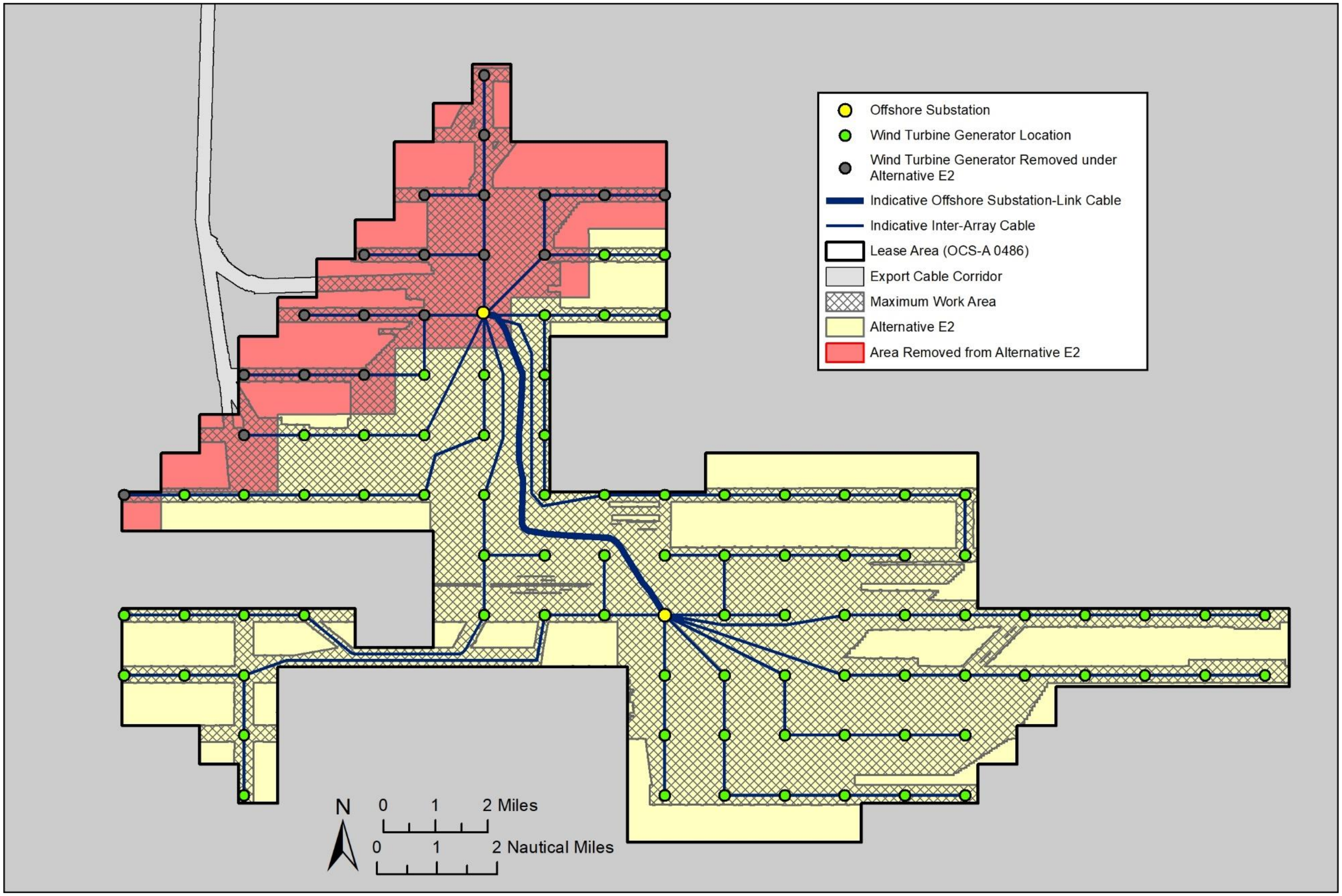



**Figure 2.1-21. Project location and components under the Alternative E2.**

### 2.1.6 Alternative F: Higher Capacity Turbine Alternative

Alternative F (Selection of a Higher Capacity Wind Turbine Generator [Higher Capacity Turbine Alternative]) would comprise the construction and installation, O&M, and eventual decommissioning of a wind energy facility implementing a higher nameplate capacity WTG (up to 14 MW assumed for the analysis) than what is proposed in the COP (i.e., the Proposed Action). Key assumptions for bounding this alternative include 1) the higher capacity WTG would fall within the physical design parameters of the PDE and 2) be commercially available to the Project proponent within the time frame for the construction and installation schedule proposed in the COP. BOEM did not identify any potential commercially viable turbines of a capacity higher than 14 MW that meet both criteria (see Appendix K for feasibility analysis).

The number of WTG locations under this alternative would be sufficient to fulfill the minimum existing PPAs (total of 704 MW and 56 WTGs with five "spare" WTG locations included). Using a higher capacity WTG would reduce the number of foundations constructed to meet the purpose and need and thereby potentially reduce impacts to marine habitats and culturally significant resources and potentially reduce navigation risks. Under this alternative, BOEM could select the implementation of a higher capacity turbine in combination with any one alternative or a combination of the alternatives retained for detailed analysis in this EIS. Refer to Section 2.1.2, Section 2.1.3, Section 2.1.4, and Section 2.1.5 for figures.

### 2.1.7 Alternative G: Habitat and Viewshed Minimization Hybrid Alternative (Preferred Alternative)

Alternative G (Habitat and Viewshed Minimization Hybrid Alternative), also referred to as the Preferred Alternative, would comprise the construction and installation, O&M, and eventual decommissioning of a wind energy facility. The facility would include 65 WTGs with a 8- to 12-MW nameplate capacity that would be located within 79 WTG possible positions (Figure 2.1-22). Alternative G is a hybrid alternative combining elements of Alternatives C, D, and E. Alternative G allows for the fulfillment of the existing PPAs (total of 704 MW), while eliminating certain WTG locations to reduce impacts to complex habitats, areas of high vessel use, and important viewsheds. Alternative G consists of 21 fewer WTG positions and 35 fewer installed WTGs than the Proposed Action, and maintains an east-west and north-south grid of 1 × 1–nm spacing between WTGs.[14] All applicable EPMs, including micrositing of foundations and cables, would apply as described in the COP.

Two of the 65 WTGs have the flexibility to be located in three different spots within the 79 WTG possible positions (see Figure 2.1-22). As a result, this alternative includes the analysis of three layouts for installation of the 65 WTGs as described below and shown in Figure 2.1-23, Figure 2.1-24, and Figure 2.1-25. This flexibility in design could allow for further refinement for visual resources impact reduction on Martha's Vineyard and Rhode Island, or for habitat impact reduction in the NMFS Priority 1 area. Additionally, 14 of the 79 WTG positions are "spares" and would only be constructed on a case-by-case basis to accommodate unforeseen siting conditions that render any of the 65 WTG installations impractical in terms of technical feasibility or due to environmental impact or safety concerns (i.e., one of

[14] In accordance with 30 CFR 585.634(C)(6), micrositing of WTG foundations may occur within 500 feet of each proposed WTG location. Micrositing of WTGs would be performed on a case-by-case basis to avoid significant seabed hazards such as surface and subsurface boulders (see COP Section 2.2.1.1).

the 65 WTGs could be installed in a "spare" location). Under this alternative, BOEM could select one of the alternatives in Table 2.1-19.

**Table 2.1-19. Alternative G Alternatives**

| Alternative | Descriptions |
|---|---|
| G1 | Allows for the fulfillment of the existing three PPAs totaling 704 MW, while eliminating two WTG locations in the NMFS Priority 1 area to reduce fishery and EFH impacts. Under this alternative, 65 WTGs installed in the positions identified in Alternative G1 would be approved. |
| G2 | Allows for the fulfillment of the existing three PPAs totaling 704 MW, while eliminating two WTG locations to reduce visual impacts on the horizon from the Aquinnah Overlook, a culturally important resource. Under this alternative, up to 65 WTGs installed in the positions identified in Alternative G2 would be approved. |
| G3 | Allows for the fulfillment of the existing three PPAs totaling 704 MW, while eliminating two WTG locations closest to the shore to reduce visual impacts on these culturally important resources. Under this alternative, up to 65 WTGs installed in the positions identified in Alternative G3 would be approved. |

Design details, dimensions, and footprints specific to Alternative G are included in Table 2.1-20 All other components of the Project not listed in Table 2.1-20 remain the same for Alternative G as they are for the Proposed Action (see Tables 2.1-3 through 2.1-13). Appendix K provides a feasibility analysis of all alternatives and additional rationale on the evolution of Alternatives G1, G2, and G3. Micrositing of foundations and cables is anticipated during installation for all action alternatives analyzed in this EIS, including Alternatives G1, G2, and G3.

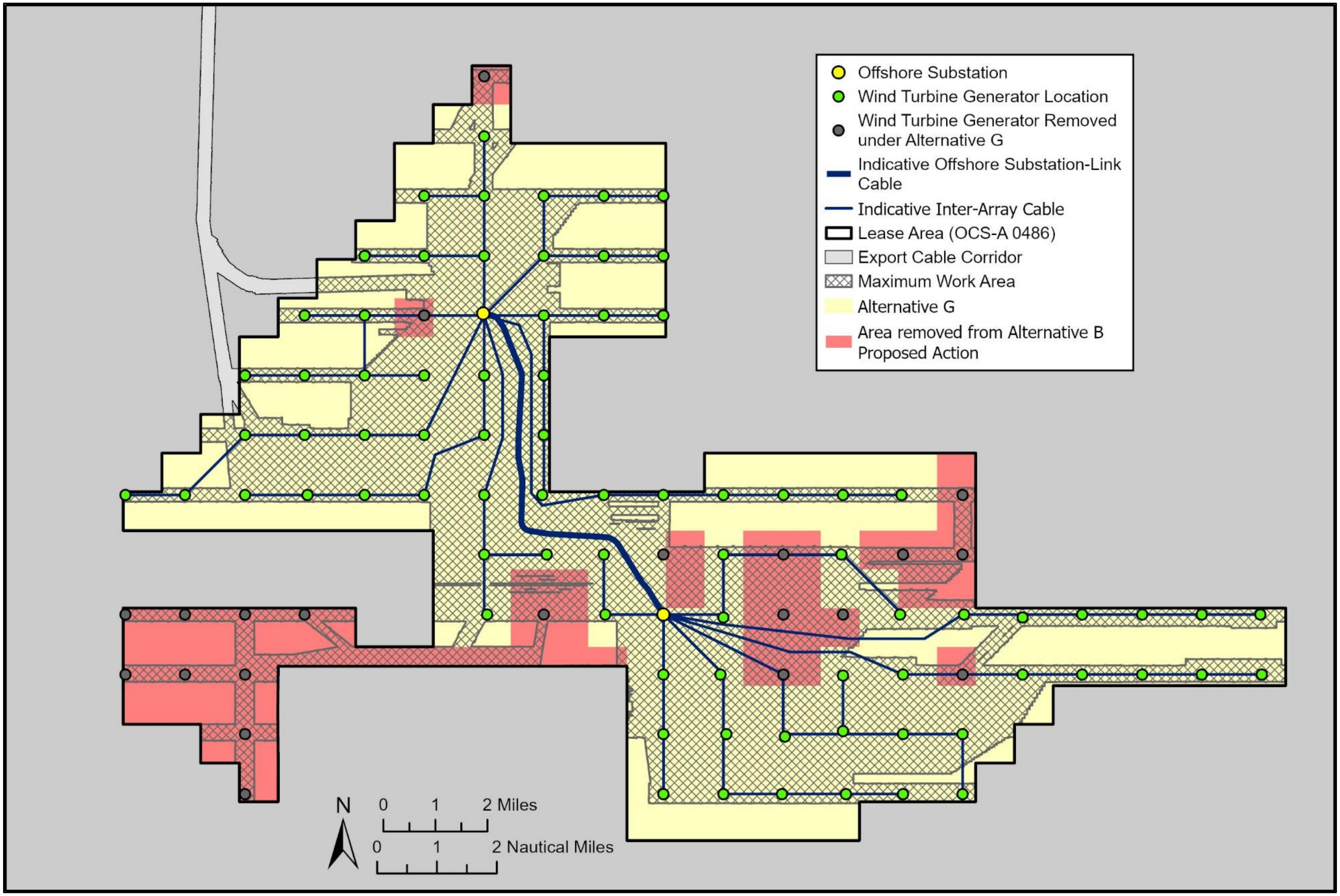



**Figure 2.1-22. Project location and components under Alternative G.**

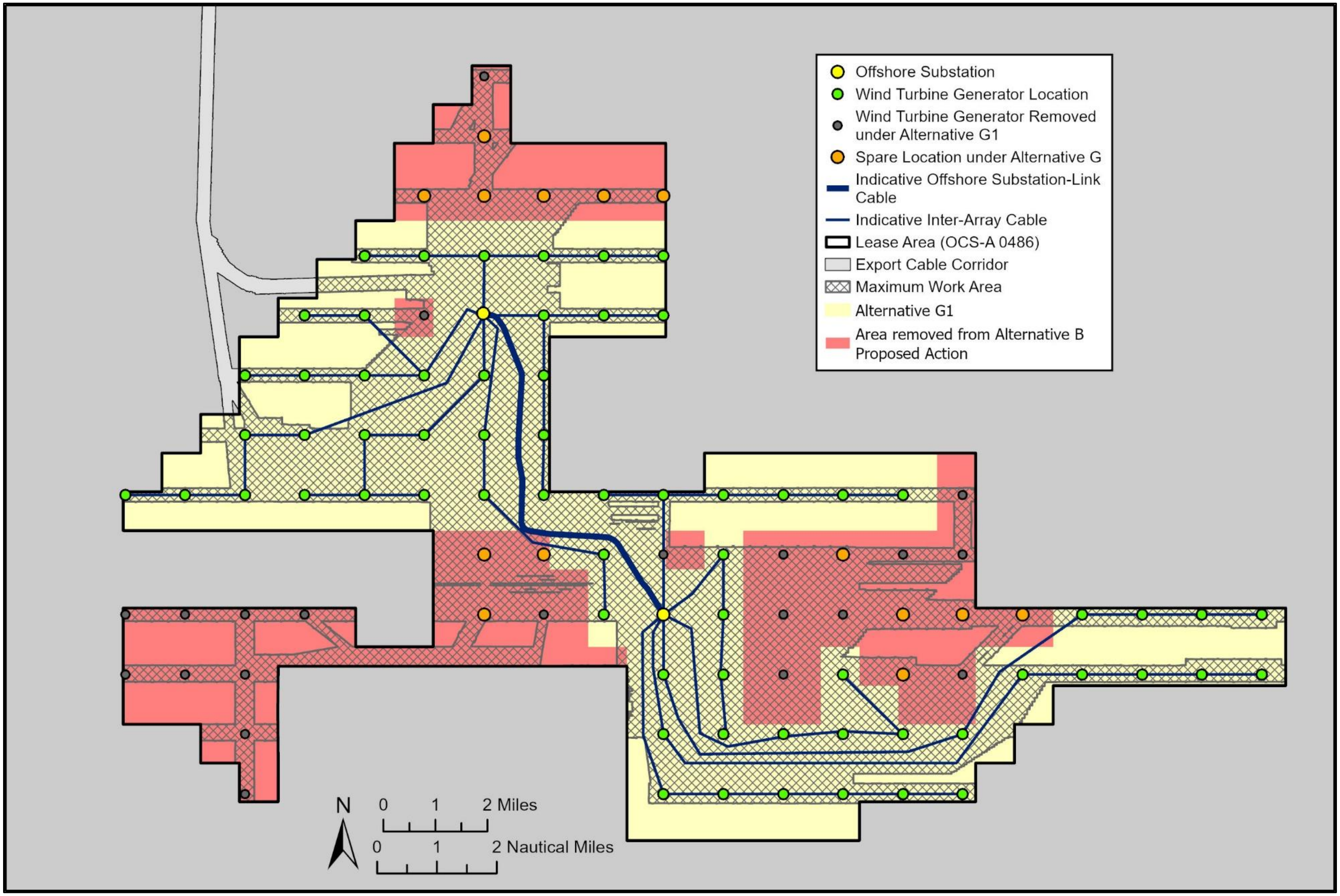



**Figure 2.1-23. Project location and components under Alternative G1.**

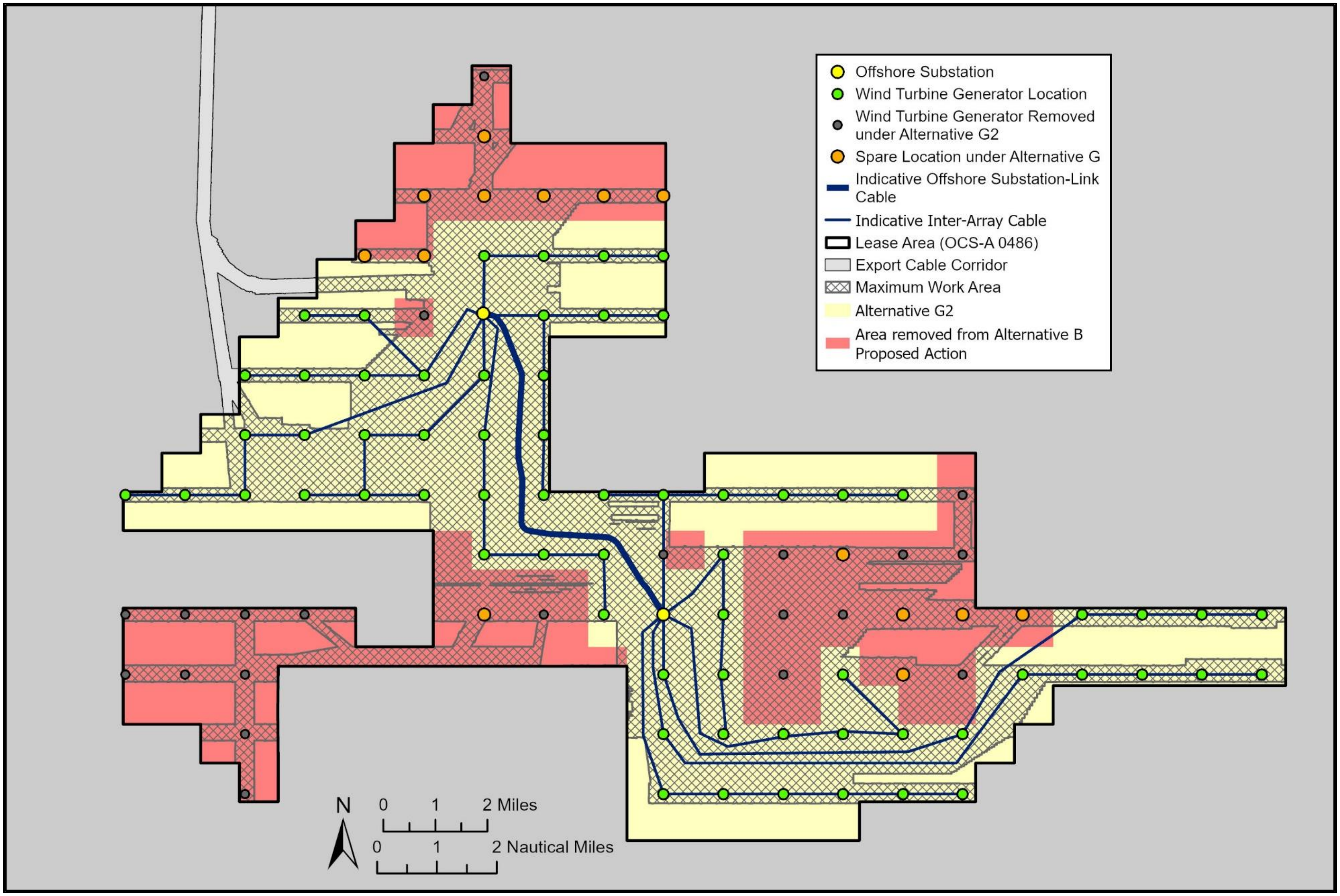



**Figure 2.1-24. Project location and components under Alternative G2.**

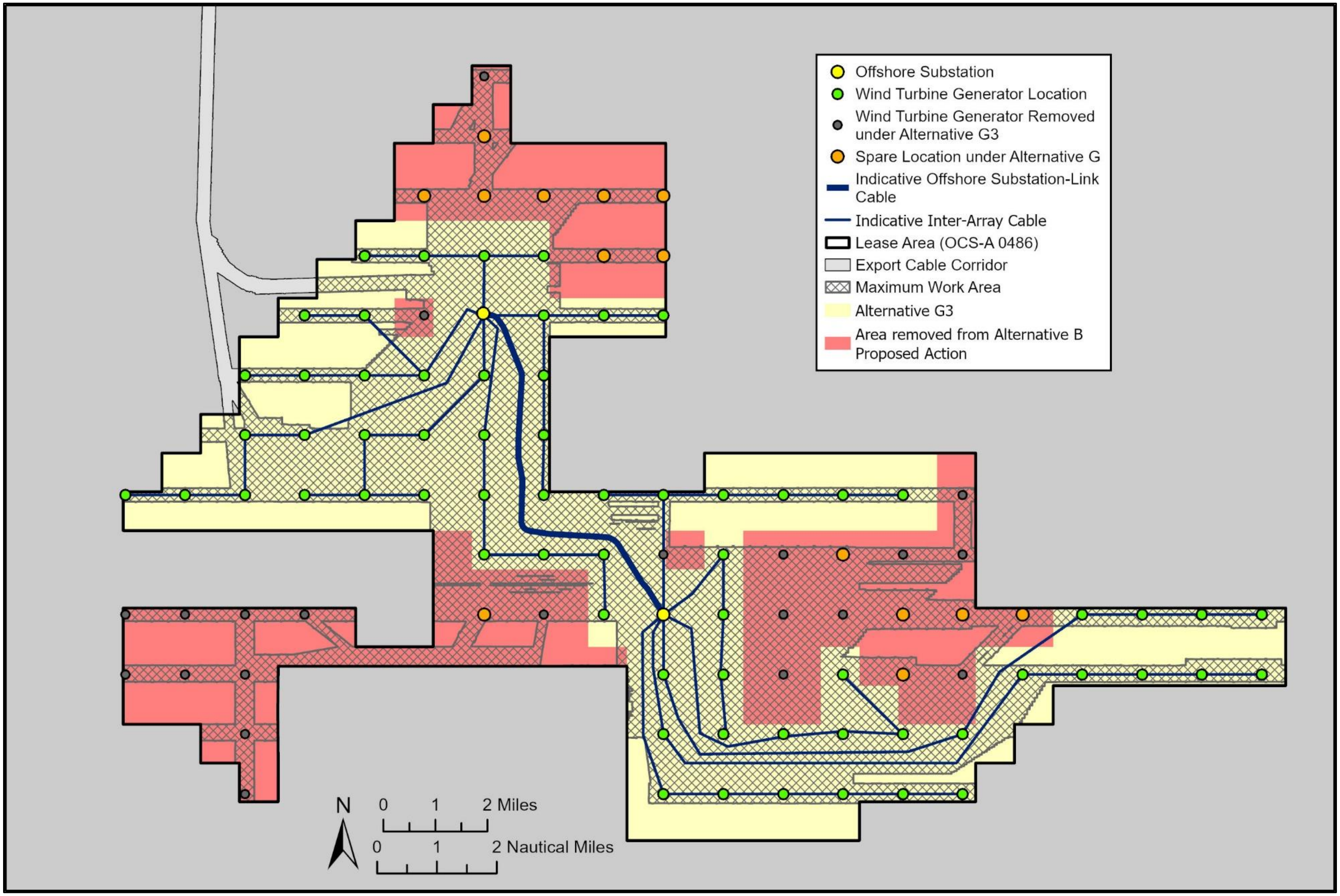



**Figure 2.1-25. Project location and components under Alternative G3.**

**Table 2.1-20. Revolution Wind Farm Components and Footprint under the Preferred Alternative (Alternative G)**

| Project Component | Location | Project Envelope Characteristics | Construction and Installation Footprint | Operation Footprint |
|---|---|---|---|---|
| WTGs<br>WTG monopile foundation<br>WTG monopile scour protection | Offshore in the OCS | WTGs: Up to 65 WTGs with a nameplate capacity of 8 to 12 MW, rotor diameter of 538 to 722 feet, hub height of 377 to 512 feet above mean sea level (amsl), and upper blade tip height up to 873 feet amsl to be installed within 79 possible WTG positions<br>WTG monopile foundation: A diameter of 20 to 39 feet and a target burial depth of 98 to 164 feet<br>WTG monopile scour protection: Rock placement, mattress protection, sandbags, and/or stone bags placed prior to foundation installation* | WTG monopile foundation:<br>7.2 acres x 79 WTG = 568.8 acres disturbance<br>Jack-up disturbance per WTG installation:<br>0.18 acre x 79 WTG x 1.15 = 16.4 acres¶<br>Total 79 WTG disturbance:<br>585.2 acres<br>7.2 acres x 65 WTG = 468-acre installation footprint<br>Jack-up disturbance per WTG installation:<br>0.18 acre x 65 WTG x 1.15 = 13.5 acres¶<br>Total 65 WTG disturbance:<br>481.5 acres | WTG monopile foundation:<br>0.027 acre x 65 WTG = 1.8 acres<br>WTG monopile scour protection:<br>0.7 acre x 65 WTG = 45.5 acres |
| OSS<br>OSS monopile foundation<br>OSS monopile scour protection | Offshore in the OCS | OSS: Up to two OSSs (OSS1 and OSS2) and up to 262 feet amsl (with lightning protection)<br>OSS monopile foundation: A diameter of 20 to 49 feet and a maximum embedment depth of 164 feet<br>OSS monopile scour protection: Rock placement, mattress protection, sandbags, and/or stone bags placed prior to foundation installation* | OSS monopile foundation:<br>7.2 acres x 2 OSS = 14.4 acres<br>Jack-up disturbance per OSS installation:<br>0.18 acre x 2 OSS = 0.36 acre<br>Total OSS disturbance:<br>14.8 acres | OSS monopile foundation:<br>0.043 acre x 2 OSS = 0.086 acres<br>OSS monopile scour protection:<br>0.7 acre x 2 OSS = 1.4 acres |

| Project Component | Location | Project Envelope Characteristics | Construction and Installation Footprint | Operation Footprint |
|---|---|---|---|---|
| Alternative G (base)<br>IAC<br>IAC protection | Offshore in the OCS | IAC: Up to a 117-mile total length with a 72-kilovolt (kV) AC cable with a diameter of 8 inches connecting WTGs and OSSs<br>IAC protection: Rock berms, concrete mattresses, fronded mattresses, and/or rock bags constituting up to 10% of the route for each cable | IAC: 1,862 acres | IAC protection: 55.9 acres[§] |
| Alternative G1<br>IAC<br>IAC protection | Offshore in the OCS | IAC: Up to a 107-mile total length with a 72-kV AC cable with a diameter of 8 inches connecting WTGs and OSSs<br>IAC protection: Rock berms, concrete mattresses, fronded mattresses, and/or rock bags constituting up to 10% of the route for each cable | IAC: 1,703 acres | IAC protection: 51.2 acres[§] |
| Alternative G2<br>IAC<br>IAC protection | Offshore in the OCS | IAC: Up to a 105-mile total length with a 72-kV AC cable with a diameter of 8 inches connecting WTGs and OSSs<br>IAC protection: Rock berms, concrete mattresses, fronded mattresses, and/or rock bags constituting up to 10% of the route for each cable | IAC: 1,671 acres | IAC protection: 50.2 acres[§] |
| Alternative G3<br>IAC<br>IAC protection | Offshore in the OCS | IAC: Up to a 105-mile total length with a 72-kV AC cable with a diameter of 8 inches connecting WTGs and OSSs<br>IAC protection: Rock berms, concrete mattresses, fronded mattresses, and/or rock bags constituting up to 10% of the route for each cable | IAC: 1,671 acres | IAC protection: 50.2 acres[§] |
| OSS-link cable†<br><br>OSS-link cable protection | Offshore in the OCS | OSS-link cable: Up to a 9-mile-long 275-kV high-voltage AC OSS-link cable with a diameter of 11.8 inches connecting OSS1 and OSS2<br>OSS-link cable protection: Rock berms, concrete mattresses, fronded mattresses, and/or rock bags constituting up to 10% of route for each cable | 148 acres | 4.4 acres |
| Vessel anchoring and mooring | Offshore in the OCS, state waters, along the RWEC offshore | Vessels for cable laying may anchor within the 1,640-foot-wide Project easement. | Not provided | N/A |

| Project Component | Location | Project Envelope Characteristics | Construction and Installation Footprint | Operation Footprint |
|---|---|---|---|---|
| | route, and at the cable landfall | Anchors for cable-laying vessels have a maximum penetration depth of 15 feet.<br>Jack-up vessels for foundation and WTG installation would include up to four spudcans with a maximum penetration depth of 52 feet and would occur within the 656-foot radius around foundation locations. | Per the COP, vessel anchoring and mooring may occur at any location in the APE.‡ | |

Source: VHB (2023).

Note: COP Tables 1.2-1, 3.3.4-1, 3.3.4-2, 3.3.5-1, 3.3.6-1, 3.3.6-2, 3.3.7-1, 3.3.7-2, and 4.1.1-1 provide assumptions used to develop the footprint estimates.

* As described in COP Section 3.3.4.2, scour protection would be installed around foundations. Several types of scour protection may be considered, including rock placement, mattress protection, sandbags, and stone bags. However, rock placement is the most frequently used solution. The design typically includes a sloped outer edge that meets the natural grade of the seafloor to the extent practicable. Depending on the nature of the rock used, the size would vary, but the average diameter would be approximately 8 inches (20 centimeters [cm]). Scour protection depth at monopile foundations would be approximately 2.2 to 4.6 feet above the seafloor. Additional details for the engineering specifications for the rock required for use as scour protection at the RWF are provided in the COP. Any rock used for scour protection would meet these specifications. COP Appendix H, Supplemental Project Information (BOEM 2021a), also includes a conceptual drawing for cable/scour protection at foundations. Engineering specifications for rock, a naturally occurring material, are as follows:

- Rock class: LMA5/40
- Particle density: 165 pounds per cubic foot
- Armor stone rock class
- Rock material must have been produced from blasted rock faces and may not be sourced from riverbed mining/extraction or equivalent.
- Mudstone, shale, and slate rock or similar rock likely to cleave during handling are not acceptable.
- The armor stone may not in general be flaky or elongated.

† The OSS-link cable would have similar design and construction parameters as the RWEC (see Section 2.1.2.3.1).

‡ COP Section 3.3.10.2 states that seafloor impacts from general construction vessel anchoring may occur anywhere within the identified APE centered on cable routes. The total amount of seafloor disturbance due to vessel anchorage cannot be estimated but is considered a temporary impact and not to occur outside of the surveyed area.

§ The general disturbance corridor width for the IAC is 131 feet (40 meters). IAC protection is calculated by multiplying a portion (10%) of the cable route by the disturbance corridor.

¶ Revolution Wind assumes that 15% of the WTG foundations would need an additional jack-up.

### 2.1.8 Alternatives Considered but Dismissed from Detailed Analysis

BOEM considered a range of alternatives during the EIS development process that emerged from scoping, interagency coordination, government-to-government consultation, and internal BOEM deliberations. To be carried forward for analysis, all considered alternatives were required to meet the following screening criteria: 1) meet the purpose of and need for the Proposed Action; 2) be operationally, technically, and economically feasible and implementable; 3) be consistent with other local, state, or federal plans, permits, and regulations; 4) further reduce or avoid impacts as compared to the Proposed Action; and 5) not be substantially the same as another alternative.

Additionally, the alternatives should be "reasonable," which the DOI has defined in 43 CFR 46.420(b) as those that are "technically and economically practical or feasible and meet the purpose and need of the proposed action."[15] There should also be evidence that each alternative would avoid or substantially lessen one or more potential, specific, and significant socioeconomic or environmental effects of the Project (43 CFR 46.415(b)). Alternatives that could not be implemented if they were chosen (for legal, economic, or technical reasons), or do not resolve the need for action and fulfill the stated purpose in taking action to a large degree, are therefore not considered reasonable. Appendix K provides additional rationale on the evolution of all alternatives.[16]

Table 2.1-21 summarizes the alternatives considered but dismissed from detailed analysis along with rationale for elimination.

[15] The terms *practical* and *feasible* are not intended to be synonymous (73 *Federal Register* 61331, October 15, 2008).

[16] BOEM received information from the Project proponent indicating that there were technical difficulties associated with installing turbines at 21 of the positions and that some of these positions would be needed to fully implement Alternatives C, D, and E. BOEM independently evaluated this information and that information was part of the basis of developing Alternative G.

**Table 2.1-21. Alternatives Considered but Dismissed from Detailed Analysis**

| Alternative | Rationale for Dismissal |
|---|---|
| Alternative location closer to shore to minimize transmission losses. | Functionally equivalent to selecting the No Action Alternative because it is not a viable alternative that can be implemented by Revolution Wind if outside the Lease Area. Locating the proposed wind energy facility outside the Lease Area is not allowed under the terms of the lease; would not be responsive to Revolution Wind's goals to construct and operate a commercial-scale offshore wind energy facility in the Lease Area; and would not meet BOEM's purpose and need to respond to Revolution Wind's proposal and determine whether to approve, approve with modifications, or disapprove the COP to construct, operate and maintain, and decommission a commercial-scale offshore wind energy facility within the Lease Area. Consistent with BOEM's screening criteria, this alternative is dismissed from detailed consideration because it is not consistent with BOEM's purpose and need and would result in activities that are not allowed under the lease. |
| Alternative using the largest available WTGs to minimize the number of foundations constructed to meet the Project capacity and thereby minimize impacts to marine habitats and resources and reduce navigation and other space-use concerns. | Alternatives C through F (Habitat, Transit, Viewshed, and Higher Capacity Turbine Alternatives) already contemplate a reduction in the number of turbines to reduce impacts to habitat and navigation, viewsheds, and other sensitive resources. Alternative F analyzes the use of a higher capacity turbine provided it falls within the physical parameters of the PDE and is commercially available to the Project proponent within a reasonable time frame of the construction and installation schedule proposed in the COP. Hence the objective of this proposed alternative can be effectuated through those alternatives, or a combination thereof, if chosen.<br><br>Updating the COP to include the "largest" capacity turbines has the potential to cause delays that would make the Project infeasible given that the largest-capacity turbines currently commercially available are not available within the proposed construction time frame for the Proposed Action, nor are they within the physical design parameters proposed in the COP and evaluated in this EIS. A larger WTG than what is contemplated under Alternative F would require an update to the COP, additional NEPA review, and reinitiation of the NEPA process. Thus, the impact of such an alternative would effectively equate to selection of the No Action Alternative. |
| Fisheries Habitat Impact Minimization Alternative (Habitat Alternative), including micrositing and reduction of the total number of foundations installed in the Lease Area as well as micrositing and reduction of the linear feet of cabling in the Lease Area. This alternative would be supported by location-specific benthic and habitat characterizations, with discussion of the most | Functionally equivalent to Alternative C (Habitat Alternative); proposed for detailed analysis. |

| **Alternative** | **Rationale for Dismissal** |
|---|---|
| and least impacted areas within the Lease Area for placement of Project components, and would require preconstruction survey work. | |
| Fisheries Habitat Impact Minimization Alternative for the export cable route.<br>This alternative would be the construction, O&M, and eventual decommissioning of a wind energy facility within the PDE and implementation of applicable EPMs described in the COP, as referenced in Alternative B (the Proposed Action). However, to reduce impacts to complex fisheries habitats as compared to the Proposed Action, BOEM would require Orsted to consider routing the export cable to avoid complex habitats and maximize cable burial along the cable route. | As summarized in Section 2.1.2 of the COP, beginning in 2017, Revolution Wind conducted comprehensive desktop studies of oceanographic, geologic, shallow hazards, archaeological, and environmental resources such as tidal waters and wetlands in the Lease Area and the cable route (VHB 2023). These desktop studies informed the preliminary siting of the Project and supported the development of COP survey plans, which were conducted in 2017, 2018, and 2019. The purpose of the COP surveys was to conduct site characterization, marine archeological, and benthic studies necessary to further evaluate the seafloor in the Lease Area and along potential RWEC routes. The COP survey plans were submitted in accordance with the stipulations of the Lease as well as the following BOEM regulations and BOEM's guidelines:<br>Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR 585, dated May 27, 2020 (BOEM 2020a)<br>Guidelines for Submission of Spatial Data for Atlantic Offshore Renewable Energy Development Site Characterization Surveys, dated February 1, 2013 (BOEM 2013)<br>Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR 585, dated May 27, 2020 (BOEM 2020b)<br>Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585, dated June 2019 (BOEM 2019)<br>Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP), dated May 27, 2020 (Version 4.0) (BOEM 2020c)<br>Between the Lease Area and shore, Revolution Wind reviewed available data potentially affecting route suitability, such as seafloor slope, geological hazards, tidal currents and waters, wetlands, submarine utilities, dumping grounds, shipwrecks and other seafloor obstructions, unexploded ordnances, munitions and explosives of concern, existing cable crossings, anchorage/mooring areas, pilot boarding zones, navigational safety zones, and U.S. Department of Defense military practice areas.<br>Through the extensive survey work conducted as part of the site assessment phase, BOEM and the operator did not identify cable route alternatives during Project development that would further reduce or avoid benthic impacts (see Section 2.2.1 of the COP). Significant changes to the proposed export corridor would likely result in substantial cost for the applicant, could be counter to BOEM policy objectives of responsible and orderly development of the OCS under the OCSLA, and have not been determined as necessary based on stakeholder feedback provided to date. In addition, a site-specific cable burial risk assessment would be |

| **Alternative** | **Rationale for Dismissal** |
|---|---|
| | completed with additional approvals conducted at the facility design report/facility installation report stage prior to installation of any cables. No alternative cable route(s) have been proposed that are meaningfully different from those already evaluated, which also include supporting evidence of significantly reducing impacts when compared to the Proposed Action or that address impacts that could not be addressed in the site-specific cable burial risk assessment. |
| Alternative that uses common cable routing corridors with adjacent projects to facilitate avoidance and minimization of impacts to resources by reducing the number of corridors and allowing for programmatic-level review and comment. | The cable route for a project is primarily governed by where the energy needs to be delivered. For a corridor to be even possible, different projects would need to deliver the energy to areas that, at a minimum, are located in the general direction of where all the projects in the corridor need to deliver the power. The Project intends to deliver power to the existing Davisville Substation in North Kingstown, Rhode Island, and none of the projects for which COPs are under consideration intend to deliver power to areas that will have cables located in that general location. Therefore, it is impossible to analyze any reasonable cable routing corridor for the Project. Further, cable route planning for the Project is complex, and there is limited flexibility to accommodate major changes. In general, granting overlapping easements could unreasonably interfere with the rights of the lessee with the existing project easement or be inconsistent with the purpose for granting that existing easement.<br>The Bureau of Safety and Environmental Enforcement (BSEE) TAP-722 *Offshore Wind Submarine Cable Spacing Guidance* (BSEE 2014) notes that circumstances vary considerably locally and that spacing between cables should be considered on a case-by-case basis and incorporate all relevant information (e.g., shipping and fishing data, ground conditions, installation and repair techniques) and taking into account site- and route-specific risk assessment. Establishing shared export cable routes does not fully allow the incorporation of local, specific, and nuanced information for individual projects, and making this type of programmatic decision is outside the scope of this EIS. This alternative could limit the flexibility of both the developer and regulatory authorities for this and adjacent projects. For example:<br>There are significant safety and technological concerns around cable maintenance and repair. Developers generally require a corridor whose width is two to four times the depth of the water column to allow sufficient space for repairs.<br>Developers strive for the least amount of cable to minimize installation cost and time, seafloor disturbance, and transmission loss; therefore, a shift in plans could not be cost effective for the applicant and could be counter to BOEM policy objectives of responsible and orderly development of the OCS under OCSLA.<br>Increased Project cost and technical difficulties. Cable spacing needs to consider ongoing access to structures for O&M.<br>Installation, repair, and maintenance are expected to occur at different times for adjacent projects, requiring infrastructure already in place to be disturbed when it otherwise would not be, which adds an additional element of risk. |

| Alternative | Rationale for Dismissal |
|---|---|
| | As explained above, the export corridors for currently proposed Rhode Island and Massachusetts wind facilities offer little to no opportunity for alignment, and implementation would be impossible. |
| Alternative to require developers to be responsible for removing offshore wind equipment if and when their project ends and further require offshore wind developers and operators to place adequate resources in trust to ensure that decommissioning would occur regardless of bankruptcy, change of ownership, or lack of profitability. | BOEM regulations (30 CFR 285, Subpart I) currently require the removal of the cables by lessees. BOEM also has policies in place to ensure that the government will not incur decommissioning expenses due to company bankruptcy (30 CFR 585.515–585.537). |
| Alternate turbine foundation technologies. | The use of alternative foundation types, including suction-bucket foundations and floating wind turbine foundations, to reduce impacts on marine mammals, sea turtles, and fish from pile driving associated with monopile and jacket foundation is not feasible within the Lease Area because of the following:<br>1. The dense soils beneath an upper loose surficial layer of sand may prevent the full penetration required for stability of suction-bucket foundations.<br>2. The loose upper layer of sandy sediment also presents a settlement risk for gravity-based foundations.<br>3. The water depths are too shallow in portions of the Lease Area for floating foundations.<br>Although these foundation types would not require pile driving, the larger footprint of suction-bucket foundations would increase seafloor disturbance; additionally, all alternate foundation types would create less room for fishing activities between turbines when compared to monopile foundations. The cables associated with floating wind turbines would also increase the risk of entanglement for marine mammals. Overall, these alternative foundation types are not feasible in the Lease Area and may increase long-term environmental impacts to some resources over those from monopile foundations within the Lease Area. |
| Transit Lane Alternative with lanes at least 4 nm wide, where no surface occupancy would occur. | Aspects of this proposed alternative were incorporated into Alternative D (Transit Alternative), which analyzes setbacks from the Buzzard’s Bay Traffic Separation Scheme Inbound Lane and removes overlap with the proposed RODA lanes in which no surface occupancy would be allowed. The WTGs removed under Alternative C (Habitat Alternative) could also contribute to enhanced navigation in the Lease Area equivalent to a 4-nm-wide buffer lane with no surface occupancy. Furthermore, no additional setbacks regarding navigation concerns were identified beyond those under consideration in Alternative D (Transit Alternative). |

| Alternative | Rationale for Dismissal |
| --- | --- |
| | The commercial fishing industry has generally approached the issue of vessel transit in the southern New England lease areas holistically rather than prioritizing one route over another. In fact, RODA's February 22, 2019, comment letter on the Vineyard Wind 1 Draft EIS stated that there was "no broad 'consensus' on the location nor position of reasonable transit routes throughout the large complex of New England WEAs" (RODA 2019). Each of the proposed transit lanes reflects priorities of different ports and different fisheries.<br>In November 2019, the Northeast leaseholders' agreement was reached to align project layouts and avoid irregular transit corridors (Geijerstam et al. 2019). Adding transit corridors could erode project economics and logistics and potentially lead the lessee to retract from the agreement, which it committed to assuming that no additional transit lanes would be required.<br>The 1 × 1–nm standard and uniform grid pattern with at least three lines of orientation and standard spacing to accommodate vessel transits, traditional fishing operations, and SAR operations, throughout the MA/RI WEA was informed by the Massachusetts and Rhode Island Port Access Route Study. |
| Alternative related to location, burial depth, and spacing of export cables and IACs to minimize environmental or fishing operations and transit impacts, with the depth of burial deeper than 4 to 6 feet. | Substantially similar in design and encompassed within Alternative C (Habitat Alternative).<br>The target burial depth in specific areas along the cable routes will be determined based on an assessment of seafloor conditions, seafloor mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a required Cable Burial Risk Assessment (CBRA). The burial depth requirement would be evaluated and applied to any action alternative, and BOEM can develop and apply any appropriate mitigation measures as a result. If adequate avoidance could not be achieved through mitigation, then BOEM could require an update to the COP that could require additional NEPA review and, if warranted, could lead to selection of the No Action Alternative. The rationale for dismissal of the Fisheries Habitat Impact Minimization Alternative for the export cable route listed above in this table is also incorporated by reference here. |
| Alternative related to location and spacing of WTGs within the Lease Area to minimize environmental or fishing operations and transit impacts, with spacing farther apart than 1 × 1 nm. | Substantially similar in design and encompassed within Alternative C (Habitat Alternative) and Alternative D (Transit Alternative). Furthermore, no additional lanes were identified beyond those under consideration in the Alternative D (Transit Alternative) that would constitute wider spacing nor did any feedback from the USCG indicate a need for additional lanes based on the volume and types of vessels anticipated to be transiting within the wind farm area.<br>The 1 × 1–nm grid is supported by the MARIPAS and maximizes safety and navigation consistency. The USCG also asserted that 1 × 1–nm grid spacing provides ample maneuvering space for typical fishing vessels expected in the project area. The final Massachusetts and Rhode Island Port Access Route Study did not recommend implementation of a wider transit lane. Also, analysis of AIS data indicates that 1 × 1–nm grid spacing between WTGs is sufficient for fishing vessels to turn and navigate within the proposed WEA, and |

| **Alternative** | **Rationale for Dismissal** |
| --- | --- |
| | no other available information indicates that increased spacing between WTGs would enhance maneuverability of vessels fishing within the WEA.<br>All Rhode Island and Massachusetts offshore wind leaseholders have committed to implementing a 1 × 1–nm WTG grid layout in east-west orientation in response to stakeholder feedback. The Rhode Island and Massachusetts Lease Area developers' agreement was reached in order to avoid irregular transit corridors. Deviation from the 1 × 1–nm grid agreed to by developers would need to be considered for the entire WEA and not one to two projects. The adjoining lease areas must have the same grid throughout or at least a buffer area across borders to allow for safe navigation. Wider spacing (unless it was on axis 2 × 2 nm, which would not meet the purpose and need) would mean mismatched layouts between RWF and leases farther south and east.<br>Increasing spacing would directly affect the size of generators needed. The Navigation Safety Risk Assessment (DNV GL Energy USA, Inc. 2020) modeled 144 structures at a minimum of 0.6 nm apart and each 10 meters in diameter (i.e., very conservative). The modeling found very minimal risks from the Project as proposed. Additional buffers or corridors beyond what was analyzed in the Navigation Safety Risk Assessment was not deemed warranted. |
| Alternative that combines the most disruptive components for each option included in the PDE. | This proposed alternative is considered under the Proposed Action as BOEM's analysis focuses on the most impactful parameters or combination of parameters by resource area. |
| Alternative that includes infrastructure design technologies that differ from those proposed in the COP that may pose lesser impacts on sensitive environmental resources. | The COP (Section 2.2) thoroughly analyzes different design parameters and technologies and includes rationale for what is proposed in the PDE and why parameters outside the PDE were eliminated. This submitted alternative lacks specificity for BOEM to meaningfully analyze it in detail. The EIS will consider various methods as part of the PDE for all alternatives, and hence this separate proposed alternative is unnecessary for ensuring their consideration. |
| Alternatives to avoid development of offshore wind in 1) seasonal management areas and 2) areas where persistent or long-duration dynamic management areas are established and extended for more than 3 months in any 1 year of the most recent 5 years. | To be considered as proposed mitigation. |
| Alternative Davisville POI overland onshore cable route to lessen potential adverse impacts on the aquatic ecosystem. | Based on post–Draft EIS comments from the EPA, NOAA and USACE, two alternative onshore cable routes to the Davisville point of interconnect were identified and analyzed through a desktop analysis, known as Davisville Alternate 1 (A1) and Davisville Alternate 2 (A2). Davisville A1 and A2 were not carried forward due |

| Alternative | Rationale for Dismissal |
|---|---|
| | to several reasons relating to their 1) substantial increase in impacts to the human environment that outweigh potential benefits and 2) their technical and economic impracticality and infeasibility as described below:<br>• The Davisville selected route (the onshore route used in all action alternatives analyzed in the EIS) would impact substantially less area of Special Aquatic Sites (including wetlands) than Davisville A1 and A2. The Davisville selected route would impact approximately 4,300 square feet of wetlands through tree cutting only. In contrast, Davisville A1 would impact approximately 13,500 square feet of wetlands, and Davisville A2 would impact approximately 144, 000 square feet of wetlands. In contrast, the amount of dredge material would be the same across all three alternatives. The amount of fill material would be 5.4 acres for Davisville A1 and A2 assuming a best case that there are no submarine utility cables, which is currently unknown. The amount of fill for the Davisville selected route would be 11 acres, which does not account for the presence of seven submarine utility cables. The substantially larger impacts to wetlands (triple for A1 and over 33 times more for A2) outweigh the reduction in fill material, especially in light of the potential for additional fill to be needed for Davisville A1 or A2 if submarine utility cables were identified.<br>• Conflict with Department of Defense uses due to the need to cross a torpedo testing range.<br>• Conflict with USCG Traffic Separation Scheme due to the need to cross the scheme.<br>• Economic and technical impracticality and infeasibility due to a combination of the 1) lack of site-specific geophysical survey data for offshore portions; 2) lack of state and municipal permits; 3) lack of private real estate rights; 4) and increased costs of approximately $60 million, without accounting for project delays. Moreover, together, the time it would take to obtain the data, permits, and site control, if obtainable at all, would significantly delay onshore construction a minimum of 6 months, if not much more.<br>Please see Appendix K for additional specifics for Davisville A1 and Davisville A2. |

## 2.2 Non-Routine Activities and Low-Probability Events

Non-routine activities and low-probability events associated with the Project could occur during construction and installation, O&M, or decommissioning. Although these activities or events are impossible to predict with certainty, examples of such activities and events and potential for Project impacts are briefly summarized in Table 2.2-1.

**Table 2.2-1. Non-Routine Activities and Low-Probability Events Associated with the Project**

| Activity or Event | Potential for Project Impacts |
|---|---|
| Corrective maintenance activities | These activities could be required as a result of other low-probability events or as a result of unanticipated equipment wear or malfunctions. Revolution Wind would stock spare parts and have sufficient workforce available to conduct corrective maintenance activities, if required. Non-routine WTG, OSS, and cable maintenance are discussed in detail in COP Section 3.5.2, 3.5.3, and 3.5.4. |
| Collisions and allisions | These activities could result in spills (described below) or injuries or fatalities to humans and/or wildlife (addressed in Chapter 3). Collisions and allisions would likely be minimized through the USCG's requirement for lighting on vessels, temporary safety zones anticipated to be implemented by Revolution Wind during construction, implementation of NOAA vessel-strike guidance, proposed spacing between WTGs and other facility components, and inclusion of Project components on nautical charts. See COP Appendix R for additional information (DNV GL Energy USA, Inc. 2020). |
| Cable displacement or damage by vessel anchors or fishing gear | This could result in safety concerns and economic damages to vessel operators. However, such incidents would be minimized by the inclusion of Project components on nautical charts and the cable burial or other protection measures. |
| Chemical spills or releases | For offshore activities, these would include inadvertent releases from refueling vessels, spills from routine maintenance activities, and any significant spills as a result of other accidental events. Revolution Wind would comply with USCG and BSEE regulations relating to prevention and control of oil spills. Onshore, releases could occur from construction equipment and/or HDD activities. Revolution Wind would prepare a construction spill prevention, control, and countermeasures (SPCC) plan in accordance with applicable requirements and would outline spill prevention plans and measures to take to contain and clean up spills that could occur. See COP Appendix D for additional information. |
| Severe weather (e.g., hurricanes) and natural events | Revolution Wind designed the Project components to withstand severe weather events. However, severe flooding or coastal erosion could require repairs during construction and installation activities. Although highly unlikely, structural failure of a WTG (i.e., loss of a blade or tower collapse) would result in temporary hazards to navigation for all vessels. Information related to WTG and OSS design is found in COP Section 3.3.8.1.<br>In the event of significant facility damage, Revolution Wind would follow requirements for submitting notifications to BSEE, as described in 30 CFR 285.831. 30 CFR 285.703 defines the obligation to submit a report on repairs. Surveys, such as those to be performed after a major storm event, would be conducted to evaluate seafloor conditions. Results of surveys would be shared with relevant regulatory authorities, and remedial plans would be agreed to and implemented subject to applicable regulations. |

| Activity or Event | Potential for Project Impacts |
|---|---|
| Medical events | Illness or injury of construction or operation crew could result in emergency medical services requiring vessel or aircraft/helicopter trips. However, Revolution Wind would comply with all local emergency management plans and coordinate with local emergency officials to minimize risks associated with medical events. |
| Terrorist attacks | Impacts from terrorist attacks (including cyber-attacks) could vary greatly in magnitude and extent and therefore their analysis would be highly speculative. BOEM also considers terrorist attacks unlikely, and therefore, does not analyze them further in the EIS. |

## 2.3 Summary and Comparison of Impacts Among Alternatives without Mitigation Measures

### 2.3.1 Comparison of Impacts by Alternative

Table 2.3-1 provides a summary and comparison of the impacts under the No Action Alternative and each action alternative assessed in Chapter 3. Under the No Action Alternative, any potential environmental and socioeconomic impacts, including benefits, associated with the Proposed Action or Preferred Alternative would not occur; however, impacts could occur from other ongoing and planned activities. This table also provides a summary of the overall cumulative impacts by environmental resource and alternative. Each resource has two rows; one for the comparison of impacts and one for the overall cumulative impacts. The overall cumulative impacts for each resource include the alternative impacts combined with all planned activities (including other offshore wind activities). Chapter 3 resources include IPF-specific impact determinations that do differ from the overall impact determination and could be less than what is indicated in Table 2.3-1.

Green cell color represents negligible to minor adverse overall impact. Yellow cell color represents moderate adverse overall impact. Orange cell color represents major adverse overall impact. Resources with beneficial impacts are denoted by an asterisk, and alternatives within those resource rows with beneficial impacts are denoted by a bolded blue outline and an asterisk. Detailed comparisons of both adverse and beneficial impacts by environmental resource and alternative, as well as evaluation of impacts across alternatives by impact producing factor, are provided in each resource area within Chapter 3.

**Table 2.3-1. Comparison of Alternatives and Overall Cumulative Impacts by Alternative**

| Resource | Alternative A (No Action Alternative) | Alternative B (Proposed Action) | Alternative C (Habitat Alternative) | Alternative D (Transit Alternative) | Alternative E (Viewshed Alternative) | Alternative F (Higher Capacity Turbine Alternative) | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| Air quality – Alternative impacts* | Continuation of current air quality trends and sources of air pollution would be **moderate** adverse. | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* |
| Air quality: – Cumulative impacts* | **Minor** to **moderate** adverse; **minor** to **moderate** beneficial* | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse |
| Bats: Alternative impacts | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **negligible** adverse. | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse |
| Bats: Cumulative impacts | **Negligible** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Benthic habitat and invertebrates: Alternative impacts* | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **minor** to **moderate** adverse. | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* |
| Benthic habitat and invertebrates: Cumulative impacts* | **Minor** to **moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* |
| Birds: Alternative impacts | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **minor** adverse. | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Birds: Cumulative impacts | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Coastal habitats and fauna: Alternative impacts | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **negligible** adverse. | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse |
| Coastal habitats and fauna: Cumulative impacts | **Negligible** to **minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Commercial fisheries and for-hire recreational fishing: Alternative impacts* | Continuation of current trends would be **moderate** to **major** adverse for commercial fisheries and **minor** to **moderate** adverse and **minor** beneficial for for-hire recreational fishing.* | **Negligible** to **major** adverse; **minor** beneficial* | **Negligible** to **major** adverse; **minor** beneficial* | **Negligible** to **major** adverse; **minor** beneficial* | **Negligible** to **major** adverse; **minor** beneficial* | **Negligible** to **major** adverse; **minor** beneficial* | **Negligible** to **major** adverse; **minor** beneficial* |
| Commercial fisheries and for-hire recreational fishing: Cumulative impacts* | **Moderate** to **major** adverse for commercial fisheries; **minor** to **moderate** adverse and **minor** beneficial for for-hire recreational fishing* | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse |

| Resource | Alternative A (No Action Alternative) | Alternative B (Proposed Action) | Alternative C (Habitat Alternative) | Alternative D (Transit Alternative) | Alternative E (Viewshed Alternative) | Alternative F (Higher Capacity Turbine Alternative) | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| Cultural resources: Alternative impacts | Continuation of individual IPF impacts to cultural resources from past and current activities would be **negligible** to **major** negative.† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† |
| Cultural resources: Cumulative impacts | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† | **Negligible** to **major** negative† |
| Demographics, employment, and economics: Alternative impacts* | Continuation of current trends would be **moderate** to **major** adverse and **minor** to **moderate** beneficial.* | **Negligible** to **moderate** adverse; **minor** beneficial* | **Minor** beneficial* | **Minor** beneficial* | **Minor** beneficial* | **Minor** beneficial* | **Minor** beneficial* |
| Demographics, employment, and economics: Cumulative impacts* | **Major** adverse; **minor** to **moderate** beneficial* | **Major** adverse; **moderate** beneficial* | **Major** adverse; **moderate** beneficial* | **Major** adverse; **moderate** beneficial* | **Major** adverse; **moderate** beneficial* | **Major** adverse; **moderate** beneficial* | **Major** adverse; **moderate** beneficial* |
| Environmental justice: Alternative impacts* | Continuation of current trends would be **negligible** to **major** adverse and **negligible** to **moderate** beneficial. | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* | **Minor** to **moderate** adverse; **negligible** to **moderate** beneficial* |
| Environmental justice: Cumulative impacts* | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse |
| Finfish and essential fish habitat: Alternative impacts* | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **moderate** adverse. | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* |
| Finfish and essential fish habitat: Cumulative impacts* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* | **Moderate** adverse; **moderate** beneficial* |
| Land use and coastal infrastructure: Alternative impacts* | Continuation of current trends would be **minor** adverse. | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* |
| Land use and coastal infrastructure: Cumulative impacts | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |

| Resource | Alternative A (No Action Alternative) | Alternative B (Proposed Action) | Alternative C (Habitat Alternative) | Alternative D (Transit Alternative) | Alternative E (Viewshed Alternative) | Alternative F (Higher Capacity Turbine Alternative) | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| Marine mammals: Alternative impacts | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **moderate** adverse for all marine mammals except for the North Atlantic right whale (NARW). Continuation of population trends and human-caused stressors would be **major** for NARW. | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* |
| Marine mammals: Cumulative impacts* | **Moderate** adverse; **minor** beneficial* (**major** for NARW) | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* | **Moderate** adverse; **minor** beneficial* |
| Navigation and vessel traffic: Alternative impacts | Continuation of current trends would be **minor** to **moderate** adverse. | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Minor** to **moderate** adverse | **Moderate** adverse | **Minor** to **moderate** adverse |
| Navigation and vessel traffic: Cumulative impacts | **Minor** to **moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse |
| Other marine uses: aviation and air traffic: Alternative impacts | Continuation of current trends would be **negligible** adverse. | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse |
| Other marine uses: aviation and air traffic: Cumulative impacts | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Other marine uses: land-based radar: Alternative impacts | Continuation of current trends would be **negligible** adverse. | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Other marine uses: land-based radar: Cumulative impacts | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse |
| Other marine uses: military and national security: Alternative impacts | Continuation of current trends would be **negligible** adverse. | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Other marine uses: military and national security: Cumulative impacts | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse | **Moderate** adverse |
| Other marine uses: scientific research and surveys: Alternative impacts | Continuation of current trends would be **moderate** adverse. | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse |

| Resource | Alternative A (No Action Alternative) | Alternative B (Proposed Action) | Alternative C (Habitat Alternative) | Alternative D (Transit Alternative) | Alternative E (Viewshed Alternative) | Alternative F (Higher Capacity Turbine Alternative) | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| Other marine uses: scientific research and surveys: Cumulative impacts | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse | **Major** adverse |
| Other marine uses: undersea cables: Alternative impacts | Continuation of current trends would be **negligible** adverse. | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse |
| Other marine uses: undersea cables: Cumulative impacts | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse | **Negligible** adverse |
| Recreation and tourism: Alternative impacts | Continuation of current trends would be **minor** adverse. | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Recreation and tourism – Cumulative impacts* | **Minor** adverse | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* |
| Sea turtles: Alternative impacts* | Continuation of population trends and continuation of effects to species from natural and human-caused stressors would be **minor** adverse. | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* | **Minor** adverse; **minor** beneficial* |
| Sea turtles: Cumulative impacts* | **Minor** adverse; **minor** beneficial* | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Visual resources: Alternative impacts | Continuation of impacts to viewsheds from past and current activities would be **negligible** to **moderate** adverse. | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse |
| Visual resources: Cumulative impacts | **Moderate** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse | **Negligible** to **major** adverse |
| Water quality – Alternative impacts | Continuation of current water quality trends and sources of pollution would be **minor** adverse. | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Water quality – Cumulative impacts | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |
| Wetlands and non-tidal waters: Alternative impacts | Continuation of current wetland resources trends and sources of pollution would be **negligible** adverse. | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse | **Negligible** to **minor** adverse |
| Wetlands and non-tidal waters: Cumulative impacts | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse | **Minor** adverse |

* Resources with beneficial impacts are denoted by an asterisk, and alternatives within those resource rows with beneficial impacts are denoted by a bolded blue outline and an asterisk.

† The term "adverse" has a specific meaning under NHPA Section 106 regulations (in 36 CFR 800.5) and, therefore, to remove confusion in the Cultural Resources section, the terms "negative" and "beneficial" are used in the identification of impacts under NEPA.

# 3 Affected Environment and Environmental Consequences

This chapter analyzes the impacts of the Proposed Action and action alternatives when added to the existing conditions of the affected environment. Additionally, this chapter considers the cumulative impact on the affected environment of reasonably foreseeable future planned activities, as defined in Appendix E. Appendix E describes other ongoing and planned activities within the GAA for each resource. These activities may be occurring on the same time scale as the Project or could occur later in time but are still reasonably foreseeable. The outcome of the direct, indirect, and cumulative impacts to the affected environment is the potential environmental consequences.

In compliance with NEPA regulations (40 CFR 1501.3), the EIS evaluates the significance of Project impacts based on the potentially affected environment (context) and degree of effects (intensity). Impact levels described in BOEM's 2007 *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement* (MMS 2007) were used as the initial basis for establishing adverse and beneficial impacts specific to each resource. These impact levels were then further refined based on scientific literature and best professional judgment and are presented in Section 3.3.

Where adverse or beneficial is not specifically noted, the reader should assume the impact is adverse.[17] These overall determinations consider the combined effects of the individual impact level for each impact-producing factor (IPF) for each resource, as addressed in Section 3.1. Where information is incomplete or unavailable for the evaluation of reasonably foreseeable impacts analyzed in this chapter, BOEM identified and conducted its analysis in accordance with Section 1502.21 of the CEQ regulations in Appendix C (Analysis of Incomplete or Unavailable Information). The No Action Alternative is first analyzed to predict the impacts to the existing condition of the effected environment (as described in Section 1.6.1). A subsequent analysis is conducted to assess the cumulative impacts to the existing condition as future planned activities occur (as described in Section 1.6.2). Separate impact conclusions are drawn based on these separate analyses. Separate analyses are also conducted in the EIS to evaluate the impacts of the action alternatives when added to the effected environment of resources (as described in Section 1.6.1) and to evaluate cumulative impacts by analyzing the incremental impacts of the action alternatives when added to both the existing condition (as described in Section 1.6.1) and the impacts of future planned activities (as described in Section 1.6.2).

## 3.1 Impact-Producing Factors

BOEM's 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019) developed reference tables that evaluate potential impacts associated with ongoing and future offshore wind and non–offshore wind activities. The content of these tables have been re-evaluated in Appendix E1 to determine the relevance of each IPF to each resource analyzed in this EIS.

A resource's GAA is defined by the IPF with the maximum geographic area of impact. The purpose of using these GAAs is to capture the impacts from planned activities to each of those resources potentially

[17] The term "adverse" has a specific definition under Section 106 of the National Historic Preservation Act (NHPA) and therefore to remove confusion in the Cultural Resources section, the terms "negative" and "beneficial" are used in the identification of impacts under NEPA.

impacted by the Proposed Action. The GAA for each resource area is defined in the resource area sections of the EIS. GAAs are further discussed in Appendix E and complex GAAs are defined in Appendix G.

Each resource area in this chapter (Sections 3.4 to 3.22) includes a discussion of future offshore wind projects and other reasonably foreseeable activities without the Proposed Action, otherwise known as the No Action Alternative. The impacts resulting from this scenario are presented with a discussion of the IPFs for the resource area as determined by BOEM. Appendix E1 (Description and Screening of Relevant Offshore Wind and Non–Offshore Wind Impact-Producing Factors and Negligible Impact Determinations) includes lists of potential IPFs for each resource and provides a summary of IPFs analyzed for each resource across all action alternatives. Consistent with Section 1502.15 of the CEQ regulations, IPFs that are either not applicable to the resource area or are determined by BOEM to have a negligible effect are excluded from analysis in the body of the EIS and retained in Appendix E1. IPFs that result in a minor (or less) impact are retained in Appendix E2.

## 3.2 Mitigation Identified for Analysis in the Environmental Impact Statement

EPMs and mitigation and monitoring measures identified for the Project are identified in Appendix F (Environmental Protection Measures and Mitigation and Monitoring). EPMs (Table F-1) are those measures Revolution Wind has committed to executing in the COP and are therefore analyzed in the EIS as components of the Project design. If BOEM decides to approve the COP, BOEM could choose to require additional mitigation and monitoring measures as part of the ROD. Mitigation measures resulting from consultations between BOEM and cooperating agencies are listed in Table F-2. Additional mitigation measures identified by BOEM or cooperating agencies are listed in Table F-3. The mitigation measures identified in Tables F-2 and F-3 are analyzed in the relevant resource sections in Chapter 3. BOEM provides a separate mitigation section for each resource that identifies and discusses how and to what degree the additional mitigation measures could reduce alternative impacts. Please note that not all of these mitigation measures are within BOEM's statutory and regulatory authority but could be adopted and imposed by other governmental entities. If BOEM decides to approve the COP, its ROD would state which of the mitigation and monitoring measures identified by BOEM in Table F-2 and Table F-3 have been adopted, and if not, why. Table F-4 identifies measures that may be required by other authorizations and permits issued to the lessee.

## 3.3 Definition of Impact Levels

Based on previous environmental reviews, subject matter expert input, consultation efforts, and public involvement to date, BOEM has identified the resources in Table 3.3-1 as potentially affected by the Project. These resources fall into three categories: 1) physical resources, 2) biological resources, and 3) socioeconomic and cultural resources.

The EIS uses a four-level classification scheme (negligible, minor, moderate, and major) to characterize the potential impacts of the alternatives, including the Proposed Action. Table 3.3-2 provides negative (i.e., adverse) impact levels for each resource category, whereas Table 3.3-3 provides beneficial impact levels.

**Table 3.3-1. Resources Potentially Affected by the Project**

| Physical Resources | Biological Resources | Socioeconomic and Cultural Resources |
|---|---|---|
| Air quality<br>Water quality | Bats<br>Benthic habitat and invertebrates<br>Birds<br>Coastal habitats and fauna<br>Finfish and essential fish habitat<br>Marine mammals<br>Sea turtles<br>Wetlands and non-tidal waters | Commercial fisheries and for-hire recreational fishing<br>Cultural resources<br>Demographics, employment, and economics<br>Environmental justice<br>Land use and coastal infrastructure<br>Navigation and vessel traffic<br>Other marine uses (marine, military use, aviation, offshore energy)<br>Recreation and tourism<br>Visual resources |

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**Table 3.3-2. Definitions of Potential Adverse Impact Levels**

| Impact Level | Biological and Physical Resources | Socioeconomic Resources | Cultural Resources | Visual Resources |
|---|---|---|---|---|
| Negligible | Either no impact or no measurable impacts. | Either no impact or no measurable impacts | Impacts would be so small as to be unmeasurable (i.e., finding of "no historic properties affected" or "no historic properties adversely affected" pursuant to 36 CFR 800). | Seascape/Landscape impact assessment: Very little or no impact on seascape/landscape unit character, features, elements, or key qualities because unit lacks distinctive character, features, elements, or key qualities; values for these are low; and/or Project visibility is minimal.<br>Visual impact assessment: Very little or no impact on viewers' visual experience because view value is low, viewers are relatively insensitive to view changes, and/or Project visibility is minimal. |
| Minor | Most adverse impacts on the following affected resource(s) could occur AND the affected resource would recover completely without remedial or mitigating action, including<br>local ecosystem health;<br>the extent and quality of local habitat for both special-status species and species common to the proposed project area;<br>the richness or abundance of local species common to the proposed project area; and<br>air or water quality. | Most adverse impacts on the affected activity or community, including traditional cultural practices, could be avoided; impacts would not disrupt the normal or routine functions of the affected activity or community, including traditional cultural practices; OR<br>the affected activity or community, including traditional cultural practices, is expected to return to a condition with no measurable impacts without remedial or mitigating action. | Cultural resources (historic properties that include archaeological sites, buildings, structures, objects, and districts that are listed in or eligible for the NRHP) would be affected; however, conditions would be imposed to ensure consistency with the Secretary's Standards for the Treatment of Historic Properties (36 CFR 68) to avoid adverse impacts. (i.e., finding of "no historic properties adversely affected" pursuant to 36 CFR 800). | Seascape/Landscape impact assessment: Small but noticeable impact on seascape/landscape unit character, features, elements, or special qualities because project is somewhat inconsistent with unit character; negatively affects unit features, elements, or key qualities; and/or project visibility is low.<br>Visual impact assessment: Change to the view would have a small but noticeable impact on visual experience because view value is low, viewers are relatively insensitive to view changes, and/or project visibility is low. |
| Moderate | A notable and measurable adverse impact on the affected resource(s) could occur AND the affected resource would recover completely when remedial or mitigating action is taken, including<br>local ecosystem health;<br>the extent and quality of local habitat for both special-status species and species common to the proposed project area;<br>the richness or abundance of local species common to the proposed project area; and<br>air or water quality. | Mitigation would reduce adverse impacts substantially during the life of the proposed Project, including decommissioning; the affected activity or community, including traditional cultural practices, would have to adjust somewhat to account for disruptions due to notable and measurable adverse impacts of the Project; OR<br>once the impacting agent is gone, the affected activity or community, including traditional cultural practices, is expected to return to a condition with no measurable impacts, when remedial or mitigating action is taken. | Characteristics of cultural resources would be altered in a way that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (i.e., finding of "historic properties adversely affected" pursuant to 36 CFR 800). Measures to resolve adverse effects would minimize impacts, and the adversely affected property would remain NRHP eligible. | Seascape/Landscape impact assessment: Substantial impact on seascape/landscape unit character, features, elements, or special qualities because the Project is clearly inconsistent with unit character; substantially negatively affects unit features, elements, or key qualities; and/or Project visibility is moderate.<br>Visual impact assessment: The change to the view would have a substantial impact on the viewers' visual experience because view value is moderate, the viewers are moderately sensitive to the changes in the view, and/or the visibility of the Project is moderate. |
| Major | A regional or population-level adverse impact on the affected resource(s), could occur AND the affected resource would not fully recover, even after the impacting agent is gone and remedial or mitigating action is taken, including<br>ecosystem health;<br>the extent and quality of habitat for both special-status species and species common to the proposed project area;<br>species common to the proposed project area; and<br>air or water quality. | Mitigation would reduce adverse impacts somewhat during the life of the Project, including decommissioning; the affected activity or community, including traditional cultural practices, would have to adjust to significant disruptions due to large local or notable regional adverse impacts of the Project; AND<br>the affected activity or community, including traditional cultural practices, may retain measurable impacts indefinitely, even after the impacting agent is gone and remedial action is taken. | Characteristics of cultural resources would be affected in a way that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (i.e., finding of "historic properties adversely affected" pursuant to 36 CFR 800). Measures to resolve adverse effects would mitigate impacts; however, important characteristics would be altered to the extent that the adversely affected property would no longer be listed in or eligible for the NRHP. | Seascape/Landscape impact assessment: Dominant impact on seascape/landscape unit character, features, elements, or key qualities; fundamentally changes unit character, features, elements, or key qualities, and visibility of the Project is high.<br>Visual impact assessment: Dominate visual experience either because view value is moderate to high, viewers are moderately to highly sensitive to view changes, and the visibility of the Project is moderate to high. |

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**Table 3.3-3. Definitions of Potential Beneficial Impact Levels**

| Impact Level | Biological, Physical, and Cultural Resources | Socioeconomic Resources |
|---|---|---|
| Negligible | Either no impact or no measurable impacts. | Either no impact or no measurable impacts. |
| Minor | A small and measurable<br>improvement in ecosystem health;<br>increase in the extent and quality of habitat for both special-status species and species common to the proposed project area;<br>increase in populations of species common to the proposed project area;<br>improvement in air or water quality; or<br>Benefits to cultural resources (historic properties that include archaeological sites, buildings, structures, objects, and districts that are listed or eligible for the NRHP) would passively preserve historic properties consistent with the Secretary's Standards for the Treatment of Historic Properties or passively create conditions to protect archaeological sites. | A small and measurable<br>improvement in human health;<br>benefits for employment (e.g., job creation, workforce development);<br>improvement to infrastructure/facilities and community services;<br>economic improvement; or<br>benefit for tourism or traditional cultural practices. |
| Moderate | A notable and measurable<br>improvement in local ecosystem health;<br>increase in the extent and quality of local habitat for both special-status species and species common to the proposed project area;<br>increase in individuals or populations of species common to the proposed project area;<br>improvement in air or water quality; or<br>Benefits to cultural resources would actively preserve historic properties (historic properties that include archaeological sites, buildings, structures, objects, and districts that are listed in or eligible for the NRHP) consistent with the Secretary's Standards for the Treatment of Historic Properties. | A notable and measurable<br>improvement in human health;<br>benefits for employment (e.g., job creation, workforce development);<br>improvements to facilities/infrastructure and community services;<br>economic improvement; or<br>benefit for tourism or traditional cultural practices. |
| Major | A regional or population-level<br>improvement in the health of ecosystems;<br>increase in the extent and quality of habitat for both special-status and commonly occurring species;<br>improvement in air or water quality; or<br>Benefits to cultural resources would rehabilitate, restore, or reconstruct historic properties consistent with the Secretary's Standards for the Treatment of Historic Properties, including cultural landscapes and traditional cultural properties. | A large local or notable regional<br>improvement in human health;<br>benefits for employment (e.g., job creation, workforce development);<br>improvements to facilities and community services;<br>economic improvement; or<br>benefit to tourism or traditional cultural practices |

Note: No potential for beneficial impacts to visual resources were identified; therefore, this resource category was not included in this table.

With regard to temporal extent, construction effects generally diminish once construction ends; however, ongoing O&M activities could result in additional impacts for the potential 35-year life of the Project. Additionally, Revolution Wind would have up to an additional 2 years to complete decommissioning activities. Therefore, the EIS considers the time frame beginning with construction and ending when the Project's decommissioning is complete, unless otherwise noted. Table 3.3-4 provides the duration terms used in the EIS.[18]

**Table 3.3-4. Definitions of Duration Terms**

| Duration Term | Definitions |
|---|---|
| Long-term effects | Effects that last for a long period of time (e.g., decades or longer, including impacts beyond the life of the Project). An example would be the loss of habitat where a foundation has been installed. |
| Short-term effects | Effects that extend beyond construction, potentially lasting for several months, but not for several years or longer. An example would be the clearing of onshore shrubland vegetation during construction; the area would be revegetated when construction is complete, and once revegetation is successful, this effect would end. |
| Temporary effects | Effects that end as soon as the activity ceases. An example would be road closures or traffic delays during onshore cable installation. Once construction is complete, the effect would end. |

Within the cumulative analysis, Table 3.3-5 provides the terms used in the EIS to describe the incremental impact of the action alternative in relation to the combined impacts from all ongoing and planned activities, including both non–offshore wind and offshore wind activities.

**Table 3.3-5. Definitions of Incremental Impact Terms**

| Term | Definitions |
|---|---|
| Undetectable | The incremental impact contributed by the action alternative to impacts from all ongoing and planned activities is so small that it is impossible or extremely difficult to discern. |
| Noticeable | The incremental impact contributed by the action alternative, although evident and observable, is still relatively small in proportion to the impacts from all ongoing and planned activities. |
| Appreciable | Appreciable: The incremental impact contributed by the action alternative constitutes a large portion of the impacts from all ongoing and planned activities. |

[18] NMFS (2021) recommends the following temporal definitions, which have been applied to benthic and EFH resource areas in this EIS: short term (less than 2 years); long term (2 years to < life of the Project); permanent (life of the Project or longer).

## 3.4 Air Quality

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to air quality from implementation of the Proposed Action and other considered alternatives.

## 3.5 Bats

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to bats from implementation of the Proposed Action and other considered alternatives.

# 3.6 Benthic Habitat and Invertebrates

## 3.6.1 Description of the Affected Environment for Benthic Habitat and Invertebrates

This section evaluates effects to benthic habitat and invertebrate resources within their respective GAAs under the No Action Alternative, which considers the current environmental baseline and probable future conditions regarding the development of planned and probable future offshore wind energy projects on the Mid-Atlantic OCS. These ongoing activities are expected to contribute to the potential cumulative effects of the Proposed Action and other action alternatives. The characterization of existing and likely future conditions presented herein is consistent with BOEM's guidance for evaluating cumulative effects analyses for offshore wind activities on the North Atlantic OCS (BOEM 2019).

While these two resources are described separately for the purpose of this EIS, it is important to recognize that invertebrates are an important component of benthic habitat. The factors that contribute to benthic habitat function comprise the physical mixture, or composition, of substrate types (e.g., bedrock, boulders, gravel, sand, and silt) and benthic habitat structure, which comprises both the three-dimensional structure of sediments (e.g., bedrock towers and boulder piles, ripples, and megaripples in fine sediment) and the structural complexity created by habitat-forming invertebrates and other organisms. For example, certain amphipods and worms live in dense colonies of individuals enclosed in tubes buried in sand and mud. The ends of these tubes are routinely exposed by mobile sediments, providing complex structure used as cover by juveniles of several fish species. Encrusting organisms like sponges and mussel colonies that form on cobbles and boulders similarly provide complex structure, cover, spawning habitat, and foraging opportunities for fish and other invertebrates. The duration of impacts to benthic habitat from different construction activities is best understood as the time required for habitat-forming invertebrates to recover from the associated disturbance.

### 3.6.1.1 Benthic Habitat

Geographic analysis area: The GAA for benthic habitat has been defined to reflect the limited extent of impacts from Project activities on the structure and composition of the seafloor. This definition was selected because the GAA captures the extent of benthic habitat occurring within the footprint of Project activities because the seafloor sediments that comprise benthic habitats do not move or migrate at regional scales like other biological resources. This area also accounts for some transport of water masses, sediment transport, and benthic invertebrate larval transport due to ocean currents. The GAA is defined for the purpose of describing the composition of benthic habitat relevant to the effects analysis presented herein and is used primarily for analysis of cumulative impacts on this resource. Impacts to benthic habitat structure, which includes the contribution of habitat-forming organisms to benthic habitat function and impacts to finfish and EFH species that rely on these habitats, are addressed in the Environmental Consequences sections for those resources, respectively.

The GAA for benthic habitat comprises the maximum work area; selected control and reference areas for monitoring activities under the Project fisheries research and monitoring plan (FRMP) (Revolution Wind and Inspire Environmental 2023); 5,650-foot and 6,550-foot buffers on either side of the RWEC in federal and state waters, respectively; and a 1,500-foot buffer on either side of the IAC corridor over the entirety of its length, including the foundation and scour protection footprints; and a 1,500-foot buffer around the OSS-link cables over the entirety of their lengths. These areas are shown in Figure 3.6-1. FRMP survey activities will be randomly distributed within their associated control and reference areas.

As such, those areas do not represent an anticipated impact footprint; rather, they represent the broader area in which limited effects will occur. The RWEC, IAC, and OSS-link impact buffers represent the maximum extent of measurable impacts on benthic habitat composition resulting from Project construction and operations. The associated IPFs include bottom-disturbing activities such as anchoring, seafloor preparation, cable and foundation installation, and placement of cable and scour protection that would lead to localized changes in the composition and three-dimensional structure of seafloor sediments. This includes areas affected by the deposition of suspended sediments from construction-related seafloor disturbance resulting from deposition of suspended sediments disturbed during construction exceeding 0.003 inch (0.1 millimeter [mm]) in depth. They also include operational effects from the presence of structures that would lead over time to changes in seafloor composition, specifically the composition and three-dimensional structure of sediment types around WTG and OSS foundations resulting from reef effects. The encompassed area shown on Figure 3.6-1 that lies between the FRMP monitoring sites and the impact buffers within the RWF and RWEC are outside the likely extent of impacts to benthic habitat composition and are not included in the GAA.

It is important to recognize that certain habitat-forming invertebrates and other organisms that live in and on seafloor sediments are an important part of benthic habitat structure. Impacts to these organisms are influenced by and extend beyond impacts to benthic habitat composition. Because the geographic range and population structure of these organisms are influenced by oceanic currents and stratification patterns, the geographic extent of potential cumulative impacts on invertebrates that contribute to benthic habitat structure is necessarily broader than that for substrate composition and are analyzed separately. The GAA for invertebrates, including habitat-forming invertebrates, is described in Section 3.6.1.2.

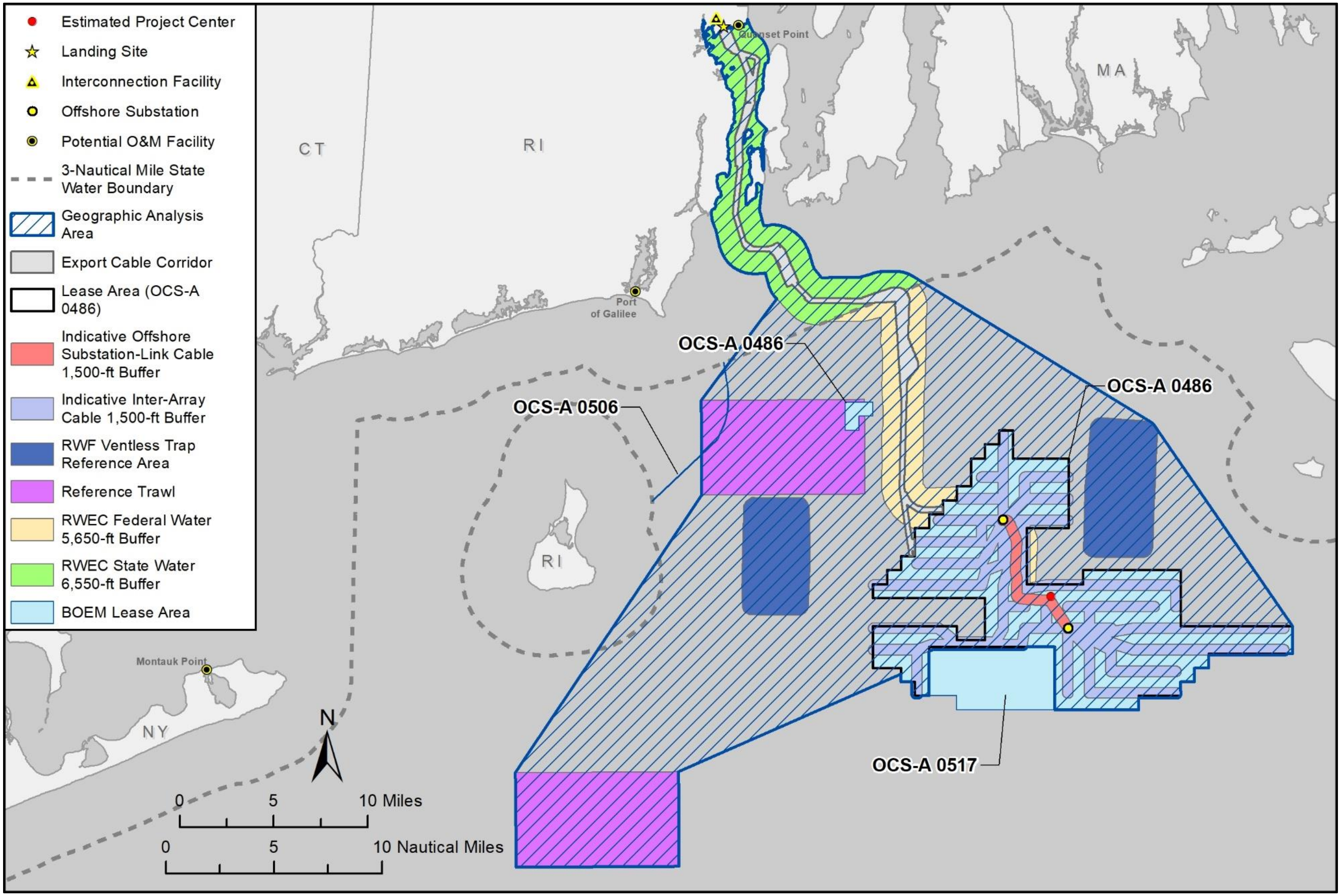


**Figure 3.6-1. Geographic analysis area for benthic habitat.**

Affected environment: The Mid-Atlantic Regional Council on the Ocean (MARCO) (2019), BOEM (Guida et al. 2017), and Revolution Wind (Fugro 2021) conducted large-scale general benthic habitat mapping within the RWF and along the RWEC corridor. Inspire Environmental (2023) characterized site-specific benthic habitat conditions by combining photographic surveys with side-scan sonar and backscatter data collected by Fugro (2021) to support the EFH analysis. Inspire Environmental (2021a, 2023) has characterized substrate composition using the Coastal and Marine Ecological Classification Standard (CMECS) (Federal Geographic Data Committee [FGDC] 2012) and mapped benthic habitat to support analysis of impacts on living marine resources following NMFS (2021a). The areas mapped by Inspire Environmental (2023) comprise the RWF maximum work area and the RWEC installation corridor. These represent the areas wherein impacts from RWF and RWEC construction and O&M may occur and not the anticipated extent of those impacts. Habitat composition within these areas is presented for the purpose of describing the environmental baseline. The impacts of the Proposed Action and the other action alternatives would be contained entirely within the areas shown.

For the purposes of analysis, the marine substrates of the affected environment are consolidated into three habitat types: 1) large-grained complex habitat, 2) complex habitat, and 3) soft-bottom habitat. These habitat types are based on substrate size and composition and their use by marine organisms. The distribution of these habitat types within the RWF maximum work area and the RWEC installation corridor is displayed in Figures 3.6-2 and 3.6-4, respectively, and summarized in Table 3.6-1. Large-grained complex habitat is composed primarily of hard surfaces in the form of large boulders and bedrock, often in a matrix of finer sediments. Complex habitat comprises a diversity of habitat types, including small boulders; cobbles and coarse gravel; shell hash; substrate matrices composed predominantly of boulders, cobbles, and pebbles mixed with patches of finer material (e.g., pebbles in a sand matrix); and/or submerged aquatic vegetation. Complex habitats provide a mixture of hard surfaces and fine material that provide habitat for many different species. Invertebrate species that encrust or attach themselves to the hard surfaces provided by immobile boulders and cobbles are important components of complex benthic habitat. Soft-bottom benthic habitat is composed of silt, sand, sandy mud, mud, and muddy sand areas and does not include a substantial portion of coarse-grained sediment, although scattered boulders and patches of gravels and small cobbles are commonly present. Boulder fields and scattered boulders are important components of benthic habitat, providing hard surfaces available for colonization by habitat-forming organisms. The distribution of medium-density (246–491 boulders/acre) and low-density (50–245 boulders/acre) boulder fields and scattered surficial boulders (< 50 boulders/acre) within the RWF maximum work area and RWEC installation corridor are shown in Figures 3.6-3 and 3.6-5, respectively.

All seafloor sediments except for bedrock and large boulders are mobile to varying degrees and are continually reshaped by bottom currents (Butman and Moody 1983; Daylander et al. 2012) and biological activity. These processes form features like sandwaves and ripples that are used by many different fish species (Langton et al. 1995). For example, mobile sediment waves form natural depressions and can expose biological structures like amphipod tubes. These features provide refuge from currents and complex cover for small fish and are components of designated EFH for some species, such as red and silver hake. BOEM (2020a) defines ripples as sediment waves less than 1.6 feet high, megaripples are sediment waves between 1.6 and 4.9 feet high, and sandwaves are sediment waves greater than 4.9 feet high. No sandwaves were observed in the RWF maximum work area or RWEC corridor, but ripples and megaripples are common. These features were observed in nearly 100% of soft-bottom habitat and were present in over 90% of large-grained complex and complex habitats (Inspire Environmental 2023).

**Table 3.6-1. Proportional Distribution of Benthic Habitat Types within the Revolution Wind Farm Maximum Work Area and Revolution Wind Export Cable Installation Corridor and the Proportional Composition of Mapped Area by Benthic Habitat Type**

| Project Component | Total Mapped Area (acres) | Large-Grained Complex (%) | Complex (%) | Soft-Bottom (%) | Anthropogenic (%) |
|---|---|---|---|---|---|
| RWF maximum work area | 58,143 | 19.1% | 30.0% | 50.8% | 0.0% |
| RWEC – OCS installation corridor | 5,028 | 0.6% | 32.1% | 67.2% | 0.0% |
| RWEC – RI installation corridor | 5,728 | 3.1% | 14.3% | 82.2% | 0.5% |

### 3.6.1.2 Invertebrates

Geographic analysis area: The intent of the GAAs used in this EIS is to define a reasonable boundary for assessing the potential effects, including cumulative effects, resulting from the development of an offshore wind energy industry on the Mid-Atlantic OCS. Given this, the GAA for invertebrates considers the effects of the Proposed Action as well as potential effects from other planned or proposed actions. GAAs for marine biological resources are necessarily large because marine populations range broadly and cumulative impacts can be expressed over broad areas. GAAs are not used as a basis for analyzing the direct and indirect effects of the Proposed Action, which represent a subset of these broader effects and expressed over a smaller area. These impacts are analyzed specific to each IPF.

The GAA for invertebrates is shown in Figure 3.13-1. This analysis area is the same for finfish and EFH resources, encompassing the Scotian Shelf, Northeast Shelf, and Southeast Shelf Large Marine Ecosystems, which captures the likely extent of adult and juvenile movement and egg and larval dispersal patterns within U.S. waters for most species in this group. The invertebrate GAA encompasses the extent of potential effects on habitat-forming organisms that comprise an important component of benthic habitat structure. Therefore, while Project-related impacts to benthic habitat composition are restricted to a relatively small geographic area, the GAA for impacts to habitat-forming organisms is necessarily large. Because the GAA for invertebrates is large, the focus of the analysis in this EIS is on those species that are likely to occur in the vicinity of the proposed RWF and RWEC on an at least infrequent basis and could be impacted by Project activities.

Affected environment: For the purposes of the EIS, marine invertebrates are grouped into three categories: 1) pelagic invertebrates, specifically squid and pelagic invertebrate eggs and larvae; 2) benthic invertebrates associated with soft sediments (i.e., soft-bottom benthic habitat); and 3) benthic invertebrates associated with hard surfaces, such as boulders, cobble, and coarse gravel (i.e., complex benthic habitat). Certain invertebrates in the latter two groups comprise and/or form complex structures that provide habitat for fish and other marine organisms and are therefore an important component of benthic habitat structure.

Squid, specifically longfin squid (*Doryteuthis pealeii*) and shortfin squid (*Illex illecebrosus*), are the pelagic invertebrate species likely to occur in the GAA during their juvenile and adult life stages (Cargnelli et al. 1999; Lowman et al. 2021). Squid eggs, most likely longfin squid, were observed at survey locations within the RWF footprint (Inspire Environmental 2021a), indicating that this species spawns in the vicinity. Squid attach their eggs to bottom substrates and use both complex and soft-bottom benthic habitats for spawning. Numerous benthic invertebrate species have pelagic eggs and larvae and rely on currents to disperse their offspring to distant habitats from where spawning occurs (e.g., Chen et al. 2021; McCay et al. 2011; Munroe et al. 2018; Roarty et al. 2020; Zhang et al. 2015). These dispersed eggs and larvae are also a component of EFH as they form part of the prey base for a variety of species during one or more life stages.

Soft-sediment invertebrates create a permanent or semipermanent home in the bed sediments. Most of these invertebrates possess specialized organs for burrowing, digging, embedding, tube building, anchoring, or locomotion in soft substrates. Some species are capable of moving slowly over the bed surface on soft substrates, but these species are generally not able to travel across hard substrates for long periods. Soft-sediment invertebrates include various types of annelid worms (oligochaetes and polychaetes), flatworms (Platyhelminthes), and nematodes (Nematoda); crustaceans, such as burrowing amphipods (Amphipoda), mysids (Mysida), copepods (Copepoda), and crabs (Brachyura); echinoderms, including sand dollars (Clypeasteroida), starfish (Asteroidea), and sea urchins (Echinoidea); and bivalve mollusks (Pelecypoda) (FGDC 2012; Inspire Environmental 2019). Economically important species, including Atlantic sea scallop (*Placopecten magellanicus*), bay scallop (*Argopecten irradians*), horseshoe crab (*Limulus polyphemus*), Atlantic surfclam (*Spisula solidissima*), squid, and ocean quahog (*Arctica islandica*), are associated with soft sediments on the Mid-Atlantic OCS.

Invertebrates associated with hard substrates are found on the different types of complex habitat defined in Section 3.6.1.1 (i.e., large-grained complex and complex habitats). This group includes a diversity of species, such as members that firmly attach to hard surfaces or that crawl, rest, and/or cling to the surface of and/or shelter in the interstitial spaces between cobbles and boulders. Attached invertebrates use structures like pedal discs, cement, and byssal threads to attach to hard surfaces. Nonattached organisms use feet, claws, appendages, spines, suction, negative buoyancy, or other means to stay in contact with the hard substrate and may or may not be capable of slow movement over the surface. Examples of attached invertebrates include sea anemones, barnacles, corals, sponges, hydroids, bryozoans, mussels, and oysters. Examples of non-attached organisms include crabs, small shrimp, amphipods, starfish, and sea urchins (FGDC 2012; Inspire Environmental 2021a). Some economically important invertebrate species—notably, American lobster (*Homarus americanus*; also referred to as lobster)—are associated with hard substrates. Both soft-sediment and hard-surface invertebrate species are likely to be present within complex benthic habitat, with the former using patches of soft substrate commonly found in this habitat type. Soft-sediment invertebrates would be largely dominant in soft-bottom habitats, although some hard-surface species may occur on scattered hard surfaces where they are available.

Several commercially important invertebrate species, such as lobster, Atlantic sea scallop, longfin inshore squid and shortfin squid, and ocean quahog, occur within the RWF and RWEC portions of the GAA (Inspire Environmental 2021b). Invertebrates are also targeted by recreational fisheries, typically close (within 1 mile) to shore (see Section 3.18). Many invertebrate species found in nearshore marine and estuarine environments were historically used by the region's Native American tribes (Bennett 1955) and are currently targeted tribal subsistence fisheries (BOEM 2020b).

The affected environment for invertebrates is influenced by commercial and recreational harvest of certain invertebrate species (e.g., squid, lobster), benthic habitat modification and disturbance by activities like vessel anchoring and bottom-disturbing fishing methods, and regional shifts in biological community structure caused by climate change trends. Some commercial fishing methods, specifically scallop and clam dredges and bottom trawling, are a source of chronic disturbance of seafloor habitats. Depending on the frequency of disturbance, this type of fishing activity can impact community structure and diversity and limit recovery over long-term periods (BOEM 2023; Grabowski et al. 2014; Henriques et al. 2014; Nilsson and Rosenberg 2003; Rosenberg et al. 2003). The severity and rate of recovery from fishing-related disturbance is variable and dependent on the type of gear used and the nature of the affected benthic habitat.

### 3.6.2 Environmental Consequences

#### 3.6.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

The analysis presented in this section considers the impacts resulting from the maximum-case scenario under the PDE approach developed by BOEM to support offshore wind project development (Rowe et al. 2017). The maximum-case scenario specifications defined in Appendix D, Table D-1 are PDE parameters used to conduct this analysis. Several Project parameters could change during the development of the final Project configuration, potentially reducing the extent and/or intensity of impacts resulting from the associated IPFs. The design parameters in Table 3.6-2 would result in reduced impacts relative to those generated by the design elements considered under the PDE.

**Table 3.6-2. Project Design Parameters That Could Reduce Impacts**

| Design Parameter | Description |
|---|---|
| Fewer WTGs could be permitted | This would result in fewer offshore structures and reduced IAC length. This would reduce the extent of short-term to permanent impacts on benthic habitat and invertebrates by<br>reducing the extent of benthic habitat disturbance and suspended sediment deposition impacts from installation of foundations, cables, and scour and cable protection, and associated vessel anchoring activities;<br>reducing the extent and duration of underwater noise impacts from WTG foundation installation; and<br>reducing the extent of reef and hydrodynamic effects resulting from structure presence. |
| Foundation and cable micrositing | Foundation locations and cable routing could be modified to avoid and minimize certain habitat impacts to the greatest extent practicable within design limits. This would reduce long-term to permanent impacts to benthic habitat and invertebrates by reducing the extent of disturbance in large-grained complex and complex habitats. |
| The use of a casing pipe method to construct the RWEC sea-to-shore transition | This would eliminate the need for a temporary cofferdam, resulting in less extensive acoustic and vibration impacts than vibratory pile driving to construct a cofferdam (Zeddies 2021). |

| Design Parameter | Description |
| --- | --- |
| The use of a temporary cofferdam for RWEC sea-to-shore transition construction | This would reduce sediment deposition and burial effects on invertebrates. |

See Appendix E1 for a summary of IPFs analyzed for benthic habitat and invertebrates across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible effect are excluded from Chapter 3 and provided in Appendix E, Table E2-3. The duration of impacts disclosed for this resource deviate slightly from general guidelines provided in Section 3.3 (see footnote in Section 3.6.2.2.2). Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives. Table 3.6-3 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. These analyses consider the implementation of all EPMs proposed by Revolution Wind to avoid and minimize impacts to benthic habitat and invertebrates. These EPMs are summarized in Appendix F, Table F-1. Additional EMPs that BOEM could propose, as well as EMPs agreed upon through consultations and agency-to-agency negotiations, are summarized in Appendix F, Tables F-2 and F-3.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. For benthic resources and invertebrates, onshore Project activities would not result in impacts to marine resources. Therefore, onshore impacts would have no measurable effects on relevant habitats or species and are not evaluated below.

It is important to note that the impact analyses for benthic habitat and invertebrates are necessarily interrelated because habitat-forming invertebrates are an integral component of benthic habitat structure. For example, the tubes formed around burrows created by certain sand- and mud-dwelling invertebrates are commonly exposed by sediment mobility, creating complex three-dimensional cover. Corals, sponges, hydroids, barnacles, and other types of invertebrates that attach to hard substrates like cobbles and boulders similarly create complex cover and habitat. These invertebrate-created features are important components of benthic habitat structure used by a diversity of fish and other organisms. Therefore, many IPFs are discussed only in terms of their potential effects on invertebrates, as short-term or longer duration impacts to benthic habitat structure are the result of effects on habitat-forming invertebrates.

The conclusion section within each alternative analysis discussion includes rationale for the overall effect call determination. The Proposed Action and all other action alternatives would result in **moderate** adverse and **moderate** beneficial impacts on benthic resources and invertebrates in the GAA because a notable and measurable impact is anticipated, but the resource would likely recover completely when the impacting agents were gone and remedial or mitigating action were taken.

**Table 3.6-3. Alternative Comparison Summary for Benthic Habitat and Invertebrates**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| **Benthic Habitat** | | | | | | | |
| Anchoring and new cable emplacement/ maintenance | **Offshore**: Under the No Action Alternative, the Project would not be constructed and no Project-related vessel anchoring or cable emplacement activities would occur. If no other offshore wind project–related activities occur in the GAA, the impacts of this IPF would be **negligible** adverse. Should future projects include anchoring and cable placement activities within the GAA, **minor** adverse impacts on benthic habitats could result from this IPF. | **Offshore**: Seafloor preparation (boulder relocation) and cable installation activities during construction would impact approximately 246 and 501 acres of large-grained complex and complex habitat, respectively, and 1,297 acres of soft-bottom habitat within the RWF and RWEC construction footprints. This seafloor disturbance would constitute short- to long-term impacts and long-term habitat modification that would constitute a **minor** adverse impact to benthic habitat.<br>The IAC, OSS-link cable, and RWEC would not require routine maintenance, but up to 10% of cable protection could need to be replaced over the life of the Project. Cable protection maintenance and the eventual decommissioning and removal of buried cables would produce direct disturbance of the seafloor, suspended sediment deposition in the surrounding area, and injury and displacement of invertebrates using these habitats. These O&M impacts would be short term in duration and would recover over time without mitigation and would therefore be **minor** adverse.<br>There would be no cumulative impacts from this IPF associated with other planned and foreseeable future wind energy projects. BOEM estimates a total of 3,204 acres of anchoring and mooring-related disturbance and 2,043 acres of cabling-related disturbance for the Proposed Action within the benthic GAA. Short-term disturbance impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 30 months, whereas impacts in complex benthic habitats could be long term to permanent. Long-term impacts to habitat-forming organisms in complex habitats would require several years to recover full habitat function. Permanent habitat impacts would result where seafloor preparation and placement of scour protection result in conversion to a new habitat type. While habitat structure may be altered, habitat composition in the affected areas would recover to functional condition over the life of the Project. Therefore, the Proposed Action when combined with past, present, and reasonably | **Offshore**: See Section 3.6.2.6.1 for construction impact analysis.<br>Anchoring and cable maintenance O&M effects on benthic habitat from Alternatives C through F would be similar to but reduced in extent from the Proposed Action. The distribution of habitat impacts would vary between alternatives, with the two proposed configurations of Alternative C producing the greatest reduction in impacts to large-grained complex and complex habitats. In terms of significance, impacts to benthic habitat would be similar across alternatives: **minor** adverse.<br>Alternatives C through F when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to benthic habitats under all proposed configurations. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could take several years to recover to full habitat function. | | | | **Offshore**: See Section 3.6.2.9.1 for construction impact analysis.<br>Anchoring and cable maintenance O&M effects on benthic habitat would be similar to but reduced in extent from the Proposed Action. Alternative G would decrease the estimated extent of benthic impacts by over 940 acres relative to the Proposed Action and would increase the proportional distribution of impacts occurring in soft-bottom habitat from 57.8% to 67.4%. Alternatives G1 through G3 would reduce benthic habitat impacts by an additional 479 to 488 acres relative to the base Alternative G. In terms of significance, impacts to benthic habitat would be similar across alternatives: **minor** adverse.<br>When combined with past, present, and reasonably foreseeable projects, the base configuration of Alternative G and Alternatives G1 through G3 would result in **minor** to **moderate** adverse cumulative impacts to benthic habitats under all proposed configurations. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could take several years to recover to full habitat function. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | | foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to benthic habitats. | | | | | |
| Climate change | **Offshore**: Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These changes could indirectly affect benthic habitat structure and composition through a variety of mechanisms. For example, changes in freshwater runoff rates and the frequency of large storm events could change the rate of delivery of fine sediments to nearshore environments and sediment transport patterns in the offshore environment. These trends are expected to continue under the No Action Alternative. The severity of impacts on benthic habitat resulting from climate change trends are uncertain but are anticipated to range from **minor** to **moderate** adverse and would be effectively permanent. | **Offshore**: The types of impacts from global climate change trends described for the No Action Alternative would occur under the Proposed Action, but the Proposed Action could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would be expected to help reduce climate change impacts. When combined with other past, present, and reasonably foreseeable actions, climate change trends would result in **moderate** adverse cumulative impacts to benthic habitat. | **Offshore**: The types of impacts from global climate change trends described for the No Action Alternative would occur under Alternatives C through F but, as with the Proposed Action, these alternatives could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would be expected to help reduce climate change impacts. When combined with other past, present, and reasonably foreseeable actions, climate change trends would result in **moderate** adverse cumulative impacts to benthic habitat under all proposed configurations of Alternatives C through F. | | | | **Offshore**: The types of impacts from global climate change trends described for the No Action Alternative would occur under all proposed configurations of Alternative G, but, as with the Proposed Action, these alternatives could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would be expected to help reduce climate change impacts. When combined with other past, present, and reasonably foreseeable actions, climate change trends would result in **moderate** adverse cumulative impacts to benthic habitat under all proposed configurations of Alternative G. |
| Presence of structures | **Offshore**: Under the No Action Alternative, the Project would not be constructed and no Project-related structures would be placed within the benthic habitat GAA. No associated effects would occur in the GAA and therefore the impacts of this IPF would be **negligible** adverse. | **Offshore**: The installation of 102 offshore structures in the form of monopile foundations with associated scour protection would result in the direct disturbance of benthic habitats. These impacts would be long term in duration, but the affected habitats would develop into functional complex habitat over time as they are colonized by habitat-forming invertebrates. Habitats would recover after structures are decommissioned and removed. Therefore, the presence of structures would result in a long-term **moderate** adverse effect on benthic habitat during construction.<br>During O&M, the Proposed Action would permanently alter benthic habitats within the GAA, generating an array of effects on benthic habitat function. Soft-bottom habitats would be permanently displaced while effects on large-grained complex and complex benthic habitats would range from short term to long term or permanent. Some benthic species could recolonize new hard surfaces within 2 to 4 years while others take up to a decade or more to recover from damage and/or colonize new surfaces like concrete mattresses. This would constitute a long-term | **Offshore**: See Section 3.6.2.6.1 and 3.6.2.6.2 for construction and O&M impacts.<br>Alternatives C through F would result in the installation of 56 to 93 new offshore wind energy structures in the GAA, resulting in the long-term alteration of benthic habitat composition by foundations, scour protection, and cable protection. For comparison, Alternatives C and E would reduce seafloor disturbance during construction by 7% to up to 35%; Alternative D would reduce seafloor disturbance from foundation construction by up to 21.6%; and Alternative E would reduce seafloor disturbance by up to 34%, as compared to the maximum-case scenario for the Proposed Action. Implementation of Alternative F in conjunction with Alternatives C, D, and E would further reduce seafloor disturbance for these alternatives by up to 8%, 21.5%, and 8%, respectively. The resulting impacts would be limited in extent to the area of influence around each foundation but would be long term in duration. BOEM anticipates that hydrodynamic impacts of Alternatives C, D, and E would be broadly similar to those under the Proposed Action, with some variation in distribution and extent due to differences in the number and location of foundations. However, Alternative C and corresponding configurations of Alternative F would avoid impacts to sensitive large-grained complex habitats in the center of the Lease Area to a greater extent than Alternatives D and E. Hydrodynamic effects from Alternative F would be similar to those from the selected alternative configuration but could vary slightly due to differences in WTG rotor height. On this basis, reef and hydrodynamic effects from the presence of structures under Alternatives C through F would contribute to cumulative long-term effects on benthic habitat that would range from **moderate** beneficial to **minor** to **moderate** adverse. | | | | **Offshore**: See Sections 3.6.2.4.1 and 3.6.2.4.2 for construction and O&M impacts.<br>The base configuration of Alternative G would result in the installation of 67 new offshore wind energy structures in the GAA, resulting in the long-term alteration of benthic habitat composition by foundations, scour protection, and cable protection. Alternatives G1 through G3 would each result in the installation of 65 WTG and two OSS structures. The base configuration of Alternative G and Alternatives G1 through G3 would reduce seafloor disturbance from foundation construction by 21% to 34%, respectively, as compared to the maximum-case scenario for the Proposed Action. The resulting impacts would be limited in extent to the area of influence around each foundation but would be long term in duration. BOEM anticipates that hydrodynamic impacts of Alternative G would be broadly similar to those under |

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|---|---|---|---|---|---|---|---|
| | | reduction in benthic habitat function. In contrast, biologically productive reef effects would likely develop within 3 to 4 years after construction, continuing to mature over the life of the Project. These effects could be **minor** to **moderate** adverse or **moderate** beneficial, depending on how benthic habitat change influences the broader biological community.<br>There would be no cumulative impacts from this IPF associated with other planned and foreseeable future wind energy projects. The alterations in substrate composition resulting from the Proposed Action described above would be limited to the area of influence around each foundation but would be long term in duration, as changes in substrate composition from the accumulation of shell hash and altered substrate chemistry would continue to persist after the structures are removed during decommissioning. As such, reef effects from the presence of structures would result in cumulative long-term effects on benthic habitat and would range from **moderate** beneficial to **minor** to **moderate** adverse. | | | | | the Proposed Action, with some variation in distribution and extent due to differences in the number and location of foundations. As such, reef and hydrodynamic effects from the presence of structures under Alternative G would contribute to cumulative long-term effects on benthic habitat that would range from **moderate** beneficial to **minor** to **moderate** adverse. |
| **Invertebrates** | | | | | | | |
| Accidental releases and discharges | **Offshore**: Offshore wind energy development could result in the accidental release of water quality contaminants or trash/debris, which could theoretically lead to an increase in debris and pollution in the invertebrate GAA. However, the combined impacts on invertebrate resources (mortality, decreased fitness, disease) from accidental releases and discharges are expected to be minimal, localized, and short term due to the likely limited extent and duration of a release. On this basis, the effects of this IPF on invertebrates under the No Action Alternative would be **negligible** adverse. | **Offshore**: BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operations of offshore energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of environmentally damaging trash or debris (MARPOL, Annex V, Public Law 100–220 (101 Stat. 1458)). Given these restrictions, the risk to invertebrates from trash and debris from the Project, including habitat-forming invertebrates that contribute to benthic habitat structure, is **negligible** adverse. In the unlikely event that accidental spills should occur, adverse impacts to benthic habitats could range from **minor** to **moderate** adverse in significance depending on the size of the spill and the nature of the materials involved.<br>When combined with other offshore wind projects, up to approximately 34 million gallons of coolants, fuels, oils, and lubricants could cumulatively be stored within WTGs and OSSs in the invertebrate GAA. All vessels associated with the Proposed | **Offshore**: Given restrictions on the discharge or disposal of solid debris, as described for the Proposed Action, effects on invertebrates and on benthic habitat structure through impacts on habitat-forming invertebrates from trash and debris under Alternatives C through F would be **negligible** adverse. The Project would follow strict oil spill prevention and response procedures during all phases, effectively avoiding the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that an unforeseen accident results in a high-volume spill, **minor** to **moderate** adverse effects on invertebrates and on benthic habitat structure through impacts on habitat-forming invertebrates could potentially result. Those impacts could range from short term to long term in duration, depending on the size of the accident, the nature of the materials involved, and the type and location of habitat impacts.<br>Alternatives C through F could slightly reduce total chemical uses relative to the Proposed Action, but this effect would be small in comparison to projected chemical use on the Mid-Atlantic OCS. All future offshore energy development projects would comply with BOEM and USCG regulations that prohibit dumping of trash and debris and require measures to avoid and minimize accidental spills. This would minimize, but not completely eliminate the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse cumulative effects on invertebrates could potentially result. | | | | **Offshore**: Given restrictions on the discharge or disposal of solid debris, as described for the Proposed Action, effects on invertebrates and benthic habitat structure through impacts on habitat-forming invertebrates from trash and debris would be the same under all configurations of Alternative G as for Alternatives C through F: **negligible** adverse. In the unlikely event that an unforeseen accident results in a high-volume spill, **minor** to **moderate** adverse effects on invertebrates could result under the same rationale presented for Alternatives C through F.<br>Alternative G could slightly reduce total chemical uses relative to the Proposed Action, but this effect would be small in comparison to projected chemical use on the Mid-Atlantic OCS. Based on the same rationale presented for Alternatives C through F, the risk of large-scale, |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | | Action and other offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. However, higher volume spills of toxic materials could occur due to unanticipated events, such as a vessel allision with a WTG foundation. When low-probability, unanticipated events are considered, the Proposed Action when combined with other past, present, and reasonably foreseeable projects, poses a potential for **minor** to **moderate** adverse cumulative impacts on invertebrates that could range from short term to long term in duration. | | | | | environmentally damaging spills under reasonably foreseeable circumstances is very low but cannot be completely discounted. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse cumulative effects on invertebrates could potentially result. |
| Anchoring and new cable emplacement/ maintenance | **Offshore**: Offshore energy facility construction would involve direct disturbance of the seafloor, leading to direct impacts on invertebrates. In general, however, these effects would be localized to the disturbance footprint and vicinity. The severity of these effects would vary depending on the species and life stage sensitivity to specific stressors that extend into the area, resulting in **minor** adverse impacts on invertebrates. | **Offshore**: Seafloor preparation, cable trenching, dredging, vessel anchoring, and short-term bed disturbance at the sea-to-shore transition site would directly disturb soft-bottom benthic habitat by crushing and displacing epifaunal organisms on the bed surface and liquifying sand and mud sediments from the bed surface to depths of up to 6 feet, killing and displacing benthic infauna within the cable path. The Proposed Action includes several EPMs, listed in Table F-1 in Appendix F, that would limit, but not completely avoid, crushing, burial, and entrainment impacts on invertebrates. While some impacts would be unavoidable, the affected habitats would recover naturally over time, and impacts on invertebrates are unlikely to be measurable at the population level. Therefore, adverse impacts to invertebrates from this IPF during construction would be **minor** adverse**.**<br>Up to 10% of cable protection could need to be replaced over the life of the Project. The IAC, OSS-link cable, and RWEC would also be removed from the seafloor during Project decommissioning. Resulting effects from O&M and decommissioning would be short term in duration, and similar in nature but lesser in magnitude than those resulting from Project construction. Therefore, these adverse effects would be **minor** adverse**.**<br>BOEM estimates a cumulative total of 11,631 acres of anchoring and mooring-related disturbance and 105,390 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the benthic GAA. The duration and magnitude of these effects would vary depending on the types of habitats impacted. | Alternatives C through F would reduce the total length of IAC and anchoring relative to the Proposed Action, meaning that the total amount of construction- and maintenance-related impacts on invertebrates would decrease commensurately. This decrease would be noticeable in comparison to the Proposed Action. Impacts from decommissioning and removal of the IAC, including seafloor disturbance and TSS effects, would likewise be reduced relative to the Proposed Action. The resulting adverse effects from O&M and decommissioning would be similar in nature but lesser in magnitude than those resulting from Project construction and would therefore be **minor** adverse.<br>The reduction in total IAC length under Alternatives C through F and reduced O&M anchoring requirements for structure maintenance would noticeably decrease the cumulative impact acreage across projects relative to the Proposed Action, but the nature, duration, and general scope of effects would otherwise be similar. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could take up to a decade or more to fully recover. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to benthic habitats and habitat-forming invertebrates. | | | | The base configuration of Alternative G would reduce the total length of IAC from approximately 155.3 miles to 116.1 miles, and the total number of installed offshore wind structures from 102 to 82. This would result in a commensurate reduction in associated cable installation impacts and anchoring requirements for foundation installation relative to the Proposed Action. The distribution of impacts by habitat type would shift toward soft-bottom habitat and associated invertebrate species. Alternatives G1 through G3 would reduce IAC length by an additional 9.9 to 11.5 miles relative to the Proposed Action and would decrease the total number of structures to 67. As with Alternatives C through F, this would reduce the related extent of construction- and maintenance-related impacts on invertebrates. Similarly, Alternative G would result in fewer offshore wind structures and a commensurate reduction in maintenance-related anchoring requirements relative to the Proposed Action. Like Alternatives C through F, Alternative G would noticeably decrease the cumulative impact acreage across projects relative to the Proposed Action, but the nature, duration, and general scope of effects would otherwise be similar. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| | | Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could take up to a decade or more to fully recover. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts. | | | | | would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could take up to a decade or more to fully recover. Therefore, Alternative G when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to benthic habitats and habitat-forming invertebrates. |
| Climate change | **Offshore**: Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These changes have affected habitat suitability for the invertebrate community of the GAA. For example, several invertebrate species are shifting in distribution to the northeast, farther from shore and into deeper waters, in response to an overall increase in water temperatures and an increasing frequency of marine heat waves (NOAA 2021). These trends are expected to continue under the No Action Alternative. The intensity of adverse impacts resulting from climate change trends are uncertain but are anticipated to be **minor** to **moderate** adverse**.** | **Offshore**: Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These changes have affected habitat suitability for many invertebrates within the GAA. The intensity of climate change cumulative impacts on invertebrates are uncertain and are likely to vary considerably between species, resulting in **moderate** adverse effects. | **Offshore**: Climate change–related impacts to invertebrates under Alternatives C through F would be the same as those described for the Proposed Action. Ongoing trends associated with climate change, including increases in water temperature, ocean acidification, changes in runoff and circulation patterns, and species range shifts, are expected to continue. The intensity of climate change cumulative impacts on invertebrates is uncertain and is likely to vary considerably between species, resulting in **moderate** adverse effects. | | | | **Offshore**: Climate change–related impacts to invertebrates under Alternative G would be the same as those described for the Proposed Action. Ongoing trends associated with climate change, including increases in water temperature, ocean acidification, changes in runoff and circulation patterns, and species range shifts, are expected to continue. The intensity of climate change cumulative impacts on invertebrates is uncertain and is likely to vary considerably between species, resulting in **moderate** adverse effects. |
| EMF | **Offshore**: Under the No Action Alternative, up to 13,469 miles of cable would be added in the invertebrate GAA, producing EMF effects in the immediate vicinity of each cable during operations. BOEM would require these future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects from cable operation. Accordingly, long-term effects from Project-related EMFs on invertebrates that live in or directly on the seafloor could range from **negligible** to **minor** adverse for projects using HVAC transmission. | **Offshore**: Construction impacts would not result in EMF impacts. Operation of the IAC, OSS-link cable, and RWEC would generate EMF and substrate heating effects, altering the environment for benthic invertebrates and other organisms associated with those habitats. The evidence for EMF effects on invertebrates is equivocal, varying considerably between species and based on the type and strength of EMF source (Albert et al. 2020; Hutchison et al. 2020a, 2020b). Given this uncertainty, the potential permanent effects from Project-related EMFs on invertebrates that live in or directly on the seafloor could range from **negligible** to **minor** adverse.<br>BOEM anticipates that future offshore wind energy projects in the GAA would use HVAC (versus HVDC) transmission and apply similar design measures to those included in the Proposed Action avoid and minimize EMF effects on the environment. While | **Offshore**: See Section 3.6.2.7.2 for analysis of O&M impacts. Cable installation would not result in EMF impacts.<br>Alternatives C through F would generate EMF effects of varying intensity along the IAC, OSS-link cable, and RWEC length. These EMF effects would combine with those generated by the 13,717 miles of new and existing transmission cables from the other new offshore wind facilities planned on the Mid-Atlantic OCS as well as other existing transmission cables. These cumulative effects would be similar in nature to those described for the No Action Alternative but would occur over a larger area, as determined by the broader project footprint. Cumulative impacts to invertebrates would therefore range from **negligible** to **minor** adverse. | | | | **Offshore**: See Section 3.6.2.9.2 for analysis of O&M impacts. Cable installation would not result in EMF impacts.<br>Alternative G would generate EMF effects of varying intensity along the IAC, OSS-link cable, and RWEC length. These EMF effects would combine with those generated by the 13,717 miles of new and existing transmission cables from the other new offshore wind facilities planned on the Mid-Atlantic OCS as well as other existing transmission cables. These cumulative effects would be similar in nature to those described for the No Action Alternative but would occur over a larger area, as determined by the broader project footprint. Cumulative impacts to invertebrates would therefore range from **negligible** to **minor** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| | | uncertainties remain, cumulative adverse impacts to invertebrates from EMF and substrate heating effects are likely to be **minor** adverse**.** | | | | | |
| Light | **Offshore**: Artificial light can attract mobile invertebrates and can influence biological functions (e.g., spawning) that are triggered by changes in daily and seasonal daylight cycles (Davies et al. 2015; McConnell et al. 2010). BOEM has issued guidance for avoiding and minimizing artificial lighting impacts from offshore energy facilities and associated construction vessels (BOEM 2021a; Orr et al. 2013) and has concluded that adherence to these measures should effectively avoid adverse effects on invertebrates. Given the minimal and localized nature of lighting effects anticipated under this guidance, the related effects from proposed future activities on invertebrates, including habitat-forming invertebrates that contribute to benthic habitat structure, are likely to be **negligible** adverse. | **Offshore**: Lights would be required on offshore platforms and structures, vessels, and construction equipment during construction and O&M of the RWF. Construction vessel lighting has the potential to affect invertebrates. Many invertebrates are attracted to and/or respond behaviorally to light in the environment, and exposure to artificial light can alter biological responses (e.g., spawning) that are triggered by changes in day length and light intensity (Davies et al. 2015; McConnell et al. 2010). Consistent with BOEM guidance (BOEM 2021a; Orr et al. 2013), construction vessels would implement lighting design and operational measures to eliminate or reduce lighting impacts on the aquatic environment. Although individual invertebrates could detect light from vessels and could exhibit behavioral responses (e.g., squid being attracted to the lights), these impacts are not expected to measurably affect invertebrates at population levels because of the limited area of impact at any given time and the limited duration of Project activities. Any resulting adverse impacts on invertebrates would be short term in duration and biologically insignificant, and therefore **negligible** adverse**.**<br>All future projects would also be expected to comply with BOEM design guidance for avoiding and minimizing adverse lighting impacts on the environment. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be similar to those impacts described under the No Action Alternative: **negligible** adverse. | **Offshore**: Alternatives C through F would reduce the total length of IAC and the number of offshore wind energy structures relative to the Proposed Action. This would result in a commensurate reduction in the duration of construction vessel activity and related short-term lighting impacts. Construction vessels would implement the same lighting design and operational measures to reduce lighting impacts as under the Proposed Action. The level of impact would therefore be similar in nature but reduced in extent relative to the Proposed Action: **negligible** adverse.<br>Artificial light from structures during Project operations and from vessels used for O&M and decommissioning could affect invertebrates, including habitat-forming invertebrates that contribute to benthic habitat structure. Given the minimal and localized nature of anticipated lighting effects, however, any indirect effects on invertebrates from light generated during O&M and decommissioning are expected to be **negligible** adverse.<br>BOEM estimates a cumulative total of 3,146 to 3,183 offshore WTGs and OSS foundations for the Project plus all other future offshore wind projects in the invertebrate GAA. The RWF and all future projects would be expected to comply with BOEM design guidance for avoiding and minimizing adverse lighting impacts on the environment. Therefore, the cumulative impacts associated with Alternatives C through F when combined with past, present, and reasonably foreseeable activities would **negligible** adverse, mostly attributable to existing, ongoing activities. | | | | **Offshore**: Like Alternatives C through F, Alternative G would reduce the total length of IAC and the number of offshore wind energy structures relative to the Proposed Action. Based on the same rationale presented for Alternatives C through F, lighting impacts to invertebrates from construction of Alternative G would be similar in nature but reduced in extent relative to the Proposed Action: **negligible** adverse.<br>As with Alternatives C through F, lighting effects under Alternative G are anticipated to be minimal and localized. Therefore, any indirect effects on invertebrates from light generated during O&M and decommissioning are expected to be **negligible** adverse.<br>BOEM estimates a cumulative total of 3,155 offshore WTGs and OSS foundations for Alternative G, plus all other future offshore wind projects in the invertebrate GAA. RWF and all future projects would be expected to comply with BOEM design guidance for avoiding and minimizing adverse lighting impacts on the environment. Therefore, the cumulative impacts associated with Alternative G when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse, mostly attributable to existing, ongoing activities. |
| Noise | **Offshore**: Underwater noise impacts from future wind energy development would likely result in short-term localized effects on some invertebrate species in immediate proximity to intense sound sources like pile driving. These effects would end when construction is complete. While individual invertebrates could be harmed by noise impacts, potentially | **Offshore**: Construction-related sources of sound pressure and vibration that could affect invertebrates are impact and vibratory pile driving, and, potentially, unexploded ordnance (UXO) detonation. Particle motion effects from pile driving would be limited to short-term behavioral responses, most likely lasting for the duration of the noise impact and limited periods (minutes to hours) following exposure. Particle motion effects | **Offshore**: See Section 3.6.2.7.1 for analysis of construction impacts.<br>Underwater noise effects on invertebrates resulting from O&M and decommissioning of Alternatives C through F would be similar in magnitude but reduced in extent relative to those described for the Proposed Action. Noise impacts on invertebrates are expected to be limited to short-term behavioral effects on individuals within tens of feet of each sound source and therefore **negligible** to **minor** adverse.<br>Alternatives C through F would generate underwater noise effects similar to those described above for the Proposed Action but over an noticeably smaller area. These effects would combine with similar effects resulting from the construction, O&M, and decommissioning of | | | | **Offshore**: See Section 3.6.2.9.1 for analysis of construction impacts.<br>Underwater noise effects on invertebrates resulting from O&M and decommissioning of Alternative G would be similar in magnitude but reduced in extent relative to those described for the Proposed Action, commensurate with the number of operational WTGs under each |

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| | harmful impacts would be limited in extent and population-level effects would likely be unmeasurable. Underwater noise from the operation of individual wind farms would last for the life of each project. However, the resulting noise effects are not likely to produce measurable impacts on individual invertebrates. On this basis, noise effects on invertebrates from future wind energy development in the GAA are likely to be **negligible** to **minor** adverse. | from UXO detonation could result in mortality of organisms on or immediately adjacent to the munition, and short-term behavioral responses at greater distance. While mortality-level effects could occur, construction-related adverse impacts are likely to be **minor** overall because 1) the areas of effect are small relative to the available habitat, and 2) the loss of individuals would likely be insignificant relative to natural mortality rates for planktonic eggs and larvae, which can range from 1% to 10% per day or higher (White et al. 2014).<br>The RWF WTGs would generate operational noise effects throughout the life of the Project, ending when the Project is decommissioned. Invertebrates lack specialized hearing organs and cannot sense sound pressure in the same way as fish and other vertebrates. Invertebrates can sense sound as particle motion, but particle motion effects dissipate rapidly and are usually undetectable within a few feet of the source. The rapid development of diverse invertebrate communities on operational wind farms worldwide indicates that operational noise has little if any effect on benthic invertebrates. Certain invertebrate species, specifically squid and other cephalopods, may be more sensitive to sound. Although, recent studies of longfin squid have indicated pile driving noise elicits only short-term behavioral responses (i.e., rapid habituation) and does not interrupt reproductive behaviors, such as mate guarding (Cones et al. 2022a, 2022b; Steen 2022, 2023). Operational noise levels likely to be generated by the RWF are not currently known but are likely to be higher than Block Island Wind Farm. Modeling of larger WTG designs suggests that operational noise could approach levels associated with hearing injury in cephalopods, but insufficient information is available to make a definitive conclusion. Collectively, this information indicates that operational noise effects on invertebrates would be **negligible** to **minor** adverse.<br>Likewise, cumulative effects on invertebrates resulting from underwater noise are also likely to be **minor** adverse. | other planned offshore wind projects on the Mid-Atlantic OCS. Invertebrates near impact and vibratory pile-driving activities could be temporarily disturbed by vibration effects, but any such effects would be short term in duration and are unlikely to have a measurable effect on any invertebrate population at the scale of the GAA. On this basis, cumulative effects on invertebrates resulting from underwater noise caused by Alternatives C through F are likely to be **negligible** to **minor** adverse. | | | | configuration. Noise impacts on invertebrates are expected to be limited to short-term behavioral effects on individuals within tens of feet of each sound source and therefore **negligible** to **minor** adverse.<br>As with Alternatives C through F, Alternative G would generate underwater noise effects similar to those described for the Proposed Action but over an noticeably smaller area. These effects would combine with similar effects resulting from the construction, O&M, and decommissioning of other planned offshore wind projects on the Mid-Atlantic OCS. Invertebrates near impact and vibratory pile-driving activities could be temporarily disturbed by vibration effects, but any such effects would be short term in duration and are unlikely to have a measurable effect on any invertebrate population at the scale of the GAA. On this basis, cumulative effects on invertebrates resulting from underwater noise caused by Alternative G are likely to be **negligible** to **minor** adverse. |
| Bycatch | **Offshore**: A range of monitoring activities has been proposed to evaluate the short- | **Offshore**: The FRMP would result in impacts to individual invertebrates, but the extent of habitat | **Offshore**: The same FRMP included under the Proposed Action or a similar plan with modifications would be implemented under Alternatives C through F. This would result in direct | | | | **Offshore**: The same FRMP included under the Proposed Action, or a similar plan with |

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| | term and long-term effects of existing and planned offshore wind development on biological resources and are also likely for future wind energy projects on the OCS. Some of these monitoring activities are likely to affect invertebrates. For example, the South Fork Wind Fisheries Research and Monitoring Plan (SFW and Inspire Environmental 2020) includes both direct sampling of invertebrates and the potential for bycatch of invertebrates and/or damage to habitat-forming invertebrates by sample collection gear. Research and monitoring activities related to offshore wind would not necessarily result in an increase in bycatch-related impacts on invertebrates, although the distribution of those impacts could change. As such, any bycatch-related impacts on invertebrates would be **negligible** to **minor** adverse and short term in duration. | disturbance and number of organisms affected would be small in comparison to the baseline level of impacts from commercial fisheries and would not measurably impact the viability of any species at the population level. As such, habitat impacts from FRMP implementation would likely be short term in duration. The intensity and duration of impacts anticipated from FRMP implementation would constitute a **minor** adverse effect on invertebrates.<br>Other planned and potential future offshore wind energy projects have or will likely implement similar monitoring plans that employ similar sampling methods using commercial fishing gear. These monitoring methods would result in intentional and bycatch mortality of invertebrates and could also result in unintentional damage to habitat-forming invertebrates. As such, cumulative impacts from bycatch associated with monitoring activities under the Proposed Action in combination with other planned and future offshore wind projects would be **negligible** to **minor** adverse, with the impacts ranging from short term to long term in duration. | sampling and incidental bycatch mortality of invertebrates as well as incidental damage to habitat-forming-invertebrates by sampling gear that contacts the seafloor. The extent of habitat and number of organisms affected would be small in comparison to the baseline level of impacts from commercial fisheries and would not measurably impact the viability of any invertebrate species at the population level. However, the timing and distribution of impacts may change. As such, Alternatives C through F would result in short-term bycatch impacts on invertebrates that are limited to a small number of individuals. This would therefore constitute a short-term **mino**r adverse effect on invertebrates, including habitat-forming species that contribute to benthic habitat structure.<br>Like the Proposed Action, O&M under Alternatives C through F would include inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potential sources of bycatch mortality for invertebrates from the environment. This would constitute a long-term **minor** beneficial effect on invertebrates.<br>Other planned and potential future offshore wind energy projects have or will likely implement similar monitoring plans that employ similar sampling methods using commercial fishing gear. This would result in cumulative impacts to invertebrates from sampling and bycatch mortality and incidental damage to habitat-forming organisms from monitoring activities in the GAA. Those effects cumulative would be **negligible** to **minor** adverse, ranging from short term to long term in duration. | | | | modifications, would be implemented under all potential configurations of Alternative G. Under the same rationale presented for Alternatives C through F, Alternative G would result in short-term **minor** adverse effects on invertebrates, including habitat-forming species that contribute to benthic habitat structure.<br>Like the Proposed Action, O&M under Alternative G would include inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potential sources of bycatch mortality for invertebrates from the environment. This would constitute a long-term **minor** beneficial effect on invertebrates.<br>Other planned and potential future offshore wind energy projects have or will likely implement similar monitoring plans that employ similar sampling methods using commercial fishing gear. This would result in cumulative impacts to invertebrates from sampling and bycatch mortality and incidental damage to habitat-forming organisms from monitoring activities in the GAA. Those effects cumulatively would be **negligible** to **minor** adverse, ranging from short term to long term in duration. |
| Presence of structures | **Offshore**: The future addition of up to 3,008 new WTG and OSS foundations in the invertebrate GAA could result in artificial reef effects that influence invertebrate community structure within and in proximity to the project footprints. Impacts to invertebrates could range from **moderate** beneficial for organisms associated with hard surfaces to **minor** adverse and **minor** beneficial for organisms associated with soft-bottom habitat. While hydrodynamic impacts on invertebrates are likely to vary between species, localized changes in larval settlement patterns in the absence of | **Offshore**: Invertebrates within the benthic disturbance footprints for foundation installation could be exposed to crushing and burial effects, but the number of individuals affected would be insignificant relative to the size of the population and the resource would recover completely without additional mitigation. The time required for recovery would vary depending on the type of habitats affected, ranging from short term for invertebrates found in soft-bottom habitats to long term for invertebrates associated with large-grained complex and complex habitats. Therefore, adverse effects to invertebrates from construction of structures would be **minor** adverse**.** | **Offshore**: Invertebrates within the respective footprints for Alternatives C through F would be exposed to crushing and burial effects similar in nature but reduced in extent relative to those described for the Proposed Action due to a smaller number of WTGs. For comparison, Alternatives C and E would reduce seafloor disturbance during construction by up to 35%; Alternative D would reduce seafloor disturbance by up to 21.5%; and Alternative F would reduce seafloor disturbance by up to 43%, as compared to the maximum-case scenario for the Proposed Action. Alternative F would produce a similar reduction in seafloor disturbance to the selected configuration from Alternatives C through E. Therefore, the resulting effects from this IPF would similarly range from **negligible** to **minor** adverse during construction.<br>During O&M, Alternatives C through F would produce similar hydrodynamic and reef effects on invertebrates to those described for the Proposed Action, but those effects would be reduced in extent because fewer structures would be installed. Reef and hydrodynamic effects would be distributed differently (see Table 3.6-17, Table 3.6-18, and Table 3.6-19). While the extent of reef and hydrodynamic effects would vary between alternatives, the impacts to invertebrates would be of the same nature, general scale, and magnitude as those described for the | | | | **Offshore**: Invertebrates within the respective footprints for Alternative G would be exposed to crushing and burial effects similar in nature but reduced in extent relative to those described for the Proposed Action due to fewer WTGs being installed. The base Alternative G and Alternatives G1 through G3 would reduce the foundation construction footprint by 21% and 34% compared to the Proposed Action, respectively. The distribution of impacts would shift substantively toward soft-bottom habitats (64.1% to 69.7% under Alternative G and Alternatives G1 to G3 versus 51.3% under the Proposed |

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| | population-level effects would constitute a **minor** adverse impact on this resource. | On balance, the effects of foundation and scour protection presence on invertebrates are likely to range from **minor** to **moderate** adverse to **moderate** beneficial in terms of the overall O&M impact, varying by species. Concrete mattresses used for cable protection may have to reside in the environment for some time before they provide suitable invertebrate habitat, which would constitute a long-term **minor** adverse impact depending on the amount of cable protection used. O&M would also include regular inspections of offshore structures and opportunistic removal of derelict fishing gear and other accumulated debris over the life of the Project. Derelict gear and debris removal from structures would constitute a long-term **minor** beneficial effect.<br>BOEM estimates the Proposed Action and other planned future projects will result in the development of 3,190 WTG and OSS foundations within the invertebrate GAA. Depending on how they are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential impacts of these broader cumulative effects on invertebrates in general. However, cumulative effects could be beneficial or adverse, varying by species, and would likely range from **minor** adverse and beneficial to **moderate** adverse and beneficial in terms of overall impact. | Proposed Action. These effects would therefore range from **minor** adverse to **moderate** beneficial, with some invertebrate species experiencing a permanent loss of suitable habitat while other species would gain habitat and otherwise benefit from increased biological productivity.<br>BOEM estimates the Proposed Action and other planned future projects will result in the development of up to 3,146 to 3,183 foundations within the invertebrate GAA. Depending on how they are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential biological significance of broader cumulative effects on invertebrates. However, BOEM anticipates that cumulative effects could vary by species, and would likely range from **minor** adverse and beneficial to **moderate** adverse and beneficial. | | | | Action). While the extent and distribution of foundation construction impacts to invertebrates would decrease and shift under Alternative G, the overall impacts of this IPF would be similar to those resulting from the Proposed Action: **negligible** to **minor** adverse.<br>During O&M, Alternative G would produce similar hydrodynamic and reef effects on invertebrates to those described for the Proposed Action, but those effects would be reduced in extent because fewer structures would be installed. Reef and hydrodynamic effects would be distributed differently (see Table 3.6-17, Table 3.6-18, and Table 3.6-19). While the extent of reef and hydrodynamic effects would vary between alternatives, the impacts to invertebrates would be of the same nature, general scale, and magnitude as those described for the Proposed Action. These effects would therefore range from **minor** adverse and beneficial to **moderate** adverse and beneficial, with some invertebrate species experiencing a permanent loss of suitable habitat while other species would gain habitat and otherwise benefit from increased biological productivity.<br>BOEM estimates Alternative G and other planned future projects will result in the development of 3,155 foundations within the invertebrate GAA. Under the same rationale presented for Alternatives C through F, BOEM anticipates that cumulative effects from Alternative G would likely range from **minor** adverse and beneficial to **moderate** adverse and beneficial, varying by species. |
| Sediment deposition and burial | **Offshore**: Cable placement and other related construction activities would disturb the seafloor, creating plumes of fine sediment that would disperse and resettle in the vicinity. Burial effects would be short term in duration, effectively ending once the sediments have resettled. | **Offshore**: Jet plow trenching and dredging used to install the IAC, OSS-link cable, and RWEC and construction of the sea-to-shore transition would disturb the seafloor and release plumes of suspended sediment into the water column. However, the sand and mud substrates on the Mid-Atlantic OCS are continually reshaped by bottom | **Offshore**: See Section 3.6.2.7.1 for construction impact analysis.<br>Cable protection maintenance and decommissioning would produce similar effects as those described for the Proposed Action, although reduced in extent. Therefore, resulting adverse effects from O&M and decommissioning would be **minor** adverse**.**<br>Sediment deposition and burial impacts would result from the estimated up to 105,390 cumulative acres of cabling-related disturbance for Alternatives C through F, plus all other future offshore wind projects within the invertebrate GAA. While suspended sediment effects | | | | **Offshore**: See Section 3.6.2.9.1 for construction impact analysis.<br>Cable protection maintenance and decommissioning would produce similar effects under Alternative G to those described for the Proposed Action, although reduced in extent and varying in |

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| | Similarly, suspended sediment concentrations close to the disturbance could exceed levels associated with behavioral and physiological effects on invertebrates but would dissipate with distance, generally returning to baseline conditions within a few hours. In theory, bed-disturbing activities occurring nearby (i.e., within a few hundred feet) could elevate suspended sediment levels, resulting in short-term **minor** adverse effects on invertebrates, including some habitat-forming invertebrate species. | currents and sediment delivery from upland sources (Daylander et al. 2012). This means that these habitats and the invertebrates associated with benthic habitat are regularly exposed to and therefore must be able to recover from burial by mobile sediments. In this context, the short-term effects of sediment deposition on benthic habitats would be **negligible** to **minor** adverse.<br>Up to 10% of cable protection could need to be replaced over the life of the Project under the Proposed Action. Cable protection maintenance and decommissioning effects would range from short-term behavioral disturbance of benthic infauna and other invertebrates accustomed to naturally high rates of sediment deposition, to mortality of benthic eggs and invertebrates subject to burial effects greater than 0.4 inch (10 mm). These adverse O&M effects would be **minor** adverse. When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would also result in **minor** adverse cumulative impacts on benthic habitats and invertebrates. | from future projects cannot be predicted without area-specific modeling, these effects are expected to be similar in magnitude and extent to those described for the Proposed Action: **minor** adverse. Cumulative short-term adverse impacts from all planned and future projects are not likely to have measurable population-level effects on any invertebrate species. However, more extensive suspended sediment and deposition effects could occur in areas where mud and silts are more prevalent in bed sediments. | | | | distribution by configuration. Therefore, resulting adverse effects from O&M and decommissioning would be **minor** adverse.<br>Sediment deposition and burial impacts would result from the estimated up to 104,781 cumulative acres of cabling-related disturbance for Alternative G, plus all other future offshore wind projects within the invertebrate GAA. While suspended sediment effects from future projects cannot be predicted without area-specific modeling, the effects produced by Alternative G are expected to be similar in magnitude and extent to those described for the Proposed Action: **minor** adverse. Cumulative short-term adverse impacts from all planned and future projects are not likely to have measurable population-level effects on any invertebrate species. However, more extensive suspended sediment and deposition effects could occur in areas where mud and silts are more prevalent in bed sediments. |

### 3.6.2.2 Alternative A: Impacts of the No Action Alternative on Benthic Habitat

#### 3.6.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for benthic habitat (see Section 3.6.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the benthic GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.6.2.2.2 Cumulative Impacts

This section discloses potential benthic habitat impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

The duration of impacts disclosed for this resource deviate slightly from the general guidelines in Section 3.3 using the following: short term (less than 2 years); long term (2 years to < life of the project); permanent (life of the project).[19] The impact definitions used are the same as described in Section 3.3. The analysis presented below comprises those IPFs associated with planned and future offshore wind energy development that are likely to result in greater than negligible effects on benthic habitat composition and structure. Those IPFs that are likely to result in negligible effects and impacts from other non–offshore wind–related activities are analyzed in Appendix E1, Table E2-3.

Offshore wind development projects will eventually be decommissioned and removed from the marine environment at the end of project life. It is not practicable at this Project to provide specific estimates of the potential extent and magnitude of decommissioning impacts. However, it is anticipated that decommissioning effects on benthic habitat and invertebrates will be broadly similar to those resulting from Project construction, with the exception that unexploded ordnance (UXO) detonation and impact pile driving will not be required. These impacts are described generally herein, with the understanding that BOEM would require every offshore wind project to develop a project-specific decommissioning plan to remove each facility at the end of its operational life. Those plans would all be subject to independent environmental and regulatory review requirements that would fully consider the impacts of project decommissioning in the context of future environmental baseline conditions.

[19] NMFS (2021b) recommends the following temporal definitions: short term (less than 2 years); long term (2 years to < life of the project); permanent (life of the project).

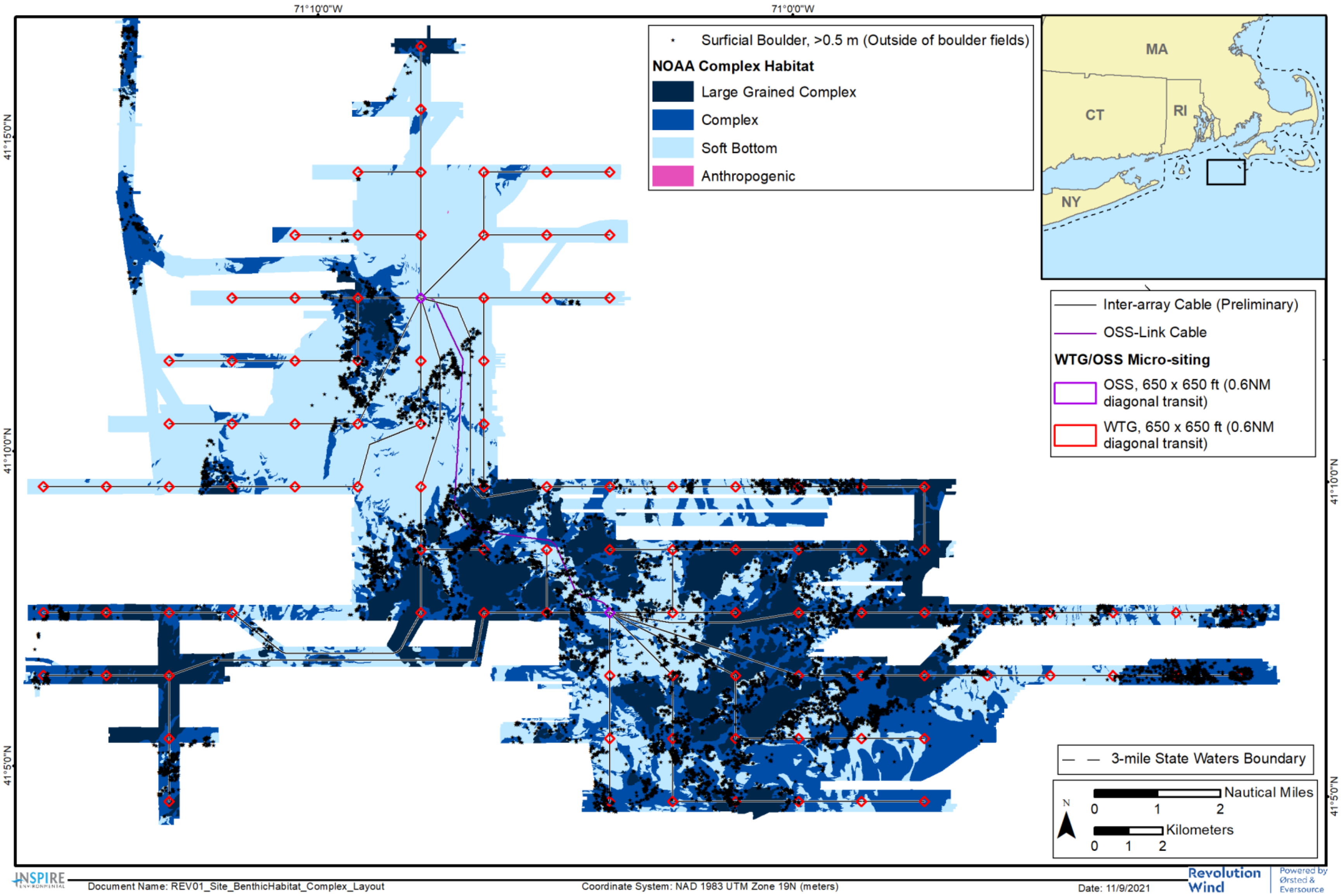



**Figure 3.6-2. Distribution of large-grained complex, complex, and soft-bottom benthic habitat within the Revolution Wind Farm maximum work area.**

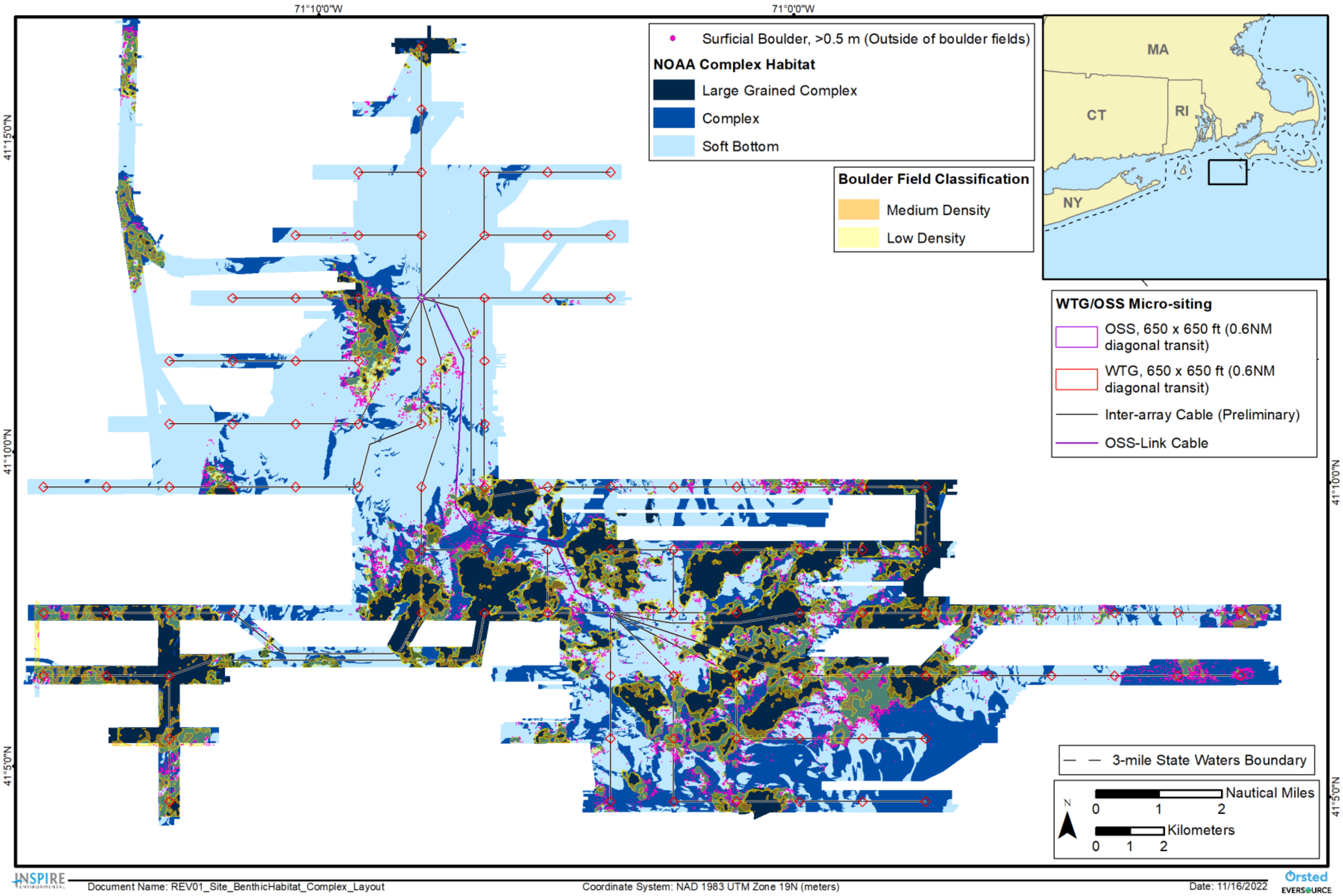



**Figure 3.6-3. Distribution of medium-density (246–491 boulders/acre) and low-density (50–245 boulders/acre) boulder fields and scattered surficial boulders (< 50 boulders/acre) within the Revolution Wind Farm maximum work area.**

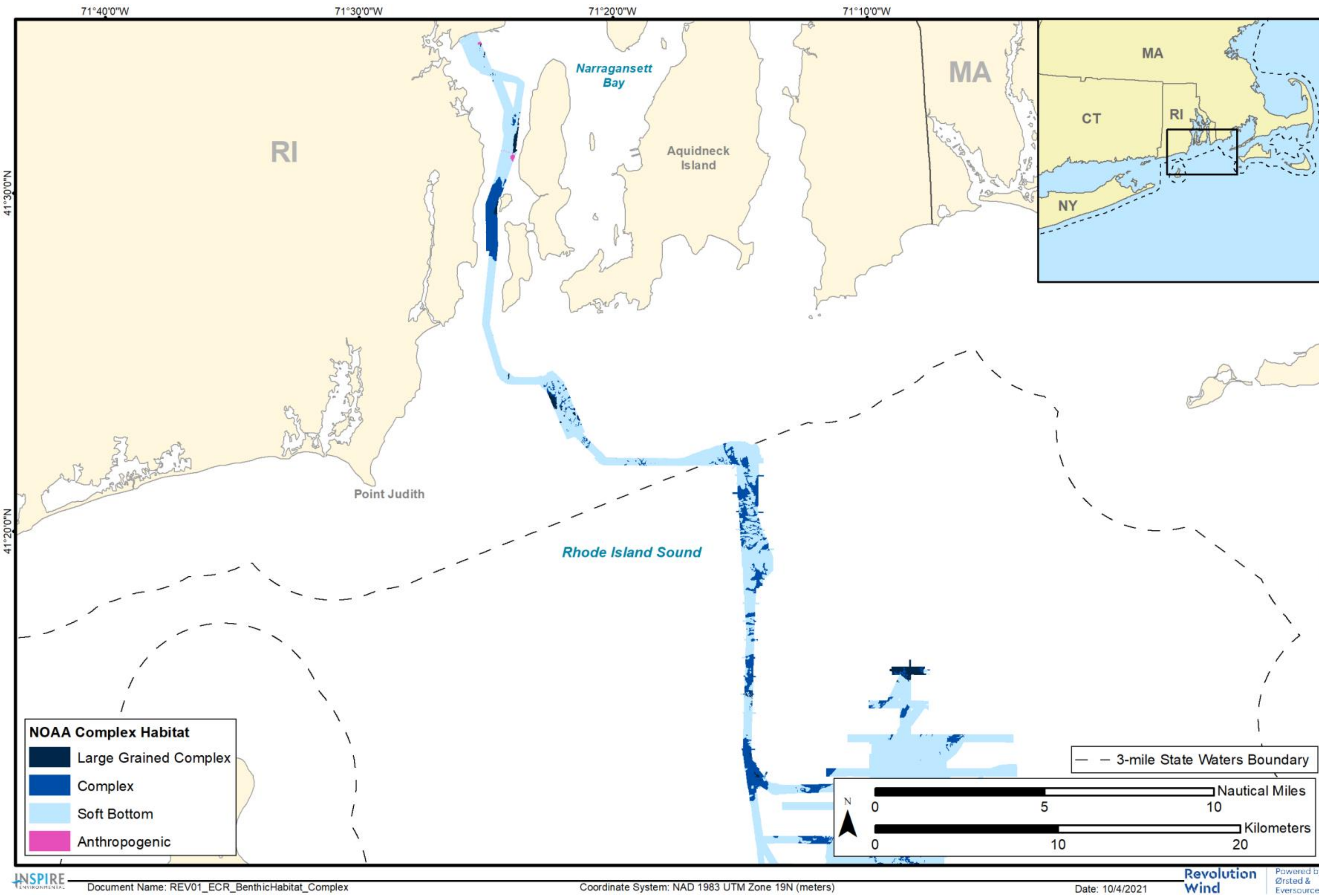



**Figure 3.6-4. Distribution of large-grained complex, complex, and soft-bottom benthic habitat within the Revolution Wind Export Cable corridor.**

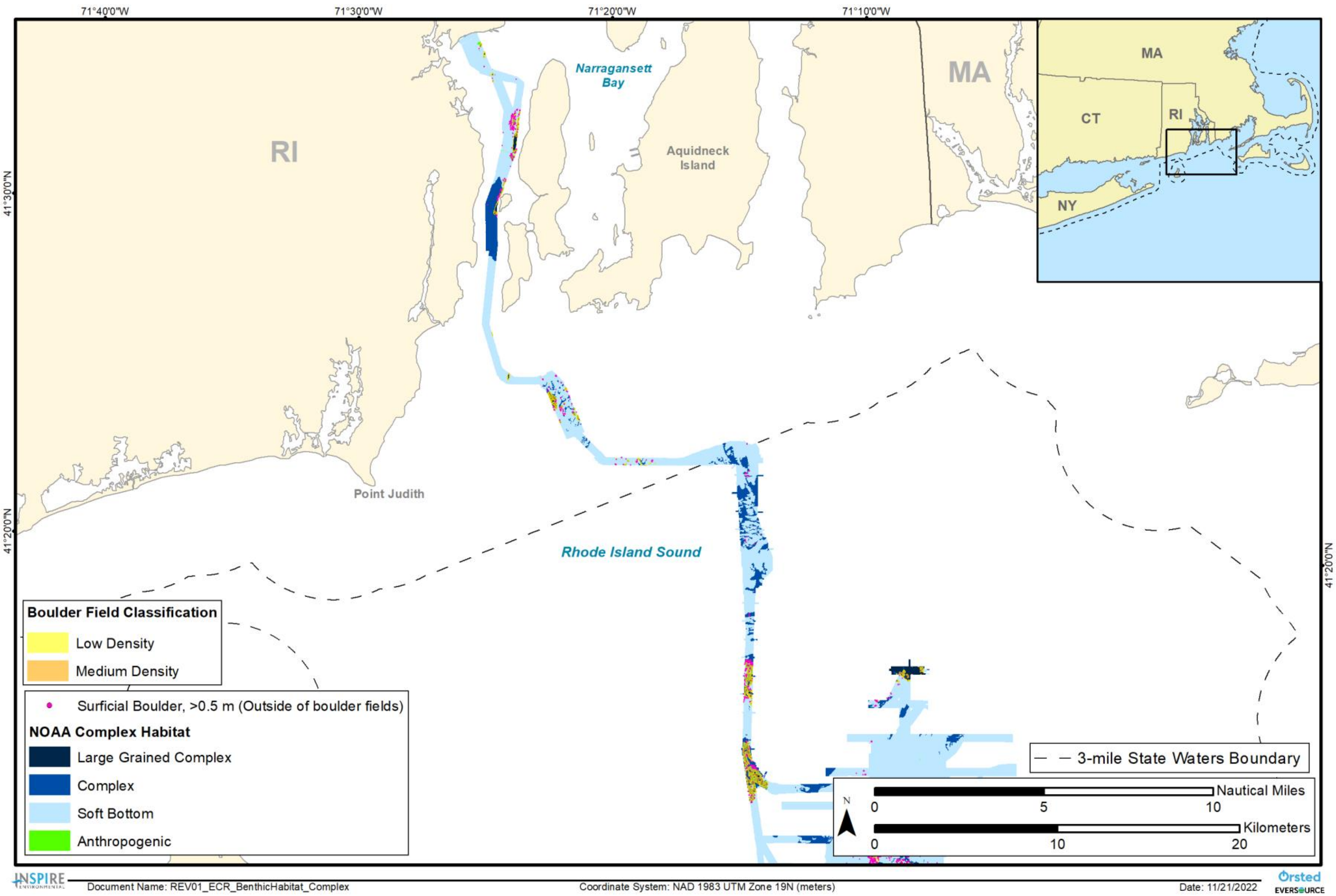



**Figure 3.6-5. Distribution of medium-density (246–491 boulders/acre) and low-density (50–245 boulders/acre) boulder fields and scattered surficial boulders (< 50 boulders/acre) within the Revolution Wind Export Cable corridor.**

### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Under the No Action Alternative, the Project would not be built. Certain activities such as construction vessel transits and cable emplacement and maintenance activities could conceivably occur within the benthic habitat GAA; however, no specific projects or activities have been identified. In the absence of information about planned non-project activities in the GAA, the impacts of this IPF would be **negligible** adverse. Should future projects include anchoring and cable placement activities within the GAA, **minor** adverse impacts on benthic habitats could result from this IPF. The rationale for this conclusion is based on the same rationale presented for the Proposed Action in Section 3.6.2.4.3.

Climate change: Climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These changes could indirectly affect benthic habitat structure and composition through a variety of mechanisms. For example, changes in freshwater runoff rates and the frequency of large storm events could change the rate of delivery of fine sediments to nearshore environments and sediment transport patterns in the offshore environment. Climate change has resulted in a measurable increase in annual precipitation on the East Coast, increasing the amount of freshwater runoff and the delivery of sediments and stormwater pollutants to coastal and estuarine habitats. This has altered the character of these habitats in ways that have adversely affected some marine species (NOAA 2021). Sediment transport patterns on the Mid-Atlantic OCS are strongly influenced by winter storm events (Daylander et al. 2012). Climate change is projected to lead to a general decrease in wave height and change in wave period on the Mid-Atlantic OCS (Erikson et al. 2016), which could modify these sediment transport patterns. This in turn could alter the structure of certain benthic habitats and the distribution of benthic features like sandwaves and ripples within the GAA over time. Climate change has also influenced benthic habitat composition by altering the environmental conditions experienced by habitat-forming invertebrates in the GAA. For example, warmer water could influence invertebrate migration and could increase the frequency or magnitude of disease (Brothers et al. 2016; Hoegh-Guldberg and Bruno 2010). Ocean acidification, also a function of climate change trends, is contributing to reduced growth or the decline of zooplankton and other invertebrates that have calcareous shells (Pacific Marine Environmental Laboratory [PMEL] 2020). Climate change has also altered the distribution of many fish and invertebrate species, including organisms that prey on and provide forage for habitat-forming invertebrates (see Section 3.6.1.2). These trends are expected to continue under the No Action Alternative. The severity of impacts on benthic habitat resulting from climate change trends are uncertain but are anticipated to range from **minor** to **moderate** adverse and would be effectively permanent.

Presence of structures: Under the No Action Alternative, the Project would not be built and there would be no offshore wind–related structures placed within the GAA and no associated construction and operational activities. No associated effects would occur in the GAA and therefore the impacts of this IPF would be **negligible** adverse.

### 3.6.2.2.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on benthic habitat and habitat-forming invertebrates associated with the Project would not occur.

Based on the analysis presented under the IPFs above, BOEM anticipates that the planned and future offshore wind activities would have no effect on benthic habitat composition within the GAA for benthic habitat. However, reasonably foreseeable impacts from climate change trends and other ongoing activities like navigation, dredging and dredge disposal, commercial vessel anchoring, and fishing activities would contribute to ongoing adverse impacts on benthic habitat composition. BOEM anticipates that the overall impacts associated with ongoing activities in the GAA combined with reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** to **moderate** adverse impacts on benthic habitat.

### 3.6.2.3 Alternative A: Impacts of the No Action Alternative on Invertebrates

#### 3.6.2.3.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for invertebrates (see Section 3.6.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the benthic GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.6.2.3.2 Cumulative Impacts

This section discloses potential invertebrate impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1. The duration of impacts disclosed for this resource deviate slightly from general guidelines provided in Section 3.3 (see footnote in Section 3.6.2.2.2).

##### Offshore Activities and Facilities

Accidental releases and discharges: Offshore wind energy development could result in the accidental release of water quality contaminants or trash/debris, which could theoretically lead to an increase in debris and pollution in the invertebrate GAA. Additionally, increased vessel traffic associated with offshore wind energy development presents the potential for the inadvertent introduction of invasive species during discharge of ballast and bilge water. This includes invasive invertebrate species that could compete with, prey on, or introduce pathogens that negatively affect native invertebrates. See Section 3.21.1 for an analysis of the contribution of future offshore wind projects to water quality. Compliance with state and federal regulatory water quality requirements would effectively avoid any measurable impacts on invertebrates.

The risk of releases from future offshore wind activities would represent a low percentage of the overall risk from ongoing activities. In the context of reasonably foreseeable environmental trends, the combined impacts on invertebrate resources (mortality, decreased fitness, disease) from accidental releases and discharges are expected to be minimal, localized, and short term due to the likely limited extent and duration of a release. On this basis, the effects of this IPF on invertebrates under the No Action Alternative would be **negligible** adverse.

Anchoring and new cable emplacement/maintenance: Up to 8,427 acres could be affected by anchoring/mooring activities during offshore wind energy development within the invertebrate GAA. As discussed under benthic habitat, this offshore energy facility construction would involve direct disturbance of the seafloor, leading to direct impacts on invertebrates, and these effects would be localized to the disturbance footprint and vicinity. The severity of these effects would vary depending on the species and life stage sensitivity to specific stressors that extend into the area, resulting in **minor** to **moderate** adverse impacts on invertebrates. Such impacts are expected to be localized and short term but could be long term in duration if they occur in eelgrass beds or permanent if they occur in hard-bottom habitats.

Future projects would also disturb up to 101,381 acres of seafloor from cable installation within the invertebrate GAA. The specific type and extent of habitat conversion and the resulting effects on invertebrates due to seafloor disturbance would vary depending on the project design and site-specific conditions. In addition, bottom-disturbing fishing activities, such as benthic trawl and scallop dredge fisheries, would continue to occur. These activities would result in short-term to long-term alterations of the seafloor. Invertebrates associated with soft-bottom habitat could be displaced if desired habitats, such as biogenic depressions, are altered, and the duration of displacement would vary depending on the nature of the effect. For example, seafloor preparation and cable installation would flatten sand ripples and eliminate or alter depressions in soft-bottom habitats. As stated in Section 3.6.1.1, those habitats are continually reshaped by natural sediment transport processes. Based on observed rates of sediment transport in the region (Daylander et al. 2012), these features would be expected to recover within 18 to 30 months as the seafloor is reshaped by these natural processes. Seafloor-dwelling organisms are adapted to these naturally dynamic conditions and are capable of recovering from disturbance relatively quickly (Grabowski et al. 2014; HDR 2018). In contrast, relocation of boulders into soft-bottom habitat during seafloor preparation could permanently displace invertebrates that rely on sand and mud substrates from the affected footprint. Some of these losses would be offset by the exposure of soft-bottom habitats where boulders were previously located.

Bycatch: A range of monitoring activities have been proposed to evaluate the short-term and long-term effects of existing and planned offshore wind development on biological resources and are also likely for future wind energy projects on the OCS. Some of these monitoring activities are likely to affect invertebrates. For example, the South Fork Wind Fisheries Research and Monitoring Plan (SFWF and Inspire Environmental 2020) included both direct sampling of invertebrates and the potential for bycatch of invertebrates and/or damage to habitat-forming invertebrates by sample collection gear. Biological monitoring uses the same types of methods and equipment employed in commercial fisheries, meaning that impacts to invertebrates would be similar in nature but reduced in extent in comparison to impacts from current and likely future fishing activity. Monitoring activities are commonly conducted by commercial fishers under contract who would otherwise be engaged in fishing activity. As such, research and monitoring activities related to offshore wind would not necessarily result in an increase in bycatch-related impacts on invertebrates, although the distribution of those impacts could change. Therefore, any bycatch-related impacts on invertebrates would be **negligible** to **minor** adverse and short term in duration.

Climate change: As discussed under benthic habitat, climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These changes have affected habitat suitability for the invertebrate community of the GAA. For example, several invertebrate species are shifting in distribution to the northeast, farther from shore and into deeper waters, in response to an overall increase in water temperatures and an increasing frequency of marine heat waves (NOAA 2021). Hale et al. (2017) observed that the biogeographic ranges of several species of subtidal benthic invertebrates, such as clams and bristleworms, are shifting northward in an apparent response to these stressors. Tanaka et al. (2020) project that suitable habitat ranges on the Mid-Atlantic OCS for lobster and sea scallop are likely to shift farther offshore and northward, respectively, in the coming decades. Warmer water could broadly influence invertebrate migration and dispersal, rates of colonization by invasive species, and the frequency and severity of disease outbreaks (Brothers et al. 2016; Hoegh-Guldberg and Bruno 2010). Ocean acidification, also a function of climate change trends, is contributing to the reduced growth or decline of zooplankton and other invertebrates that have calcareous shells (PMEL 2020; Petraitis and Dudgeon 2020). These ongoing changes have altered marine habitats in ways that have adversely affected some marine invertebrate species (NOAA 2021), including habitat-forming organisms. These trends are expected to continue under the No Action Alternative. The intensity of adverse impacts resulting from climate change trends are uncertain but are anticipated to be **minor** to **moderate** adverse.

EMF: Numerous submarine power and communications cables are present within the GAA for invertebrates. These cables would presumably continue to operate and generate EMF effects under the No Action Alternative. Although the type and capacity of those cables are not specified, the associated baseline EMF effects can be inferred from available literature. For example, electrical telecommunications cables are likely to induce a weak EMF on the order of 1 to 6.3 microvolts µV) per meter within 3.3 feet (1 m) of the cable path (Gill et al. 2005). Fiber-optic communications cables with optical repeaters would not produce EMF effects. EMF effects from submarine power cables would be similar in magnitude to those described for the Proposed Action but would vary depending on specific transmission load. For example, the two power cables supplying Nantucket Island at a typical load of 46 kV and 420 amps (Balducci et al. 2019).

Under the No Action Alternative, up to 13,469 miles of offshore wind–related transmission cable would be added in the invertebrate GAA, producing EMF effects in the immediate vicinity of each cable during operations. BOEM anticipates that the proposed offshore energy projects would use high-voltage alternating current (HVAC) transmission, but high-voltage direct current (HVDC) designs are possible and could occur. BOEM would require these future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects from cable operation. EMF effects from these future projects on invertebrates would vary in extent and magnitude depending on overall cable length, the proportion of buried versus exposed cable segments, and project-specific transmission design (e.g., HVAC or HVDC, transmission voltage, etc.). The available research on EMF effects on invertebrates is contradictory, varying between studies and by type of transmission, making it difficult to draw definitive conclusions (Hutchison et al. 2020a, 2020b). However, HVAC transmission appears to be less likely to result in measurable physiological or behavioral effects (Hutchison et al. 2020b). Minor effects, should they occur, would be limited to short-term behavioral responses (e.g., brief changes in foraging behavior or swimming direction) that are unlikely to have a biologically significant effect at individual or population levels. Projects that use HVDC transmission could result in greater impacts, but no such projects are currently proposed. HVAC transmission would result in substrate heating effects. In general, these effects are limited to within 2 feet or less of each cable. Cables are typically buried at target depths greater than 4 feet, meaning that invertebrates are unlikely to be impacted by heating effects from buried cable segments. However, substrate heating may occur near the bed surface at the transition points between buried and unburied cable sections, negatively impacting benthic infauna in these specific areas. However, these effects would be limited in extent and would fully recover after the Project is decommissioned and the cables are removed. Accordingly, long-term effects from Project-related EMFs on invertebrates that live in or directly on the seafloor could range from **negligible** to **minor** adverse for projects using HVAC transmission.

Light: Planned future activities include up to 3,088 offshore WTGs and OSS foundations in the GAA for invertebrates. The construction and O&M of these structures would introduce new short-term and long-term sources of artificial light to the offshore environment in the forms of vessel lighting and navigation and safety lighting on offshore WTGs and OSS foundations. Artificial light can attract mobile invertebrates and can influence biological functions (e.g., spawning) that are triggered by changes in daily and seasonal daylight cycles (Davies et al. 2015; McConnell et al. 2010). BOEM has issued guidance for avoiding and minimizing artificial lighting impacts from offshore energy facilities and associated construction vessels (BOEM 2021a; Orr et al. 2013) and has concluded that adherence to these measures should effectively avoid adverse effects on invertebrates, fish, and other aquatic organisms. BOEM would require all future offshore energy projects to comply with this guidance. Given the minimal and localized nature of lighting effects anticipated under this guidance, the related effects from proposed future activities on invertebrates are likely to be **negligible** adverse.

Noise: Numerous proposed offshore wind construction projects could be developed on the Mid-Atlantic OCS between 2022 to 2030 (see Appendix E). This would result in noise-generating activities—specifically, impact pile driving, high-resolution geophysical (HRG) surveys, construction and O&M vessel use, and WTG operation. Based on the scientific research summarized below, BOEM believes it is reasonable to conclude that impact pile driving, construction vessel, and HRG survey noise from future projects could have localized adverse effects on invertebrates. Due to the unknowns associated with proposed projects, the timing and extent of these effects on habitat and aquatic community structure cannot currently be quantified. However, as discussed below, invertebrates are relatively insensitive to underwater noise in comparison to other aquatic organisms like fish and marine mammals. Therefore, the severity of these impacts is likely to be limited to short-term impacts on individuals with no measurable effects at the population level.

Certain construction activities, specifically impact and vibratory pile driving and HRG surveys, would produce intense underwater sound potentially detectable to invertebrates. Invertebrates in general are insensitive to sound pressure and can only detect the particle motion component of sound, or the vibration of the surrounding water column and sediments in immediate proximity to a sound source (Carroll et al. 2016; Edmonds et al. 2016; Hawkins and Popper 2014). Detectable particle motion effects on invertebrates are typically limited to within 7 feet of the source or less (Carroll et al. 2016; Edmonds et al. 2016; Hawkins and Popper 2014; Payne et al. 2007). Intense particle motion exposure can have harmful effects on invertebrate larvae close to (i.e., within inches of) the source (Aguilar de Soto et al. 2013). Vibration from impact pile driving can also be transmitted through sediments. Recent research (Jones et al. 2020, 2021) indicate that longfin squid can sense and respond to vibrations from impact pile driving at a greater distance based on sound exposure experiments. This in turn suggests that infaunal organisms, such as clams, worms, and amphipods, may exhibit a behavioral response to vibration effects over a larger area, but additional research is needed to confirm these effects and their biological significance. Particle motion effects could theoretically cause injury and/or mortality to invertebrates in a limited area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. The affected areas would likely be recolonized in the short term, and the overall impact on invertebrates would be **minor** adverse.

Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct-drive systems like those proposed for the RWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 root mean square decibels ($dB_{RMS}$), occasionally reaching as high as 128 $dB_{RMS}$, in the 10-hertz (Hz) to 8-kilohertz (kHz) range. This is consistent with the noise levels observed at the Block Island Wind Farm (BIWF) (110 to 125 decibels referenced to a pressure of one micropascal [dB re 1 µPa] sound pressure level [SPL] RMS) (Elliot et al. 2019) and the range of values observed at European wind farms. However, the 6-MW direct-drive turbines used at BIWF may not be representative of noise levels produced by higher capacity WTG designs under consideration for planned and foreseeable future wind energy projects. These larger designs have yet to be employed, so no comparable observational data are currently available. Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise current generation direct-drive WTGs of up to 10 MW in capacity and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects on invertebrates could be more intense and extensive than those considered herein, but additional research is required to determine if significant effects on invertebrates are likely to occur.

In general, anticipated noise and particle motion levels from Project operations are below levels associated with behavioral and injury-level effects on invertebrates and are comparable to the environmental baseline in busy marine traffic areas. WTG foundations are readily colonized by diverse invertebrate communities (Degraer et al. 2020; Hutchison et al. 2020c), indicating that operational noise has a **negligible** adverse effect on habitat suitability for benthic invertebrate species. Certain invertebrate species, such as cephalopods, may be more sensitive to underwater noise effects (see Section 3.6.2.5.1). Higher capacity WTGs could theoretically produce operational noise approaching levels associated with injury-level effects on cephalopods in recent research (see Section 3.6.2.5.2). However, this is an evolving area of research, and insufficient information is available to determine the likelihood and extent of such effects. Should certain invertebrate species prove sensitive to operational noise effects, effects on invertebrates could range from **negligible** to **minor** adverse, varying by species.

On this basis, underwater noise impacts from future wind energy development would likely result in short-term localized effects on some invertebrate species in immediate proximity to intense sound sources like pile driving. These effects would end when construction is complete. While individual invertebrates could be harmed by noise impacts, potentially harmful impacts would be limited in extent and population-level effects would likely be unmeasurable. Underwater noise from the operation of individual wind farms would last for the life of each project. However, the resulting noise effects are not likely to produce measurable impacts on individual invertebrates. On this basis, noise effects on invertebrates from future wind energy development in the GAA are likely to be **minor** adverse and limited to short-term impacts during project construction.

<u>Presence of structures:</u> The future addition of up to 3,088 new WTG and OSS foundations in the invertebrate GAA would create a network of artificial reef effects that influence invertebrate community structure within and in proximity to the project footprints and beyond. These reefs form biological hotspots that could support species range shifts and expansions, the establishment of nonnative species, and changes in biological community structure. The ecological effects of artificial reefs share some commonality across regions with variation influenced by site-specific oceanographic conditions and the existing biological community (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). The

resulting effects on invertebrates would vary by species. For example, researchers observed changes in invertebrate community composition in sediments surrounding BIWF structures associated with changes in sediment composition caused by nutrient enrichment and the accumulation of shell hash from mussel colonies formed on the structures (Hutchison et al. 2020c). Based on responses observed at BIWF, invertebrates that colonize hard surfaces, like mussels, tunicates, and sponges, are likely to benefit from the new habitats created by offshore wind farms in the invertebrate GAA. Other invertebrate species, such as crabs, worms, and lobsters, that use these complex habitats for cover and foraging would similarly benefit. In contrast, invertebrate species associated with soft-bottom substrates would lose some habitat and could also be affected by changes in nutrient cycling associated with reef effects. Those changes could influence invertebrate community structure in the future, but the nature, extent, and biological significance of these potential changes are difficult to predict and a topic of ongoing research.

Several researchers (e.g., Coolen et al. 2020; Degraer et al. 2020; De Mesel et al. 2015; Hemery and Rose 2020) have raised concerns that offshore wind structures could provide novel habitats for nonnative species, serving as stepping stones that could facilitate the establishment of potentially harmful organisms. Nonnative species have been detected at wind farms in Europe and are commonly species that are already present in intertidal habitats and that are able to exploit newly created wind farm surfaces within a similar depth range near the water surface (Coolen et al. 2020; De Mesel et al. 2015). De Mesel et al. (2015) concluded that nonnative species were able to use wind farm foundations to expand their range within the North Sea. Coolen et al. (2020) similarly observed nonnative species on wind farm structures as well as on oil and gas platforms. Nonnative species were most common at surface to Mid-depths and comparatively rare around the base of the foundations. Hemery and Rose (2020) reviewed the available science and concluded that wind farms do not pose an inherently higher risk of nonnative species invasions than other existing marine installations. Further, these risks can be minimized by managing pathways for nonnative species introductions during project construction and O&M (e.g., through ballast water controls and avoiding ports where high-risk species are known to be present).

Impacts to invertebrates could range from **moderate** beneficial for organisms associated with hard surfaces to **minor** adverse and **minor** beneficial for organisms associated with soft-bottom habitat, varying by species. While reef effects would largely be limited to the areas within and or close to wind farm footprints, the development of individual or contiguous wind energy facilities in nearby areas could produce cumulative effects that could influence invertebrate community structure in the future. The likelihood, nature, and significance of these potential changes are difficult to predict and a topic of ongoing research.

Hydrodynamic disturbance resulting from the development of offshore wind farms is a topic of emerging concern. Human-made structures, especially tall vertical structures such as foundations, alter local water flow at a fine scale by potentially reducing wind-driven mixing of surface waters or increasing vertical mixing as water flows around the structure (Carpenter et al. 2016; Cazenave et al. 2016; Segtnan and Christakos 2015). When water flows around the structure, turbulence is introduced that influences local current speed and direction. Turbulent wakes have been observed and modeled at the kilometer scale (Cazenave et al. 2016; Vanhellemont and Ruddick 2014). While impacts on current speed and direction decrease rapidly around monopiles, there is a potential for hydrodynamic effects out to a kilometer from a monopile (Li et al. 2014). Direct observations of the influence of a monopile extended to at least 300 m, however, was indistinguishable from natural variability in a subsequent year (Schultze et al. 2020). The range of observed changes in current speed and direction 300 m to 1,000 m from a monopile is likely related to local conditions, wind farm scale, and sensitivity of the analysis. In strongly stratified locations, the mixing seen at monopiles is often masked by processes forcing toward stratification (Schultze et al. 2020), but the introduction of nutrients from depth into the surface mixed layer can lead to a local increase in primary production (Floeter et al. 2017).

A growing body of research has demonstrated that the extraction of energy from the atmosphere and turbulent wakes created by in-water structures could have observable effects on oceanographic conditions up to tens of miles downfield from wind farm sites (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorell et al. 2022; Floeter et al. 2022; Raghukumar et al. 2022). These atmospheric and oceanographic effects can also influence stratification and mixing of surface waters, although the extent of these effects and resulting significance on biological processes are likely to vary considerably between different oceanographic environments (van Berkel et al. 2020). Hydrodynamic effects are an issue of concern for offshore wind development on the Mid-Atlantic Bight because of potential effects on an oceanographic feature known as the "cold pool" (Chen et al. 2016). The cold pool is a mass of relatively cool water that forms in the spring and is maintained through the summer by stratification. The cold pool supports a diversity of marine fish and invertebrate species that are usually found farther north but thrive in the cooler waters it provides (Chen 2018; Lentz 2017). Changes in the size and seasonal duration of the cold pool over the past 5 decades are associated with shifts in the fish community composition of the Mid-Atlantic Bight (Chen 2018; Saba and Munroe 2019). Several lease areas within the RI/MA WEA are located on the approximate northern boundary of the cold pool. Changes in cold pool dynamics resulting from future activities, should they occur, could conceivably result in changes in habitat suitability and invertebrate community structure, but the extent and biological significance of these potential effects are unknown.

Van Berkel et al. (2020) and Schultze et al. (2020) note that environments characterized by strong seasonal stratification, such as the Mid-Atlantic Bight, are likely to be less sensitive to changes and disruptions to oceanographic processes from atmospheric effects. In addition, atmospheric effects are influenced by WTG design. Golbazi et al. (2022) demonstrated that the surface effects of wind wakes from 10- to 15-MW WTGs, the size range being considered for development in the region, were less than those produced by smaller turbine designs currently employed in Europe (Akhtar et al. 2022; Christiansen et al. 2022; Daewel et al. n.d. [2023]). Broadly speaking, the atmospheric effects of wind farms appear to decrease as WTG hub height above the sea surface increases. Collectively, these findings indicate that planned and probable future wind farm development on the Mid-Atlantic OCS are not likely to produce hydrodynamic effects on the order of those associated with European wind farm development in the southern North Sea (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorell et al. 2022).

This conclusion is supported by regional modeling. BOEM has conducted a modeling study to predict how turbulent wakes and atmospheric effects resulting from offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions in the northern Mid-Atlantic Bight. Johnson et al. (2021) considered a range of development scenarios, including full build-out of both WEAs with 1,063 WTG and OSS foundations at approximately 1 nm spacing. Johnson et al. (2021) determined that all model scenarios would lead to small but measurable changes in current speed, wave height, and sediment transport in the northern Mid-Atlantic Bight. In addition, small changes in stratification could occur. Specifically, stratification within and downfield from the WEAs was likely to strengthen, leading to prolonged retention of cold water near the seafloor during spring and summer. These findings suggest that offshore wind development in these WEAs is unlikely to negatively disrupt cold pool dynamics.

Hydrodynamic effects would lead to changes in surface current and circulation patterns within and around the WEAs, which would in turn affect the dispersal of planktonic organisms, eggs, and larvae. Johnson et al. (2021) used an agent-based model to evaluate how these environmental changes could affect planktonic larval dispersal and settlement for two fish species and the Atlantic sea scallop. In the case of scallops, they determined that offshore wind development could affect larval dispersal patterns, leading to increases in settlement density in some areas and decreases in others. For example, larval dispersal to waters southwest of Block Island is predicted to increase while dispersal to waters south of Martha's Vineyard would decrease under all modeled scenarios (Johnson et al. 2021). These localized effects are unlikely to be biologically significant at population levels, as sea scallop larvae originate in both local and distant spawning areas and are dispersed throughout the region (Johnson et al. 2021).

Prior to the Johnson et al. (2021) analysis, Chen et al. (2016) used a hydrodynamic model to assess how the installation of large numbers of wind turbines on the Mid-Atlantic OCS would impact oceanographic processes during storm events. They determined that structure presence would not have a significant influence on southward larval transport from Georges Bank and Nantucket Shoals to the Mid-Atlantic Bight, but wind farm development could lead to an increase in cross-shelf larval dispersion. The combined findings of the Johnson et al. (2021) and Chen et al. (2016) modeling studies indicate that broad changes in regional circulation patterns are unlikely to occur as a result of regional offshore wind development. These patterns are broadly consistent over time but vary from year to year, and organisms that depend on circulation-driven larval dispersal are adapted to that variability (Chen et al. 2021; McCay et al. 2011; Munroe et al. 2018; Roarty et al. 2020; Zhang et al. 2015). In this context, localized shifts in larval transport and settlement density on the scale of miles to tens of miles are unlikely to negatively affect larval survival at regional scales. Even where they occur, localized changes in larval recruitment may not necessarily translate to negative effects on adult biomass. For example, Atlantic sea scallops are prone to overcrowding and reduced growth rates in areas where larval recruitment exceeds carrying capacity (Bethoney and Stokesbury 2019). In such cases, changes in dispersal that reduce overcrowding could lead to positive effects on larval growth and survival to adulthood.

While hydrodynamic impacts on invertebrates are likely to vary between species, the modeled findings for sea scallops are likely representative of the magnitude of potential effects on any invertebrate species that rely on current-driven dispersal of planktonic larvae. Localized changes in larval settlement patterns in the absence of population-level effects would constitute a **minor** adverse impact on this resource. This impact would be effectively permanent.

<u>Sediment deposition and burial:</u> As previously noted, cable placement and other construction activities would disturb the seafloor, creating plumes of fine sediment that would disperse and resettle in the vicinity. The resulting effects on invertebrates would likely be similar in nature to those observed during construction of the BIWF (Elliot et al. 2017) but would vary in extent and severity depending on the type and extent of disturbance and the nature of the substrates. Invertebrates like burrowing bivalve clams and burrow-forming amphipods are highly tolerant to burial (Gingras et al. 2008; Johnson 2018). More sedentary invertebrates that cannot move within the sediment column as quickly, such as tube-dwelling worms, could exhibit stress or mortality if completely buried (Johnson 2018). Some invertebrate species and their eggs and larvae could be adversely affected by burial by as little as 0.4 inch (10 mm) of fine sediment (Wilber and Clarke 2001), but indicators of stress are typically associated with burial depths on the order of 2 inches or more (Johnson 2018). Burial effects would be short term in duration, effectively ending once the sediments have resettled. Similarly, suspended sediment concentrations close to the

disturbance could exceed levels associated with behavioral and physiological effects on invertebrates but would dissipate with distance, generally returning to baseline conditions within a few hours. In theory, bed-disturbing activities occurring nearby (i.e., within a few hundred feet) could elevate suspended sediment levels, resulting in short-term **minor** adverse effects on invertebrates, including some habitat-forming invertebrate species.

#### 3.6.2.3.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on invertebrate species associated with the Project would not occur. However, ongoing and future activities, specifically the other planned and potential future offshore renewable energy projects identified in Appendix E, would continue to have short- to long-term impacts on invertebrates.

Should the proposed Project not be built, BOEM expects ongoing and future activities, including those related to offshore wind, will continue to affect invertebrates in the GAA. Invertebrates would continue to be exposed to a range of short- to long-term impacts from habitat disturbance, displacement, injury, mortality, and reduced reproductive success resulting from a variety of activities. These primarily include resource exploitation/regulated fishing effort, bottom-disturbing fishing activities, dredging, installation of new offshore structures and transmission cables, the presence of structures, and climate change trends.

Reasonably foreseeable activities other than offshore wind include commercial and recreational fishing effort; increasing vessel traffic; marine surveys, marine minerals extraction, port expansion, and channel-deepening activities; and the installation of new towers, buoys, and piers. Planned and reasonably foreseeable future activities and projects in the invertebrate GAA are summarized in Appendix E. These include planned and potential port expansions and improvements described in Appendix E, Table E-6. These and related activities may have a range of effect on benthic habitats and associated invertebrates (BOEM 2014, 2021b; Grabowski et al. 2014; Michel et al. 2013). BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **minor** to **moderate** adverse impacts on invertebrates, primarily driven by ongoing dredging and fishing activities.

The combined impact-level criteria in Table 3.3-2 and Table 3.3-3 are used to characterize the combined effects of all IPFs likely to occur under the No Action Alternative. BOEM anticipates that the overall impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts and could potentially include **moderate** beneficial impacts on invertebrate resources. Future offshore wind activities are expected to contribute considerably to several IPFs, primarily new cable emplacement and the presence of structures—namely, foundations and scour/cable protection. BOEM has concluded that the onshore components of offshore wind energy development are unlikely to measurably affect the marine environment and would therefore have no effect on marine invertebrates.

Likewise, BOEM anticipates that the overall impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts and potentially some **moderate** beneficial impacts for invertebrates. Future offshore wind activities are expected to contribute considerably to several IPFs, the most prominent being the presence of structures. Ongoing and future research surveys and monitoring studies will help improve the understanding of the effects of offshore wind development on invertebrates and other marine species.

### 3.6.2.4 Alternative B: Impacts of the Proposed Action on Benthic Habitat

#### 3.6.2.4.1 Construction and Installation Offshore Activities and Facilities

##### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: The construction of the RWF and RWEC would result in a range of short-term and long-term impacts on benthic habitat from vessel anchoring, cable installation, seafloor preparation, and placement of cable protection. The estimated acres of construction-related impacts on benthic habitat resulting from each of these construction activities are summarized in Table 3.6-4.

**Table 3.6-4. Acres of Benthic Habitat Disturbance by Construction Activity and Percentage Distribution by Habitat Type**

| Construction Activity | Maximum Construction Disturbance Footprint (acres) | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|
| General construction vessel anchoring* | 3,167 | 19.1% | 30.1% | 50.9% |
| Jack-up vessel anchoring[†] | 21.1 | 19.0% | 29.7% | 51.3% |
| Pull-ahead anchoring[†] | 16.1 | 0.0% | 21.4% | 78.2% |
| IAC and cable protection[‡] | 1,183 | 18.6% | 26.1% | 55.3% |
| OSS-link cable and cable protection[‡] | 59.4 | 12.5% | 26.7% | 60.8% |
| RWEC installation and cable protection[‡,§] | 759 | 2.3%[¶] | 22% | 75.7% |
| RWEC cable joint installation | 40.8 | | | |
| Sea to shore transition | 0.8 | 0% | 0% | 100% |
| Maximum bed disturbance footprint[¥] | 5,247.2 | 14.9% | 27.3% | 57.8% |

* Estimated total assuming that seafloor impacts from general construction vessel anchoring will occur within a 656-foot radius around each foundation (COP Table 4.1.1-1); acreage shown is the total area for all foundations minus the jack-up vessel anchoring footprint. The values presented represent the acreage and habitat composition of the area where anchoring impacts may occur. The actual footprint of anchoring impacts is not currently known but would likely only represent a fraction of this area.

[†] Jack-up vessel anchoring impacts based on an estimated 0.18 acre of seafloor impacts per vessel jack-up event. OSS foundations will require one jack-up event per installation. An estimated 85% of WTG installations will require one jack-up

event and 15% will require two jack-up events. The total area where general vessel anchoring impacts around foundations may occur assumes a 656-foot (200-m) impact radius. The actual acres of anchoring impacts would likely be less than this total. Pull-ahead anchoring impact estimate calculated using an anchor width of 18 feet, typical drag lengths per set, in sand and medium clay sediments for a 5-metric-ton STEVIN MK3 anchor (Vryhof 2018), and 200, 150, and 50 anchor sets during construction of the RWEC-RI, RWEC-OCS, and OSS-link cable, respectively. Values consider the proportional distribution of mapped sediment types along each cable path.

‡ Values represent the estimated extent of benthic habitat impacts for IAC, OSS-link cable, and RWEC construction. The estimates reflects the maximum footprint of overlapping habitat impacts from seafloor preparation (pre-lay grapnel run, boulder relocation), cable installation, and placement of cable protection. The proportional distribution of impacts by habitat type for each Project element is based on the habitat composition of the approved 40-m wide impact corridor for each Project element. Habitat impacts could occur anywhere within this 40-m wide corridor, which covers approximately 1,355, 1,824, and 122 acres for the RWEC, IAC, and OSS-link, respectively. The total area impacted by placement of cable protection is 74.1 acres for the IAC, 4.4 acres for the OSS-link cable, and 60.6 acres for the RWEC. These impacts would occur within the respective seafloor preparation footprints for each Project component, predominantly in complex benthic habitat where boulders and other hard substrates prevent cable burial. The cable joint installation impact estimate assumes four cable joint installations, two each within RWEC segments on the OCS and in state waters, with a 673-foot-wide impact corridor at each joint location. Acreages shown are non-overlapping impacts extending beyond the seafloor preparation corridor for cable installation.

§ Bed disturbance footprint based on a 23-m-wide average installation corridor width for boulder relocation, the reported proportion of cable route requiring boulder relocation, and an overlapping 7.5-m-wide impact corridor width for cable installation for each RWEC #1 and RWEC #2 cable path with no corridor overlap. These impacts may occur anywhere within a 40-m wide corridor around each cable covering approximately 3,943 acres for all cables combined.

¶ Total includes 0.3% of benthic habitat structure that is anthropogenic in origin (concrete rubble, bridge demolition debris, etc.).

¥ Total acreage represents the estimated total impact footprint, not accounting for jack-up vessel anchoring impacts that overlap the 200-m impact radius for general vessel anchoring. These overlapping impacts may occur later in time.

The estimated anchoring impacts presented in Table 3.6-4 are based on the best currently available information, comprising anchoring information presented in the COP and supplemental information about jack-up vessel anchoring and pull-ahead anchoring provided by Revolution Wind. The general vessel anchoring estimate of 3,167 acres comprises the area covered by one hundred two 656-foot- (200-m-) radius circles, one around each proposed WTG and OSS foundation, where construction-related anchoring impacts may occur. Actual anchoring requirements and the average extent of impacts per foundation would likely be appreciably smaller. Jack-up vessel and pull-ahead anchoring acreage estimates are precise and based on currently understood anchoring requirements and equipment. Jack-up vessel anchoring during WTG and OSS foundation installation would impact approximately 21.1 acres of seafloor habitat. Some portion of these impacts would occur in areas previously impacted by seafloor preparation for foundation installation and subsequently impacted by placement of scour protection. Pull-ahead anchoring for cable installation would impact an estimated 16.1 acres, based on the anticipated number of anchoring events, anchor type, and substrate conditions in the RWEC corridor. Combined impacts from general vessel anchoring, jack-up vessel anchoring, and pull-ahead anchoring would impact up to, but likely less than, an estimated total of 3,204 acres of seafloor. Benthic habitat in the areas wherein anchoring impacts could occur is composed of approximately 19.1% large-grained complex, 30.0% complex, and 50.9% soft-bottom habitats. However, the total acreage and distribution of anchoring impacts cannot be predicted with certainty as anchoring requirements and vessel positioning are affected by construction needs and real-time wind and current conditions. The vessel anchoring plan developed by the applicant (see EPM Ben-6 in Table F-1, Appendix F) will be used to identify and avoid impacts to large-grained complex and complex benthic habitats to the greatest extent practicable. Impacts on bedforms in soft-bottom benthic habitat are expected to recover within 18 to 30 months following initial disturbance as a result of natural sediment transport processes (Daylander et al. 2012) and recolonization by habitat-forming organisms from adjacent habitats. This estimate is based on observed recovery rates from fishing-related disturbance (Grabowski et al. 2014) and from cable installation impacts at the nearby BIWF (HDR 2020) and for similar bed disturbance impacts observed in other regions (de Marignac et al. 2008). In contrast, anchoring in complex and large-grained complex habitats could result in long-term to permanent impacts on habitat structure by redistributing coarse substrates (i.e., creation of anchor furrows) and by damaging habitat-forming organisms on those substrates. These habitats would likely recover to functional condition within 10 years of the disturbance (see Section 3.6.2.5.1). These impacts would constitute a **minor** adverse impact to benthic habitat.

Cable installation impact acreage values presented in Table 3.6-4 represent the best available estimate of the total impact footprint for the Proposed Action design, based on proposed seafloor preparation and cable installation technologies and methods. These impacts could occur anywhere within the 131-foot- (40-m-) wide cable installation impact corridors, which cover an estimated 1,325, 2,471, and 148 acres for the RWEC, IAC, and OSS-link, respectively. The precise location of specific seafloor preparation impacts is not currently known; therefore, the distribution of impacts by habitat type for each cable is based on the composition of its respective impact corridor. Micrositing will be used during construction to minimize impacts on large-grained complex and complex benthic habitats to the greatest extent practicable. This would shift some of the projected impacts on complex habitats to soft-bottom habitat. Therefore, the actual distribution of impacts by habitat type will likely vary from the estimates presented in Table 3.6-4.

Seafloor preparation and cable installation activities would impact approximately 158 and 743 acres of large-grained complex habitat and complex habitat, respectively, and 2,375 acres of soft-bottom habitat within the RWF and RWEC construction footprints. Seafloor preparation in large-grained complex, complex, and heterogenous complex benthic habitats would clear larger substrates like boulders and cobbles from the construction footprint by rolling them to the edge of the clearance area using a large plow dragged behind a construction vessel. Boulder relocation would permanently modify the distribution of substrates in the affected area, resulting in a long-term effect on benthic habitat composition. Moreover, habitat-forming invertebrates damaged or killed during boulder relocation could take several years to fully recover. This would constitute a long-term effect on benthic habitat structure. This seafloor disturbance would constitute a long-term habitat modification resulting in **minor** adverse impacts to benthic habitat (see also O&M effects in Section 3.6.2.2.2).

While placement of concrete mattress cable protection would occur during Project construction, these features would remain in place throughout the operational life of the Project and would have long-term effects on habitat composition in all habitat types. These long-term effects are therefore considered in Section 3.6.2.4.2 under O&M and Decommissioning.

<u>Presence of structures:</u> The installation of up to 102 offshore monopile foundations with associated scour protection would result in the direct disturbance of benthic habitats. The duration of these impacts would vary depending on the type of benthic habitat impacted. Disturbance of soft-bottom benthic habitat would flatten sand ripples, pits, and depressions and kill or displace habitat-forming invertebrates living on and in the seafloor within the impact footprint. Disturbance of complex benthic habitat during seafloor preparation could change benthic habitat composition by relocating boulders and cobbles and exposing soft substrates. The estimated extent of effects by construction activity is summarized in Table 3.6-5. All monopile foundation, cable protection system, and scour protection placement impacts would occur in areas that were previously disturbed during seafloor preparation. Impacts to benthic habitat from the presence of structures would be long term in duration, but the affected habitats would develop into

functional complex habitat over time as they are colonized by habitat-forming invertebrates. Those habitats would recover after structures are decommissioned and removed. Consistent with the impact level definitions presented in Table 3.2-2, the presence of structures would therefore result in a long-term **moderate** adverse effect on benthic habitat.

An unknown proportion of scour protection impacts would occur in areas previously disturbed by general construction and jack-up vessel anchoring during foundation and WTG installation.

**Table 3.6-5. Acres of Benthic Habitat Disturbance by Construction Activity and Percentage Distribution by Habitat Type**

<table>
<tr><th>Construction Activity</th><th>Maximum Construction Disturbance Footprint (acres)</th><th>Large-Grained Complex (%)</th><th>Complex (%)</th><th>Soft Bottom (%)</th></tr>
<tr><td>Seafloor preparation*</td><td>734</td><td>18.9%</td><td>29.6%</td><td>51.5%</td></tr>
<tr><td>Monopile foundations and scour protection†</td><td>74.3</td><td rowspan="2">20.0%</td><td rowspan="2">30.1%</td><td rowspan="2">49.9%</td></tr>
<tr><td>Cable protection systems‡</td><td>7.1</td></tr>
</table>

* Revolution Wind estimates that seafloor preparation could be required within approximately 23% of a 656-foot radius, or 7.2 acres, around each WTG and OSS foundation.

† The habitat composition shown is based on the mapped habitat composition within a circular seafloor preparation radius of 316 feet (96 m) and within the proposed monopile footprints of 0.03 and 0.04 acre for the WTG and OSS foundations, respectively. An estimated 0.7 acre of rock scour protection would be placed in a circular area around each monopile. Both monopile and scour protection impacts occur within the seafloor preparation footprint and are overlapping impacts.

‡ Cable protection system installation at WTG and OSS foundation installation would mostly overlap scour protection, but some benthic habitat disturbance would extend beyond the scour protection footprint (approximately 0.07 additional acre per foundation). These impacts will occur within the broader seafloor preparation footprint.

While placement of the monopile foundations, cable protection systems, and scour protection are elements of Project construction and installation, these features would remain in place throughout the operational life of the Project and would have long-term effects on habitat composition in all habitat types. These long-term effects are therefore considered in Section 3.6.2.4.2 under O&M and Decommissioning.

#### 3.6.2.4.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> Cable protection maintenance and the eventual decommissioning and removal of buried cables would produce similar effects as those described for construction and installation in Section 3.6.2.2.1. These effects would include direct disturbance of the seafloor, suspended sediment deposition in the surrounding area, and injury and displacement of invertebrates using these habitats. Habitat-forming benthic invertebrates could be damaged or killed outright, but the affected hard surfaces would be recolonized over time. Impacts to benthic habitat could include disturbance and relocation of boulders and hard substrates and flattening of ripples and

depressions. These adverse impacts would be short term in duration and would recover over time without mitigation and would therefore be **minor** adverse.

<u>Presence of structures:</u> This section describes long-term alterations of benthic habitat composition, specifically the mixture and distribution of different types of substrates, resulting from the presence of structures under the Proposed Action during operations. This IPF would also result in impacts to benthic habitat structure through effects on habitat-forming organisms, varying in duration by habitat type. Effects to habitat structure resulting from impacts on habitat-forming organisms are discussed under operational impacts on invertebrates in Section 3.6.2.3.2.

The Proposed Action would alter benthic habitat composition, converting existing large-grained complex, complex, and soft-bottom benthic habitat to artificial or introduced hard surfaces. In addition, redistribution of cobbles and boulders during seafloor preparation would convert some existing hard-bottom substrate into soft-bottom substrates and vice versa. For example, anchor scars from BIWF construction created corridors of sandy soft-bottom habitat through existing boulder fields that have persisted since the project was completed (Guarinello and Carey 2020). Similar effects would be anticipated from boulder clearing. The acres of potential impacts to benthic habitat composition and distribution by habitat type are summarized in Table 3.6-6. In general terms, RWF and RWEC installation would permanently displace some benthic habitat within the monopile footprints, would alter the character of existing hard-bottom habitat exposed to reef effects, and would convert some soft-bottom benthic habitat to new hard surfaces in the form of scour protection and concrete mattresses. These effects would be long-term to permanent in duration.

Seafloor preparation for foundation installation would result in the long-term modification of approximately 734 acres of benthic habitat, and the subsequent placement of monopiles, scour protection, and cable protection systems would permanently modify 81.4 acres within this footprint. In total, an estimated 209.5 acres of benthic habitat would be exposed to long-term habitat conversion effects from placement of scour and cable protection within the cable and foundation installation footprints. Of this total, approximately 3.1 acres of habitat would be displaced by monopile foundations. The remainder would be impacted by the placement of scour protection and cable protection systems around each foundation and by placement of cable protection. Approximately 1,835 acres of benthic habitat would be affected by boulder relocation during IAC, OSS-link cable, and RWEC construction, and 128.2 acres within this footprint would subsequently be modified by placement of cable protection. These impacts could occur anywhere within a 131-foot- (40-m-) wide cable installation impact corridor, totaling 3,301 combined acres for the RWEC, IAC, and OSS-link cable.

**Table 3.6-6. Acres of Benthic Habitat Disturbance by Operations and Maintenance and Decommissioning Activities and Percentage Distribution by Habitat Type**

| Operations and Maintenance and Decommissioning Activity | Maximum Seafloor Footprint (acres) | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|
| WTG and OSS foundations | 2.8 | 20.2% | 29.3% | 50.5% |
| Foundation scour protection | 71.4 | 20.0% | 30.1% | 49.9% |
| Cable protection systems* | 7.1 | 20.0% | 30.1% | 49.9% |
| Cable protection† | 128.2 | 18.5% | 26.1% | 55.3% |
| **Total** | 209.5 | 18.4% | 26.6% | 55.1% |

* Benthic habitat impacts from cable protection systems installed at WTG and OSS foundation installation extending beyond the scour protection footprint (approximately 0.07 additional acre per foundation).

† Protective structures placed on exposed segments of the RWEC, IAC, and OSS-link cable, independent from cable protection systems at monopile foundations. Cable protection requirements are specified in the COP as an estimated percentage of total cable length. These features may be placed anywhere within the 131-foot-(40-m-) wide cable installation corridor totaling 3,301 combined acres for the RWEC, IAC, and OSS-link.

The precise distribution of habitat conversion impacts by benthic habitat type cannot be predicted with certainty as preconstruction micrositing will affect where Project features are ultimately located. However, the habitat conversion impacts described above would occur within areas having the habitat composition shown in Table 3.6-6. In general, long-term impacts from boulder relocation are expected to occur in areas where boulders are most prevalent and are therefore most likely to occur in large-grained complex and complex benthic habitats. However, boulder relocation could move boulders into soft-bottom habitat, changing habitat composition. Cable protection would most likely be required in areas where hard substrates, such as boulder fields, prevent cable burial. This means that cable protection impacts are more likely to occur in large-grained complex and complex habitats, and those acres of impacts would overlap habitats previously impacted by seafloor preparation. However, cable protection would also be used in soft-bottom habitat where required (e.g., at cable crossings). The values presented in this EIS likely overestimate the total acres of impacts that would occur, as micrositing of the foundations and cable routes would emphasize relocating Project features into soft-bottom benthic habitat where practicable. This would reduce the extent of long-term impacts. For example, adjusting cable routes to avoid complex benthic habitat could mean that less cable protection is ultimately required. Therefore, fewer acres of long-term habitat impacts would occur.

The introduction of 102 WTG and OSS foundations would alter pelagic habitats by introducing approximately 1.2 million square feet (107,500 $m^2$) of vertical hard surfaces into the water column. Over time these foundations, surrounding scour protection, and cable protection mattresses would become colonized by sessile invertebrates, such as mussels, tunicates, anemones, and sponges, creating complex habitat. Damage to complex habitat structure from construction would also recover over time as surfaces are recolonized by habitat-forming organisms, but full recovery could require several years, potentially a decade or more for certain organisms. Long-term effects to benthic habitat structure are described in greater detail under the presence of structures IPF in Section 3.6.2.3.2.

The Proposed Action would permanently alter benthic habitats within the GAA, generating an array of effects on benthic habitat function. Soft-bottom habitats would be permanently displaced while effects on large-grained complex and complex benthic habitats would range from short term to long term or permanent. Some benthic species could recolonize new hard surfaces within 2 to 4 years while others take a decade or more to recover from damage and/or colonize new surfaces like concrete mattresses. For example, concrete mattresses used at the BIWF did not exhibit surface growth of habitat-forming invertebrates after 3 years, but the structures provided refuge space for some fish and invertebrate species (HDR 2020).

This would constitute a long-term reduction in benthic habitat function. In contrast, biologically productive reef effects like those observed at the BIWF would likely develop within 3 to 4 years after construction, continuing to mature over the life of the Project. These effects could be **minor** to **moderate** adverse or **moderate** beneficial, depending on how benthic habitat change influences the broader biological community.

#### 3.6.2.4.3 Cumulative Impacts

### Offshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> The Proposed Action would result in localized minor to moderate adverse impacts to benthic habitats and invertebrates through an estimated 3,204 acres of anchoring and mooring-related disturbance and 3,452 acres of cabling-related seafloor disturbance within the benthic habitat GAA. Actual anchoring requirements have not been fully specified, and the former represents an overestimate of probable effects. Further, an appreciable portion of anchoring and cable installation impacts would overlap. Therefore, total acres of benthic habitat impacted by this IPF would likely be smaller than the estimated total of 5,247 acres from these two sources. The duration and magnitude of these effects would vary depending on the types of habitats impacted, ranging from short term to long term or permanent. Short-term impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 30 months, whereas complex benthic habitats could require several years to recover full habitat function. Recent research obtained by BOEM (2023) suggests that functional recovery of epibenthic organisms would occur within a decade. There would be no cumulative impacts from other planned and reasonably foreseeable offshore wind projects as impacts to benthic habitat from these projects would occur outside the GAA as defined. These totals do not account for other anchoring activities and cable emplacement work that could occur within the GAA over the life of the Project.

Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to benthic habitats and habitat-forming invertebrates.

<u>Climate change:</u> The types of impacts from climate change described for the No Action Alternative would occur under the Proposed Action, but the Proposed Action could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would be expected to help reduce climate change impacts. When combined with other past, present, and reasonably foreseeable actions, climate change trends would result in **moderate** adverse cumulative impacts to benthic habitat and habitat-forming invertebrates under the Proposed Action.

Presence of structures: The Proposed Action would result in the installation of 102 new offshore wind energy structures and associated scour and cable protection in the GAA, resulting in the long-term alteration of benthic habitat composition on approximately 220.5 acres of seafloor. That total would comprise approximately 2.9 and 71.4 acres of seafloor displaced by foundations and associated scour protection, respectively; 7.1 acres of cable protection system impacts extending beyond the scour protection footprint; and 128.2 acres affected by cable protection. The foundations would effectively displace benthic habitat, with each foundation replacing 0.03 to 0.04 acre of seafloor with approximately 1.2 million square feet (107,500 $m^2$) of vertical surfaces extending from the seafloor to the surface. Impacts to habitat composition from scour and cable protection would vary depending on the type of habitat affected (Causon and Gill 2018; Degraer et al. 2020; Langhamer 2012; Taormina et al. 2018). When placed in soft-bottom habitat, these structures would effectively change the habitat type. When placed in large-grained complex or complex habitat, these structures would either alter the habitat type or modify benthic habitat structure through burial and damage to habitat-forming invertebrates. That habitat structure would recover and would evolve over time into functional benthic habitat as reef effects mature. In all cases, the presence of structures would constitute a long-term to permanent impact to benthic habitat. When reef effects are considered, long-term impacts to benthic habitat composition and structure could be **minor** to **moderate** adverse or **moderate** beneficial, depending on how benthic habitat change influences the broader biological community.

The specific type and extent of habitat conversion and the resulting effects on benthic habitat composition and structure would vary depending on the Project design and site-specific conditions. Once operational, the WTG and OSS foundations and associated scour protection would produce artificial reef effects that influence benthic habitat structure within and in proximity to the Project footprint. While reef effects would largely be limited to the areas within and in proximity to foundation footprints, the development of individual or contiguous wind energy facilities in nearby areas could produce cumulative effects. For example, large quantities of shell hash created by mussels and other colonizing organisms can alter the composition of soft-bottom sediments in the surrounding area. These alterations in substrate composition would be limited in extent to the area of influence around each foundation but would be long term in duration, as changes in substrate composition from the accumulation of shell hash and altered substrate chemistry would continue to persist after the structures are removed during decommissioning. As such, reef effects from the presence of structures would result in cumulative long-term effects on benthic habitat and would range from **moderate** beneficial to **minor** to **moderate** adverse.

#### 3.6.2.4.4 Conclusions

The construction and installation, O&M, and decommissioning of the Proposed Action would impact benthic habitat through several mechanisms, including short-term and long-term habitat disturbance, permanent habitat conversion, and changes in substrate composition and nutrient cycling from reef effects caused by colonization of structures by habitat-forming invertebrates. These effects would alter the structure and function of benthic habitats within the maximum work area, including where cable protection is used, and create new biological hotspots that would benefit some fish and invertebrate species. Long-term to permanent habitat disturbance effects would occur on an estimated 2,570 acres of large-grained complex and complex habitats from vessel anchoring, cable installation and cable protection, seafloor preparation for foundation installation, and the presence of foundations and scour protection. An estimated 131 acres of soft-bottom habitat would be converted to hard bottom habitat by the presence of structures. Collectively, these impacts would constitute a **moderate** adverse effect on benthic habitat, resulting from habitat conversion and long-term impacts to certain types of habitat-forming organisms. These adverse effects would be partially offset by **moderate** beneficial effects on benthic habitat structure and productivity resulting from reef effects. The colonization of artificial structures by a complex community of habitat-forming organisms would increase the structural complexity of benthic habitat in and around WTG and OSS foundations. Some benthic habitat effects could persist even after the Project is decommissioned. For example, reef effects would result in shell hash accumulation around foundations that would remain after the structures are removed. This would alter the composition of sediments within the RWF beyond the life of the Project but would not be expected to negatively affect the ability of benthic habitats to support ecosystem function after the Project is decommissioned.

Collectively, BOEM anticipates that the overall impacts from offshore activities associated with the Proposed Action when combined other with past, present, and reasonably foreseeable activities would result in notable and measurable impacts on benthic habitat. Some of these impacts could persist after the Project is decommissioned, but they would not prevent full recovery of ecosystem function. These findings would constitute a **moderate** adverse impact on benthic habitat composition and **moderate** adverse to **moderate** beneficial effects on benthic habitat structure in the GAA.

### 3.6.2.5 Alternative B: Impacts of the Proposed Action on Invertebrates

#### 3.6.2.5.1 Construction and Installation

#### Offshore Activities and Facilities

<u>Accidental releases and discharges:</u> The potential impact to invertebrates from trash and debris from the Project, including habitat-forming invertebrates that contribute to benthic habitat structure, is as described in the No Action Alternative and is **negligible** adverse.

In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, adverse effects on invertebrates, including benthic habitat–forming invertebrates living on or in seafloor sediments, could potentially result. Substrates could also become contaminated with materials that prevent or limit recolonization by these organisms. These effects could be short term to long term in duration, depending on the type and volume of material released and the habitats exposed to spilled material. For example, bunker oil commonly sinks and remains on the seafloor for extended periods before breaking down, whereas diesel fuel and gasoline float on the water surface and weathers more quickly (Etkin 2015). A heavy bunker oil spill could therefore be more damaging to habitat-forming invertebrates on the seafloor. In contrast, spills of diesel fuel or gasoline would remain at or near the water surface, would weather more quickly, and would therefore be less likely to negatively impact benthic habitats. As discussed in Section 3.21.1.2, in the unlikely event that accidental spills should occur, adverse impacts to benthic habitats could range from **minor** to **moderate** adverse in significance depending on the size of the spill and the nature of the materials involved.

<u>Anchoring and new cable emplacement/maintenance:</u> Invertebrates occurring within the impact footprints described in Section 3.6.2.2.1 for cable installation and construction vessel anchoring would be exposed to a range of **minor** short-term to long-term adverse impacts.

Seafloor preparation, cable trenching,[20] vessel anchoring, and short-term bed disturbance at the sea-to-shore transition site would also directly disturb soft-bottom benthic habitat by crushing and displacing epifaunal organisms on the bed surface and liquifying sand and mud sediments from the bed surface to depths of up to 6 feet, killing and displacing benthic infauna within the cable path. These activities would flatten ripples, megaripples, and biogenic depressions that provide habitat for certain invertebrates, including EFH species. Seafloor preparation, cable trenching, and sea-to-shore transition construction would impact up to 1,360 acres of benthic habitat within the installation corridors for the RWF and RWEC (see Table 3.6-4). Approximately 4.8% and 22.7% of these impacts would occur in large-grained complex and complex benthic habitats, respectively, and 72.5% would occur in soft-bottom habitats (see Table 3.6-4).

Invertebrates within these disturbance footprints could be exposed to crushing and burial effects. The extent and severity of exposure will vary by species and life stage–specific sensitivity and habitat association. For example, highly mobile invertebrates like longfin squid or adult crab and lobster would likely be able to avoid being crushed during seafloor preparation and materials placement or overrun by the jet plow. In contrast, immobile or slow-moving benthic invertebrates (e.g., worms, anemones, surf clams, ocean quahogs) and immobile life benthic stages (e.g., longfin squid eggs, post-settlement invertebrate larvae) within the construction footprint would likely be killed by bed disturbance and could also be injured or killed by sediment deposition. Sessile invertebrates, like sponges and hydroids, attached to boulders and cobbles would be damaged or killed when boulders are relocated during seafloor preparation and when scour and cable protection are placed in complex and potentially complex benthic habitats. Mobile benthic invertebrates, like adult lobsters and horseshoe crabs, would likely be able to avoid the jet plow but could be injured or killed by placement of cable protection.

The jet plow injects water into the sediments to liquify the seafloor for cable installation. While the water intake, located near the water surface, is screened to avoid entraining (suctioning) small fish, it would unavoidably entrain and kill zooplankton and planktonic fish eggs and larvae. Zooplankton comprise a diverse group of invertebrate organisms, including larval life stages of crustaceans (crabs and lobsters), echinoderms (urchins and sand dollars), bivalves (clams and mussels), and other species as well as invertebrates that spend their entire lives as zooplankton, such as calanoid copepods. Zooplankton are a central component of the food web and provide an important prey resource for many fish, filter feeding invertebrates, and even large marine mammals like humpback whale (*Megaptera novaeangliae*) and North Atlantic right whale (NARW) (*Eubalaena glacialis*). Inspire Environmental (2019) estimated potential plankton mortality from construction of the 61.8-mile South Fork Export Cable (SFEC) and 21.4-mile SFWF IAC based on jet plow intake volume and movement speed and documented plankton density. It calculated that over a billion fish eggs and 8.5 billion invertebrate zooplankton could be killed by entrainment impacts. Impacts of similar magnitude are likely to result from the construction of the Proposed Action.

While construction impacts could injure or kill invertebrates on over 5,981acres of benthic habitat (see Tables 3.6-4 and 3.6-5) and kill billions of individual phytoplankton, these impacts must be placed into context to evaluate overall impacts. Invertebrates associated with soft-bottom habitat are likely to recover from disturbance within 18 to 30 months (de Marignac et al. 2008; Dernie et al. 2003; Desprez 2000;

[20] The potential equipment used for cable trenching (mechanical cutter, mechanical plow, and jet plow) are expected to have comparable effects to benthic habitat.

Grabowski et al. 2014; HDR 2020). In contrast, epifaunal invertebrates associated with complex benthic habitat, like sponges and hydroids, could take several years to fully recover (Auster and Langton 1999; Collie et al. 2005; Lukens and Selberg 2004; Tamsett et al. 2010). Research obtained by BOEM (2023) suggests that full recovery of habitat function is likely to occur within a decade of disturbance. The study in question compared the community composition and abundance of habitat-forming organisms in heavily fished areas on Georges Bank to reference sites. The findings of this long-term study demonstrated that epifaunal species damaged by repeated exposure to scallop dredging were able to recover to levels that were statistically indistinguishable from unfished reference sites within 6 years. Given the proximity of this study to the Lease Area and the similarity of disturbance, these findings suggest a similar rate of recovery is likely for Project-related construction impacts.

Accordingly, impacts from bed disturbance could range from short term negligible adverse for mobile invertebrates like adult squid and crabs; short term minor adverse for immobile or slow-moving invertebrates like clams, scallops, and worms in soft-bottom habitat; to long-term adverse effects for certain slow-growing invertebrates associated with complex benthic habitat. While the latter effects would be long term in duration, they would be localized and would recover over time without mitigation; therefore, these adverse effects would be **minor** adverse.

Jet plow operation would entrain tens to hundreds of millions of cubic meters of water and billions of organisms, including invertebrate zooplankton. While these values appear significant, they represent a tiny fraction of the total habitat available to zooplankton and typical zooplankton abundance. While zooplankton distribution is not uniform, it is reasonable to conclude that the billions of entrained zooplankton represent a biologically insignificant proportion of the available resource. Moreover, as stated in the previous section, zooplankton have high natural mortality rates, and losses of even several billion organisms may not be measurable relative to year-to-year variation in abundance under natural conditions. On this basis, entrainment effects on invertebrates from cable installation would be short term and likely **negligible** adverse.

The Proposed Action includes EPMs, listed in Table F-1 in Appendix F, which would avoid and minimize impacts on invertebrates. These include design and siting of Project features to minimize the overall Project footprint and impacts on complex benthic habitat where practicable, establishing no-anchor areas to avoid sensitive habitats like observed squid spawning sites. These EPMs would limit, but not completely avoid, crushing, burial, and entrainment impacts on invertebrates. While some impacts would be unavoidable, the affected habitats would recover naturally over time, and impacts on invertebrates are unlikely to be measurable at the population level. Therefore, adverse impacts to invertebrates from this IPF would be **minor** adverse.

<u>Light</u>: Light is an important cue in guiding the settlement of invertebrate larvae (Davies et al. 2015). Artificial light can change the behavior of aquatic invertebrates, although the direction of response can be species and life stage specific. Currently there are no artificial lighting sources present in the RWF or RWEC, except for fishing vessel activity and other periodic vessel transit. The O&M facility would be sited in a currently developed commercial moorage with existing artificial lighting and would not modify existing conditions. Lights would be required on offshore platforms and structures, vessels, and construction equipment during construction of the RWF. Consistent with BOEM guidance (BOEM 2021a; Orr et al. 2013), construction vessels would implement lighting design and operational measures to eliminate or reduce lighting impacts on the aquatic environment. Although individual invertebrates

could detect light from construction vessels and could exhibit behavioral responses (e.g., squid being attracted to the lights), these impacts are not expected to measurably affect invertebrates at population levels because of the limited area of impact at any given time and the limited duration of construction activities. Any resulting adverse impacts on invertebrates would be short term in duration and biologically insignificant and therefore **negligible** adverse.

<u>Noise:</u> Construction-related sources of sound pressure and vibration that could affect invertebrates are impact and vibratory pile driving, construction vessels and HRG surveys, and UXO detonation. Invertebrates represent a broad and diverse group of organisms with varying levels of sensitivity to sound disturbance, and sound sensitivity is an evolving field of study (Popper and Hawkins 2018). In general, bivalves and crustaceans are less sensitive to noise-related injury than many fish because they lack internal air spaces and are therefore less vulnerable to sound pressure injuries on internal organs than vertebrates. Available research indicates that many invertebrate species groups, such as cephalopods (e.g., octopus, squid), crustaceans (e.g., crabs, shrimp), and some bivalves (e.g., Atlantic scallop, Atlantic surfclam, ocean quahog) are capable of sensing sound through particle motion (Andre et al. 2011; Carroll et al. 2016; Edmonds et al. 2016; Hawkins and Popper 2014; Popper et al. 2001). Particle motion effects dissipate rapidly and are highly localized around the noise source, with detectable effects on invertebrates typically limited to within 3 to 30 feet of the source (Edmonds et al. 2016; Jézéquel et al. 2022; Payne et al. 2007). However, considerable uncertainty remains about invertebrate sensitivity to various aspects of sound (Popper and Hawkins 2018). Notably, current understanding of fish and invertebrate sensitivity to particle motion effects is limited, and no thresholds have been established to analyze these effects (Popper and Hawkins 2018).

Some species groups may be sensitive to sound-related injury and behavioral effects that do not explicitly involve hearing or particle motion effects. For example, cephalopods, the group of species that includes cuttlefish and squid, may be more sensitive to sound-related injury and behavioral effects than other invertebrate groups. Cephalopods use specialized cells called statocysts for balance and spatial orientation and to detect changes in particle motion that signal the presence of predators and prey. These cells appear to be susceptible to injury from exposure to intense sound pressure (Solé et al. 2018, 2022). For example, Andre et al. (2011) observed damage to statocysts in adult squid exposed to repetitive noise pulses ranging from 157 to 175 dB re 1 µPa over a 2-hour period. Solé et al. (2018, 2022) exposed larvae of various species of cephalopods to underwater noise comparable to impact pile driving and observed similar statocyst injuries. Solé et al. (2022) found that exposure to impact pile-driving noise above 170 dB re 1 $\mu Pa^2$ caused observable damage to statocysts in cuttlefish larvae and that those effects could be attributed to the sound pressure (versus particle motion) component of noise. That damage resulted in an apparent reduction in survival and reduced response to predator stimuli in the developing larvae. Solé et al. (2018) observed similar statocyst damage in two species of squid exposed to maximum peak noise levels of 175 dB re 1 µPa. Although Kusel et al. (2023) did not explicitly model this threshold value, the acoustic ranges modeled suggest that Project-related impact pile driving could cause injury-level effects on cephalopod larvae at distances on the order of 3,000 to 6,000 feet from each foundation site.

Jones et al. (2020, 2021) determined that longfin squid, an EFH species, can likely sense and exhibit behavioral responses to vibration from impact pile driving transmitted through sediments, potentially several hundred to several thousand feet from the source. They theorized that intense particle motion exposure could have indirect effects (e.g., impaired ability to detect predators or prey) on squid. However, Jones et al. (2020) also observed rapid, short-term habituation of longfin squid exposed to pile-driving sounds. Further, recent studies investigating the potential impacts of pile-driving noise to longfin squid found no statistically significant differences in the ability of squid to capture prey between exposure and control trials (Jones et al. 2021) and short-lived disruptions to fine-scale movements expected to minimally impact energetics (Cones et al. 2022b), and no significant changes in reproductive behaviors, such as mate guarding (Steen 2023) Collectively, these findings suggest that invertebrates like squid could experience injury or behavioral effects from intense underwater noise exposure. However, extensive behavioral impacts are unlikely, as most appear to be short term in duration with exposed individuals exhibiting rapid habituation, limited energetic costs, and no apparent effect on reproductive behaviors. The aforementioned studies were all conducted in laboratory settings that are imperfect representations of the impacts likely to occur in the marine environment. Additional research is needed to establish thresholds for determining the extent and severity of impacts, and field trials should be conducted to test the representativeness of these thresholds in the real world.

Bivalve mollusks also have statocysts, suggesting that this species group could be susceptible to similar impacts. Certain bivalves exhibited behavioral responses to impulsive noise in controlled research. For example, Jézéquel et al. (2022) observed that substrate vibration from impact pile driving caused behavioral responses in Atlantic sea (giant) scallop, specifically rapid closing of shells in response to each pile strike, up to 26 feet (8 m) from the source. No visible responses were observed at 164 feet (50 m) from the source, indicating that these behavioral effects are generally localized to the vicinity of the disturbance. Particle motion effects from pile driving would be short term in duration, lasting for the duration of the noise impact and limited periods (minutes to hours) following exposure. These findings, combined with the research cited above, indicate that invertebrates like clams, worms, and amphipods that live on or in the seafloor could exhibit a behavioral response to vibration effects over a larger area than implied by particle motion effects alone. Although this potential is acknowledged, additional research is needed to confirm these effects and their biological significance.

As of February 2023, 16 UXOs have been identified in the RWEC corridor. Revolution Wind (Orsted 2023) has determined that all 16 devices can be safely avoided by shifting the cable route within the approved installation corridor without the need for detonation. See Figure 2.1-10 in Chapter 2. However, it is possible that additional devices could be discovered prior to or during construction that cannot be avoided or safely relocated. BOEM has concluded that the need for UXO detonation cannot be entirely ruled out; therefore, the potential effects of this activity on invertebrates are considered herein.

Research on invertebrate exposure to UXO detonation is somewhat more limited, but the available research findings for high-intensity impulsive sound sources summarized above would also likely apply. Broadly speaking, measurable effects on benthic invertebrates that are only sensitive to particle motion effects would be limited to habitats within tens of feet of the outer perimeter of the blast zone. In contrast, cephalopods and bivalves could be sensitive to statocyst injury at greater distances. Particle motion effects from UXO detonation could result in mortality of organisms on the munition and within the blast area, injury-level effects, and short-term behavioral responses at greater distances. As stated, UXO detonation is not currently anticipated as part of the Proposed Action. However, should this activity be required, impacts of this magnitude would constitute a **minor** adverse effect on invertebrates.

Revolution Wind estimates that up to 10,779 linear miles of preconstruction HRG surveys will be required. These surveys would be conducted continuously, 24 hours per day, over approximately 248 days of survey effort. Noise generated by construction vessels and HRG survey activities are of much lower intensity (Denes et al. 2021; LGL Ecological Research Associates [LGL] 2022), with behavioral-level effects on invertebrates likely limited to within 7 feet of a continuously mobile noise source. Only pelagic invertebrates like squid would be likely to detect these effects as the HRG equipment is operated well above the seafloor. HRG survey effects are therefore likely to be **negligible** adverse.

Underwater noise from construction activities could also affect invertebrate eggs and larvae. Popper et al. (2014) summarized available research on the sensitivity of finfish to underwater noise effects. They recommended thresholds for lethal injury and temporary threshold shift (TTS) effects by fish hearing group, including fish eggs and larvae, which are summarized in Table 3.6-7. The applicability of the fish egg and larvae threshold to invertebrate eggs and larvae is unclear, but it is used here to estimate the range of potential effects. Noise impacts could be greater if they occur in important spawning habitat, occur during peak spawning periods, and/or result in reduced reproductive success in one or more spawning seasons, which could result in long-term effects to populations if one or more year classes suffer suppressed recruitment. As shown in Table 3.13-1 in Section 3.13.2.2.1 (noise effects on finfish), impact pile driving and UXO detonation are the only noise sources with the potential to affect invertebrate eggs and larvae. Eggs and larvae within approximately 1,680 and 3,458 feet of WTG and OSS monopile installation, respectively, could be injured or killed by cumulative exposure to impact pile-driving noise. As stated, UXO detonation is not currently anticipated, but BOEM conservatively assumes that additional UXOs could be identified within the RWF and/or RWEC corridor during preconstruction surveys that may require detonation in place. The locations where UXOs are most likely to be encountered are within the central portion of the RWF and on the RWEC corridor at the mouth and outside of Narragansett Bay (Ordtek, Inc. [Ordtek] 2021). Should UXO detonation be required, the resulting impacts could kill eggs and larvae from tens to potentially thousands of feet from the source depending on the size of the device. Keevin and Hempen (1997) examined these effects and determined that setbacks of 49, 213, and 656 feet would protect eggs and larvae from detonation effects for 1.1-, 22-, and 220-pound devices, respectively. Extrapolating from this relationship, the setback requirement to protect eggs and larvae from a 1,000-pound UXO, the largest device anticipated in the maximum work area (Hannay and Zykov 2022; LGL 2022), is approximately 1,385 feet (see Table 3.13-2, Section 3.13.2.2.1).

These findings indicate that impact pile driving and, if required, UXO detonation are likely to cause mortality-level effects on some invertebrate eggs and larvae. However, these adverse impacts are likely to be **minor** overall because 1) the areas of effect are small relative to the available habitat, and 2) the loss of individuals would likely be insignificant relative to natural mortality rates for planktonic eggs and larvae, which can range from 1% to 10% per day or higher (White et al. 2014).

**Table 3.6-7. Noise Exposure Thresholds for Finfish Lethal Injury, Temporary Threshold Shift, and Behavioral Effects**

| Sound Source | Fish Hearing Group | Lethal Injury, Peak*,† | Lethal Injury, Cumulative*,‡ | Recoverable Injury, Cumulative*,‡ | Temporary Threshold Shift*,‡ | Behavioral§ |
|---|---|---|---|---|---|---|
| Impact pile driving and HRG surveys | Fish with swim bladder, involved in hearing | 207 | 207 | 203 | 186 | 150 |
| | Fish with swim bladder, not involved in hearing | 207 | 210 | 203 | 186 | 150 |
| | Fish without swim bladder | 213 | 219 | 216 | 186 | 150 |
| | Eggs and larvae | 210 | 207 | None defined | None defined | N/A |
| UXO detonation | All fish hearing groups | 229 | None defined | None defined | None defined | None defined |
| | Eggs and larvae | >13 mm/s¥ | None defined | None defined | None defined | N/A |

Note: N/A = not applicable.
* Thresholds from Popper et al. (2014).
† Values in dB re 1 μPa, except where indicated.
‡ Values in decibels referenced to the sum of cumulative pressure in micropascals squared, normalized to 1 second.
¥ Particle acceleration exposure threshold (Popper et al. 2014).
§ Threshold from Fisheries Hydroacoustic Working Group (2008).

Collectively, these findings indicate that sound pressure and particle motion effects could cause injury and behavioral effects to invertebrates at distances ranging from a few feet to several hundred feet, and potentially thousands of feet, from each pile. These effects would vary considerably by species group. Behavioral effects are also likely to occur over similar distances, again varying by species group. These effects would be short term in duration, and the overall impact on invertebrates would be **minor** adverse.

Presence of structures: Invertebrates within the benthic disturbance footprints for foundation installation, described in Section 3.6.2.2.1, could be exposed to crushing and burial effects. Some individual invertebrates would unavoidably be injured or killed, but the number of individuals affected would be insignificant relative to the size of the population and the resource would recover completely without additional mitigation. The time required for recovery would vary depending on the type of habitats affected, ranging from short term for invertebrates found in soft-bottom habitats to long term for invertebrates associated with large-grained complex and complex habitats. Therefore, adverse effects to invertebrates from construction of structures would be **minor** adverse.

Sediment deposition and burial: The Project conducted a model-based analysis of the anticipated extent and magnitude of suspended sediment impacts on water quality and benthic habitats in COP Appendix J (RPS 2022). This analysis considered impacts from jet plow trenching for IAC and OSS-link cable installation, jet-plow and mechanical trenching used to install the RWEC, and dredging associated with sea-to-shore transition construction. It determined that suspended sediments released into the water column would be rapidly dispersed by tidal currents, settling back to the seafloor within minutes to hours of the disturbance. Most water column effects would be limited to short-term TSS pulses below 100 mg/L. Higher TSS concentrations exceeding 100 mg/L would occur in areas where seafloor sediments have a greater proportion of mud and silt. TSS plumes caused by construction disturbance would dissipate quickly, with concentrations above 100 mg/L lasting no longer than 6 hours at any location (RPS 2022). A summary of the anticipated extent of water column TSS and substrate burial effects is provided in Table 3.6-8.

Suspended sediments will resettle on the seafloor, blanketing the existing habitat with layers of fine sediment of varying thickness. Sediment deposition from IAC construction could exceed 0.4 inch (10 mm) and 0.004 inch (0.1 mm) on up to 273 and 10,081 acres, respectively. Burial depths from OSS-link cable construction could exceed 0.4 inch (10 mm) and 0.004 inch (0.1 mm) on up to 8.6 and 918 acres, respectively. Burial depths from RWEC construction could exceed 0.4 inch (10 mm) and 0.004 inch (0.1 mm) over 35 and 8,354 acres, respectively. Burial effects on invertebrates would be short term in duration, lasting for minutes to hours after initial bed disturbance as suspended sediments resettle on the seafloor. The actual area of effect at a given moment during construction would be limited to the seafloor disturbance footprint within and adjacent to cable installation activities and the deposition zone downcurrent of the disturbance. IAC and OSS-link cable installation impacts would occur intermittently over a 5-month construction window while the RWEC installation would occur continuously over a period of approximately 8 months. Impacts from other activities like anchoring and boulder relocation were not modeled but are likely to be similar in magnitude but reduced in extent per unit mile of activity relative to jet plow trenching. These impacts would occur prior to cable installation, meaning that this IPF would produce sequential impacts on some benthic habitats.

The magnitude and duration of construction-related sediment effects must be considered in the context of the environmental baseline. As stated in Section 3.6.1.2.1, the sand and mud substrates on the Mid-Atlantic OCS are continually reshaped by bottom currents and sediment delivery from upland sources (Daylander et al. 2012). The prevalence of sediment ripples and megaripples throughout the maximum work area is evidence of these dynamic conditions. This indicates that the benthic habitats associated with invertebrates affected by the Project are regularly exposed to and therefore must be able to recover from burial by mobile sediments. In this context, the short-term effects of sediment deposition on benthic habitats would be **negligible** to **minor** adverse.

**Table 3.6-8. Estimated Maximum Extent of Total Suspended Solid Plumes and Area of Sediment Deposition Resulting from Inter-Array Cable, Offshore Substation-Link Cable, and Revolution Wind Export Cable Construction**

| Project Element | Location | Length (miles) | 0.004 inch (acres) | 0.04 inch (acres) | 0.4 inch (acres) | 50 mg/L (feet) | 100 mg/L (feet) |
|---|---|---|---|---|---|---|---|
| IAC* | OCS | 155.3 | 20,096 | 10,081 | 273 | 1,209 | 932 |
| OSS-link cable‡ | OCS | 9.3 | 1,444 | 918 | 9 | 1,209 | 932 |

| Project Element | Location | Length (miles) | 0.004 inch (acres) | 0.04 inch (acres) | 0.4 inch (acres) | 50 mg/L (feet) | 100 mg/L (feet) |
|---|---|---|---|---|---|---|---|
| RWEC #1 and #2, installation‡ | OCS | 37.3 | 5,786 | 3,684 | 35 | 1,542 | 1,476 |
| | State | 46.0 | 8,031 | 4,670 | 0 | 3,764 | 2,345 |
| Sea-to-shore transition† | State | N/A | 35 | 20 | 7 | 1,460 | 1,312 |

* RPS (2022) did not estimate deposition acreage for the entire IAC. Sediment deposition and burial effects for IAC installation were estimated for this EIS based on the modeled deposition acreage per mile for IAC, OSS-link cable, and RWEC segments for different substrate classifications reported by Inspire Environmental (2023), and the proportional distribution of IAC segments by substrate classification. Values are averages of modeled results for two different tidal current regimes.

‡ RPS (2022) modeled TSS impact estimates for RWEC #1 and the OSS-link cable combined. OSS-link cable values are estimated using the modeled deposition rate/mile for comparable substrate classes in the RWEC footprint. RWEC deposition area results are two times the RPS (2022) results for RWEC #1 minus the estimated OSS-link cable deposition area, assuming that RWEC #2 impacts will be similar to those from RWEC #1 based on proximity and routing through similar benthic habitat types.

† The RPS (2022) model scenario assumed excavation and backfill of a combined 5,881 cubic yards of sediment at the HDD exit pit using a backhoe excavator and venturi eductor device.

### 3.6.2.5.2 Operations and Maintenance and Decommissioning

#### Offshore Activities and Facilities

Accidental releases and discharges: The prohibitions on releases of trash and debris and accidental spill avoidance and minimization measures described in Section 3.6.2.3.1 for project construction would continue to apply throughout the operational life of the Project. These restrictions and measures would effectively avoid adverse effects from Project-related trash and debris and accidental spills. Therefore, the effects of this impact mechanism on invertebrates would be **negligible** adverse.

Anchoring and new cable emplacement/maintenance: Cable protection maintenance would produce similar effects on habitat-forming invertebrates as those described for Project construction. The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSSs into the water column. The resulting effects from O&M and decommissioning would be short term in duration, and similar in nature but lesser in magnitude than those resulting from Project construction. Therefore, these effects would be **minor** adverse.

Bycatch: The RWF FRMP employs a variety of survey methods to evaluate the effect of RWF construction and operations on benthic habitat structure and composition and economically valuable fish and invertebrate species. The survey methods in Table 3.6-9 either directly assess or could impact invertebrates.

**Table 3.6-9. Survey Methods**

| Survey Method | Description |
|---|---|
| Ventless trap surveys | Used to evaluate changes in the distribution and abundance of lobster and Jonah crab in the RWF and adjacent reference areas and Jonah crab, lobster, whelk (Buccinidae), and finfish along the RWEC corridor and adjacent reference areas; these areas would be surveyed 12 times per month for 7 months each for 2 years prior to and at least 2 years following completion of Project construction (4 years total). |
| Otter trawl surveys | Used to assess abundance and distribution of target fish and invertebrate species within the RWF; trawls could impact a variety of invertebrate species as bycatch; these surveys would occur four times per year for 2 years prior to and at least 2 years following completion of Project construction. |
| Benthic habitat surveys | Sonar, video, and photographic imaging are used to evaluate changes in benthic habitat structure and invertebrate community composition. |

These surveys involve similar methods to and would complement other survey efforts conducted by various state, federal, and university entities supporting regional fisheries research and management.

The trawl and ventless trap surveys would target specific invertebrate species, squid and crabs and lobster, respectively, using methods and equipment commonly employed in regional commercial fisheries. Organisms captured during surveys would be removed from the environment for scientific sampling and commercial use. Other species of invertebrates could also be impacted by sampling activities. For example, benthic invertebrates could be injured or killed when survey equipment contacts the seafloor or when inadvertently captured as bycatch. Non-target organisms would be returned to the environment where practicable, but some of these organisms would not survive. While the FRMP would result in unavoidable impacts to individual invertebrates, the extent of habitat disturbance and number of organisms affected would be small in comparison to the baseline level of impacts from commercial fisheries and would not measurably impact the viability of any species at the population level. Randomized sampling distribution means that repeated disturbance of the same habitat is unlikely. As such, habitat impacts from FRMP implementation would likely be short term in duration. The intensity and duration of impacts anticipated from FRMP implementation would constitute a **minor** adverse effect on invertebrates.

<u>EMF:</u> The IAC, OSS-link cable, and RWEC would generate EMF and substrate heating effects, altering the environment for benthic invertebrates and other organisms associated with those habitats. These effects would occur throughout the operational life of the Project and cease with Project decommissioning.

The Proposed Action includes EPMs to minimize EMF impacts. The Project would employ HVAC transmission at 60 hertz (Hz). HVAC transmission produces lower intensity EMFs than HVDC and, as discussed further below, the 60-Hz electrical fields generated by HVAC transmission would be undetectable or unlikely to be detected by electrosensitive organisms. All transmission cables would be contained in grounded metallic shielding to minimize electrical field effects and buried to target depths of 4 to 6 feet (1.2 to 1.8 m) or deeper in soft-bottom benthic habitat and other areas where burial is possible. Cable segments that cross unavoidable hard substrates and other offshore infrastructure would be laid on the bed surface covered with a concrete mattress or other form of cable armoring for protection. EMF effects in these areas would be greater than for buried cable segments. EMF levels diminish rapidly with distance and would become indistinguishable from baseline conditions within about 26 feet (8 m) of both buried and exposed cable segments (Exponent 2023). Modeled EMF effects for buried and exposed cable segments under annual average and peak transmission loads are summarized in Table 3.6-10.

Hughes et al. (2015) and Emeana et al. (2016) evaluated the thermal effects of buried and exposed electrical transmission cables on the surrounding environment. They determined that heat from exposed cable segments would dissipate rapidly without measurably heating the underlying sediments. In contrast, the typical HVAC cable buried in sand and mixed sand and mud (i.e., soft-bottom benthic habitat) can heat sediments within 1.3 to 2 feet (0.4 to 0.6 m) of the cable surface by +10 to 20 degrees Celsius (°C). Substrate heating effects are also summarized in Table 3.6-10. Substrate heating effects are strongly influenced by site-specific characteristics, like the size and mixture of substrate sediments and sediment porosity. For this reason, this estimate likely represents the upper bound of potential heating effects in soft-bottom habitat. Heating effects in coarser-grained sediments with higher porosity would likely be less extensive.

**Table 3.6-10. Modeled Electromagnetic Field Levels and Estimated Substrate Heating Effects Under Average and Peak Load Conditions for Buried and Exposed Cable Segments and Miles of Cable by Category for the Proposed Action**

| Component | Installation | Total Cable Length (linear miles) | Magnetic Field (mG) at Seafloor | Magnetic Field (mG) 3.3 Feet above Seafloor | Electrical Field (mV/m at 60 Hz) at Seafloor | Electrical Field (mV/m at 60 Hz) 3.3 Feet above Seafloor | Substrate Heating |
|---|---|---|---|---|---|---|---|
| IAC* | Buried to 3.3 feet | 139.8 | 57–82 | 17–24 | 2.1–3.0 | 1.3–1.8 | +10 to +20°C within 0.4 to 0.6 m of cable |
| | On bed surface | 15.5 | 522–745 | 35–50 | 5.4–7.7 | 1.7–2.5 | Negligible |
| OSS-link cable† | Buried to 3.3 feet | 8.4 | 147–210 | 41–58 | 4.4–6.3 | 2.3–3.2 | +10 to +20°C within 0.4 to 0.6 m of cable |
| | On bed surface | 0.9 | 1,071–1,529 | 91–130 | 13–18 | 3.5–4.9 | Negligible |
| RWEC† | Buried to 3.3 feet | 70.6 | 147–210 | 41–58 | 4.4–6.3 | 2.3–3.2 | +10 to +20°C within 0.4 to 0.6 m of cable |
| | On bed surface | 12.7 | 1,071–1,529 | 91–130 | 13–18 | 3.5–4.9 | Negligible |

Note: mG = milligauss; mV/m = millivolt/meter.

* Value ranges shown are modeled effects under average and peak load conditions, estimated as 66 kV at 480 and 685 amps, respectively, for the IAC cable (Exponent 2023).

† Value ranges shown are modeled effects under average and peak load conditions, estimated as 275 kV at 690 and 985 amps, respectively, for the RWEC and OSS-link cables (Exponent 2023).

The evidence for EMF effects on invertebrates is equivocal, varying considerably between species and by the type and strength of EMF source (Albert et al. 2020; Gill et al. 2020; Hutchison et al. 2020b). Several studies have observed no apparent behavioral responses in crustaceans and mollusks at EMF field strengths similar to the highest levels likely to result from IAC, OSS-link cable, and RWEC segments laid on the bed surface (e.g., Love et al. 2017). Some studies (e.g., Cameron et al. 1985; Levin and Ernst 1995; Ottaviani et al. 2002; Stankevičiūtė et al. 2019; Zimmerman et al. 1990) have observed apparent physiological effects on organisms like clams, mussels, urchins, and worms with exposure to EMF from HVAC transmission at levels similar to those shown in Table 3.6-10, whereas other studies have observed no apparent effects on similar organisms from much higher exposures over longer periods (Gill et al. 2020; Hutchison et al. 2020b). These contradictions are compounded by differences in study methods and the type of EMF exposure (i.e., HVDC versus HVAC transmission), making it difficult to draw conclusions about invertebrate sensitivity to EMF effects (Hutchison et al. 2020b). On balance, there is limited evidence to suggest that exposure to Project-related HVAC EMF fields could lead to measurable effects on benthic infauna. Any measurable effects that do occur would be localized to the areas of greatest exposure in immediate proximity to the cables. Developmental effects leading to reduced survival of individual animals could conceivably occur, but the numbers of individuals affected would not be significant at the population level. Given this uncertainty, the potential permanent effects from Project-related EMFs on invertebrates that live in or directly on the seafloor are conservatively assumed to range from **negligible** to **minor** adverse. Any measurable EMF effects, should they occur, would be limited to individuals occurring within the immediate zone of measurable EMF effects.

While directed studies are limited, there is little evidence that epibenthic and pelagic invertebrates like crabs and squid are sensitive to EMFs from HVAC transmission of comparable or greater intensity than those likely to result from the Proposed Action (Love et al. 2015; Normandeau et al. 2011; Williamson 1995). The preponderance of evidence suggests that EMFs from the Project would have **negligible** adverse effects on invertebrates like longfin and shortfin squid, both EFH species.

Transmission cables would also generate substrate heating effects with the potential to negatively impact invertebrates, although these effects would be limited in extent and likely not biologically significant. Heating effects would likely be greatest in predominantly silt and mud sediments with little or no substrate porosity. In this type of environment, cable heating effects could increase substrate temperatures by as much as 10°C to 20°C above ambient within 1.3 to 2 feet (0.4 to 0.6 m) of buried cable segments (see Table 3.6-10). This estimate may be conservatively high in coarser sediments with higher porosity. Temperature changes of this magnitude, should they occur, could adversely affect Atlantic surfclam and ocean quahog (Acquafredda et al. 2019; Harding et al. 2008) as well as other benthic infauna species. However, the amount of suitable habitat exposed to these effects would be limited. Cable burial at 4 to 6 feet (1.2 to 1.8 m) would limit substrate heating effects to depths 2 feet or more below the bed surface, below the depths inhabited by most invertebrate species. Cable segments at the transitions between fully buried and exposed cable segments would be at shallower depths, potentially exposing quahog and surfclam habitat and other invertebrate infauna species habitat to adverse thermal effects. However, these shallow cable segments are likely to be covered by concrete mattresses, meaning that the affected areas would no longer be available to these species. The latter impacts are accounted for under presence of structures. On this basis, substrate heating impacts, while permanent, would have a **negligible** adverse effect on invertebrates.

Light: As discussed in Section 3.6.1.2.1, all planned and future offshore wind energy projects would follow BOEM design guidance (BOEM 2021a) for offshore energy structures and vessels. Compliance with this guidance would effectively minimize long-term light impacts from O&M of the Proposed Action such that effects on invertebrates, including habitat-forming invertebrates that contribute to benthic habitat structure, would be **negligible** adverse. The proposed WTG and OSS structural lighting for the Project, shown in Section 2.1.2.2.1, fully complies with BOEM guidance. Vessels used during decommissioning would follow the same or improved guidance to avoid and minimize lighting impacts as those used for project construction (see Section 3.6.2.3.1). Therefore, short-term light effects on invertebrates from decommissioning of the Proposed Action would similarly be **negligible** adverse.

Noise: The RWF WTGs would generate permanent operational noise effects throughout the life of the Project, ending when the Project is decommissioned. The Project would employ current generation direct-drive WTG designs that generally produce less underwater noise and vibration than older generation WTGs with gearboxes. Much of our current understanding about operational noise is based on the monitoring of wind farms in Europe that use these older generation designs. Although useful for generally characterizing potential noise effects, these data are necessarily representative of the noise produced by current generation designs (Elliot et al. 2019; Tougaard et al. 2020). Typical noise levels produced by older generation geared WTGs range from 110 to 130 dB re 1 µPa with 1/3-octave bands in the 12.5- to 500-Hz range, sometimes louder under extreme operating conditions (Betke et al. 2004; Jansen and de Jong 2016; Madsen et al. 2006; Marmo et al. 2013; Nedwell and Howell 2004; Tougaard et al. 2009, 2020).

Monitoring of operational noise produced by the BIWF (Elliot et al. 2019) supports the conclusion that modern WTG designs generally produce less noise than older generation models. The BIWF employs five 6-MW direct-drive WTGs. Operational noise from these WTGs was generally lower than noise levels generated by older, lower capacity WTGs at European wind farms as reported in the literature (Betke et al. 2004; Jansen and de Jong 2016; Madsen et al. 2006; Marmo et al. 2013; Nedwell and Howell 2004; Tougaard et al. 2009, 2020). Operational noise levels typically ranged from 110 to 125 re 1 µPa, occasionally reaching as high as 128 dB re 1 µPa, mostly at low frequencies ranging from 10 Hz to 8 kHz. Particle acceleration effects on the order of 10 to 30 dB re 1 $\mu m/s^2$ at a reference distance of 50 meters. Although the BIWF provides a useful basis for evaluating noise levels produced by direct-drive systems, no comparable observational data have been collected for the larger capacity WTGs proposed for the Project. Stober and Thomsen (2021) modeled operational noise from larger current generation direct-drive WTGs and concluded that these designs could generate considerably higher operational noise levels than those reported in earlier research. They estimated that a 10-MW direct-drive design could produce noise levels on the order of 167 dB re 1 µPa. This suggests that operational noise effects could be more intense and extensive than those considered herein, but additional research is needed to confirm these theoretical findings.

Invertebrates lack specialized hearing organs and cannot sense sound pressure in the same way as fish and other vertebrates. Invertebrates can sense sound as particle motion, but particle motion effects dissipate rapidly and are usually undetectable within a few feet of the source. Broadly speaking, the rapid development of diverse invertebrate communities on foundations and scour protection in operational wind farms worldwide (see the presence of structures IPF below) indicates that operational noise has little if any effect on benthic invertebrates. Certain species, specifically squid, may be more sensitive to sound than other species, such as crustaceans and bivalves. The sound pressure and particle motion effects observed at the BIWF are well below levels associated with injury and behavioral responses in cephalopods and other invertebrate species groups. However, the larger WTG designs proposed for the Project could theoretically produce operational noise approaching levels associated with injury-level effects on cephalopods in recent research (e.g., Solé et al. 2018, 2022). However, the likelihood of such effects and the area affected would depend on the specific noise levels produced by the selected WTG in this environment, and recent studies (BOEM 2023) have indicated the impacts of underwater noise on longfin squid, a managed species present in the Lease Area, are minimal (see Section 3.6.2.5.1). Collectively, this information indicates that operational noise effects on invertebrates would be **negligible** to **minor** adverse.

Project vessels used during O&M, decommissioning, and O&M-related HRG survey activities would generate similar noise effects to those described for Project construction in Section 3.6.2.3.1 and would likewise be **negligible** adverse.

<u>Presence of structures:</u> The new hard structures created by RWF foundations, scour protection around the foundations, and cable protection would displace existing habitat for invertebrates that use soft-bottom benthic habitat and create new habitats for invertebrates that colonize hard surfaces. As stated previously, approximately 1.5 acres of soft-bottom benthic habitat would be displaced by monopile foundations, 34.1 acres would be displaced by scour protection around the foundations, and 81.2 acres would be displaced by concrete mattresses protecting exposed segments of the IAC, OSS-link cable, and RWEC. Those habitats would no longer be available to invertebrate infauna like tube worms, copepods, and bivalves, including three EFH species (Atlantic surfclam, Atlantic sea scallop, and ocean quahog). Longfin squid, another invertebrate EFH species, also associate with soft-bottom benthic habitat.

Habitat for invertebrates that colonize hard surfaces or associate with complex benthic habitat would increase. Epibenthic organisms (e.g., mussels and anemones) and crustaceans that prefer hard-bottom habitat (e.g., American lobster and crab) would gain habitat. The available evidence indicates that recovery of benthic habitat structure would begin quickly and would likely be relatively rapid, but full recovery of the community of habitat-forming organisms could take up to a decade. For example, Degraer et al. (2020) have documented the development of diverse invertebrate communities on offshore wind structures around the globe. Hutchison et al. (2020a) documented the development of a diverse and biologically productive invertebrate community that developed on turbine foundations at the nearby BIWF within 3 years after construction. The structures were initially colonized by dense aggregations of mussels and barnacles, followed by corals, hydroids, anemones, and predatory invertebrates like crabs, sea stars, and snails. A nonnative tunicate, already widespread and common in the region, is also present. Shell hash and detritus falling from the foundations changed the composition of and enriched the surrounding sediments, increasing biological productivity. These effects extended beyond the scour protection footprint surrounding each foundation. Based on the proximity of RWF structures to the BIWF, it is reasonable to conclude that RWF structures would develop a similarly diverse biological community over a similarly short period.

Similar artificial reef effects have been observed at other offshore wind facilities (Causon and Gill 2018; Degraer et al. 2020; Langhamer 2012; Taormina et al. 2018). While these findings indicate relatively rapid recovery of benthic community structure in general, some impacts may be longer lasting. Certain types of habitat-forming invertebrates, such as sponges and corals, are sensitive to disturbance and slow growing. These more sensitive species can take decades to fully recover and recolonize damaged habitats (Tamsett et al. 2010), but functional habitat recovery can likely be achieved in a decade or less based on observational studies within and outside the region (Auster and Langton 1999; BOEM 2023; Collie et al. 2005; Lukens and Selberg 2004).

Offshore wind structures could in theory provide a foothold for harmful nonnative species invasions. Several researchers (e.g., Coolen et al. 2020; Degraer et al. 2020; De Mesel et al. 2015; Hemery and Rose 2020) have raised concerns that offshore wind structures could provide novel habitats for nonnative species, serving as stepping stones that could facilitate the establishment of potentially harmful organisms. Nonnative species have been observed at the BIWF (Hutchison et al. 2020c), but negative impacts on native biological communities have yet to be demonstrated. Nonnative species have been detected at wind farms in Europe and are commonly species that are already present in intertidal habitats and that are able to exploit newly created wind farm surfaces within a similar depth range near the water surface (Coolen et al. 2020; De Mesel et al. 2015). De Mesel et al. (2015) concluded that nonnative species were able to use wind farm foundations to expand their range within the North Sea. Coolen et al. (2020) similarly observed nonnative species on wind farm structures as well as on oil and gas platforms. Nonnative species were most common at surface to mid-depths and comparatively rare around the base of the foundations. Hemery and Rose (2020) reviewed the available science and concluded that wind farms do not pose an inherently higher risk of nonnative species invasions than other existing marine installations. Further, these risks can be minimized by managing pathways for nonnative species introductions during Project construction and O&M (e.g., through ballast water controls and avoiding ports where high-risk species are known to be present).

In general, reef effects are likely increase the diversity and biological productivity of the invertebrate community within and around the RWF over time (Causon and Gill 2018). The resulting effects on invertebrates would vary by species and could be positive, negative, or neutral depending on a variety of factors. For example, the displacement of soft-bottom benthic habitat would constitute a limited but permanent **moderate** adverse impact on invertebrates that use this habitat type. Some of these negative effects could be offset by organic enrichment and increased biological productivity in soft-bottom habitats at the edge of the reef effect zone (e.g., Hutchison et al. 2020c). Invertebrate species that associate with hard substrates and vertical relief created in the water column would gain new opportunities for habitat colonization that would otherwise not be present in the offshore environment, resulting in **minor** to **moderate** beneficial effects, with the level of benefit varying depending on the structures involved. For example, foundations and scour protection at the BIWF were rapidly colonized by epifaunal invertebrates, creating a diverse community of habitat-forming organisms within 4 years (Hutchison et al. 2020c). In contrast, concrete mattresses used for cable protection at the BIWF showed no measurable invertebrate community growth at 3 years following installation (HDR 2020), indicating that this type of structure will take longer to develop functional habitat value.

Hydrodynamic effects resulting from the presence of offshore wind structures could also affect the distribution and abundance of invertebrates within and around the RWF. Current movement around wind farm foundation also generates turbulent wakes that promote increased mixing downcurrent of the structures. Turbulent wakes can range from several hundred feet to potentially a mile or more in scale (Cazenave et al. 2016; Vanhellemont and Ruddick 2014). While impacts on current speed and direction decrease rapidly around monopiles, modeling studies suggest a potential for hydrodynamic effects out to 0.6 mile downcurrent (Li et al. 2014). Monopile wakes of up to 1,000 feet have been observed in real-world environments, but the resulting turbulence effects were indistinguishable from natural interannual variability (Schultze et al. 2020). The broad range of observed and predicted wake effects are likely influenced by local conditions, wind farm scale, and sensitivity of the analysis. In strongly stratified locations, the turbulent wake effects are often masked or muted by the oceanographic processes that create stratification (Schultze et al. 2020). Even in strongly stratified environments, turbulent mixing that introduces nutrients from depth into the stratified surface layer can lead to a local increase in primary production (Floeter et al. 2017).

A growing body of research has demonstrated that offshore wind farms could have observable effects on oceanographic conditions up to tens of miles downfield from wind farm sites (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorell et al. 2022; Floeter et al. 2022; Raghukumar et al. 2022). These field effects can also affect stratification and mixing of surface waters, which can in turn influence important ecological processes like larval dispersal and primary productivity. However, the extent and resulting ecological significance of these effects are likely to vary considerably between different oceanographic environments (van Berkel et al. 2020). Van Berkel et al. (2020) and Schultze et al. (2020) note that environments characterized by strong seasonal stratification, such as the Mid-Atlantic Bight, are less sensitive to changes and disruptions to oceanographic processes from atmospheric effects. In addition, atmospheric effects are influenced by WTG design. Golbazi et al. (2022) demonstrated that the surface effects of wind wakes from 10- to 15-MW WTGs, the size range being considered for development in the region, were appreciably less extensive than those produced by the smaller turbine designs currently employed in Europe (Akhtar et al. 2022; Christiansen et al. 2022; Daewel et al. 2022). Broadly speaking, the atmospheric effects of wind farms appear to decrease as WTG hub height above the sea surface increases.

Collectively, these findings indicate that planned and probable future wind farm development on the Mid-Atlantic OCS are unlikely to produce hydrodynamic effects on the order of those associated with European wind farm development in the southern North Sea (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorell et al. 2022). As discussed in Section 3.6.2.3.1, this conclusion is supported by the findings of the Johnson et al. (2021) hydrodynamic modeling study conducted for BOEM. This study determined that the planned introduction of offshore wind energy structures to the RI/MA and MA WEAs would likely lead to small but measurable changes in current speed, wave height, and sediment transport in the northern Mid-Atlantic Bight. However, changes are unlikely to disrupt the prevailing strong seasonal stratification present on the Mid-Atlantic OCS.

Windfarm effects on surface currents are also likely to influence the dispersal of planktonic invertebrate and fish larvae within the WEAs and their surroundings, increasing larval settlement in some areas and decreasing it in others (Johnson et al. 2021). Changing larval dispersal pathways can disrupt connectivity between populations and the processes of larval settlement and recruitment (Sinclair 1988). Large-scale hydrodynamic changes can create population ‘sinks,’ subpopulations that are reproductively isolated from other regional populations by unfavorable changes in larval dispersal (Sinclair 1988). While some hydrodynamic effects on larval dispersal patterns are likely to occur as a result of the Proposed Action, and these impacts would last until the Project is decommissioned, the available evidence suggests that full development of the RWF would be unlikely to cause this type of adverse population-level effect on any invertebrate species.

The rationale for this conclusion is based on the nature of the regional oceanographic environment and its invertebrate populations. The invertebrate species of the Mid-Atlantic OCS use numerous broadly distributed spawning locations from which larvae are transported by regional circulation patterns over distances ranging from tens to hundreds of miles (Chen et al. 2021; McCay et al. 2011; Munroe et al. 2018; Roarty et al. 2020; Zhang et al. 2015). The Johnson et al. (2021) modeling results indicate that Project-related shifts in larval transport and settlement density would be localized, with changes in settlement density occurring at the scale of miles to tens of miles within the natural variability of these broader regional patterns. Prior to the Johnson et al. (2021) analysis, Chen et al. (2016) used a hydrodynamic model to assess how the installation of large numbers of wind turbines on the Mid-Atlantic OCS would impact oceanographic processes during large storm events. They determined that structure presence would not have a significant influence on southward larval transport from Georges Bank and Nantucket Shoals to the Mid-Atlantic Bight, but wind farm development could lead to an increase in cross-shelf larval dispersion. The combined findings of the Johnson et al. (2021) and Chen et al. (2016) modeling studies indicate that broad changes in regional circulation patterns are unlikely to result from regional offshore wind development. These patterns are broadly consistent over time but vary from year to year, and organisms that depend on circulation-driven larval dispersal are adapted to that variability (Chen et al. 2021; McCay et al. 2011; Munroe et al. 2018; Roarty et al. 2020; Zhang et al. 2015). In this context, localized shifts in larval transport and settlement density on the scale of miles to tens of miles are unlikely to negatively affect larval survival at regional scales. Even where they occur, localized changes in larval recruitment may not necessarily translate to negative effects on adult biomass. For example, Atlantic sea scallops are prone to overcrowding and reduced growth rates in areas where larval recruitment exceeds carrying capacity (Bethoney and Stokesbury 2019). In such cases, changes in dispersal that reduce overcrowding could lead to localized beneficial effects on larval survival and growth to adulthood.

On this basis, BOEM concludes that the Proposed Action is likely to result in measurable hydrodynamic effects on invertebrates. Those effects would include changes in egg and larval dispersal patterns and the resulting effects on survival and growth to adulthood. Those effects could be positive or negative for individual organisms but are unlikely to lead to measurable consequences at population levels. The hydrodynamic effects of the Proposed Action would cease when the Project is decommissioned and removed. On this basis, hydrodynamic impacts of the Proposed Action would constitute a **minor** adverse effect on invertebrates. These impacts would cease when the Project is decommissioned, and subpopulation distribution would shift in response to the oceanographic conditions present at that time, as determined by climate change trends and other regional trends.

To summarize, long-term habitat modification caused by the presence of structures would create winners and losers, with some invertebrate species losing suitable habitat while others would gain. Negative population-level effects are unlikely to occur, as invertebrate species that lose habitat would still have abundant habitat available and those in proximity to new structures could benefit from increased biological productivity created by reef effects. On balance, the effects of this IPF on invertebrates are likely to be long term **moderate** beneficial and **moderate** adverse in terms of overall impact, varying by species and habitat association. Concrete mattresses used for cable protection may have to reside in the environment for some time before they provide suitable invertebrate habitat, which would constitute a long-term **minor** adverse impact depending on the amount of cable protection used.

O&M under the Proposed Action would include regular inspections of offshore structures and opportunistic removal of derelict fishing gear and other accumulated debris over the life of the Project. Derelict gear and debris are sources of bycatch mortality for invertebrates and can also cause damage to habitat-forming organisms that contribute to benthic habitat structure. Derelict gear and debris removal from structures would constitute a long-term **minor** beneficial effect on invertebrates and habitat-forming organisms that contribute to benthic habitat structure.

Sediment deposition and burial: Up to 10% of cable protection is anticipated to be replaced over the life of the Project. Cable protection maintenance would produce similar effects on habitat-forming invertebrates as those described for Project construction, although reduced in extent and spread out over time. These effects would range from short-term behavioral disturbance of benthic infauna and other invertebrates accustomed to naturally high rates of sediment deposition, to mortality of benthic eggs and invertebrates subject to burial effects greater than 0.4 inch (10 mm). The IAC, OSS-link cable, RWEC, and cable protection would be removed from the seafloor during Project decommissioning, releasing TSSs into the water column. The resulting adverse effects from O&M and decommissioning would be similar in nature but lesser in magnitude than those resulting from Project construction and would therefore be **minor** adverse.

#### 3.6.2.5.3 Cumulative Impacts

### Offshore Activities and Facilities

Accidental releases and discharges: Based on compliance with environmental regulations, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** adverse cumulative effects on invertebrates from accidental releases and discharges.

When the Project is combined with other future offshore wind projects, up to approximately 34 million gallons of coolants, fuels, oils, and lubricants could cumulatively be stored within WTGs and the OSSs' within the invertebrate GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. Additionally, training and awareness of EPMs (see Table G-1 in Appendix G) proposed for waste management and marine debris would be required of RWF Project personnel. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and impacts would be minimized through planned EPMs and other mitigation measures detailed in Tables F-1 and F-2, respectively, in Appendix F. Impacts to invertebrates, including habitat-forming species, from small-volume spills are therefore expected to be **negligible** adverse and short term in duration.

Higher volume spills of toxic materials could occur due to unanticipated events, such as a vessel allision with a WTG foundation. The nature and significance of such events would vary depending on the size of the release and the nature of the materials involved. Such events could lead to more extensive impacts on invertebrates, including habitat-forming species that contribute to benthic habitat structure. When low-probability unanticipated events are considered, the Proposed Action when combined with other past, present, and reasonably foreseeable projects poses a potential for **minor** to **moderate** adverse cumulative impacts on invertebrates that could range from short term to long term in duration.

Anchoring and new cable emplacement/maintenance: BOEM estimates a cumulative total of 11,631 acres of anchoring and mooring-related disturbance and 105,390 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the invertebrate GAA. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could take a up to a decade to fully recover.

Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to invertebrates and on benthic habitat structure through impacts to habitat-forming invertebrates.

Bycatch: As discussed under O&M, the Proposed Action includes implementation of a FRMP to evaluate the effects of Project construction and structure presence on economically valuable fish and shellfish resources (Revolution Wind and Inspire Environmental 2023). Other planned and potential future offshore wind energy projects have or will likely implement similar monitoring plans that employ similar sampling methods using commercial fishing gear. These monitoring programs have and will likely continue to contract with commercial fishers to conduct data collection. The commercial fishers involved would likely otherwise be engaged in commercial fishing activity, meaning that planned and future monitoring activities are unlikely to increase the amount of fishing effort and associated impacts on invertebrates in the GAA relative to existing conditions. However, the distribution and timing of those impacts may change. As such, cumulative impacts from bycatch associated with monitoring activities under the Proposed Action in combination with other planned and future offshore wind projects would be **negligible** to **minor** adverse, with the impacts ranging from short term to long term in duration. Long-term impacts could result from damage to habitat-forming invertebrates in large-grained complex and complex benthic habitat and would also constitute an impact to benthic habitat structure.

The Proposed Action would include regular inspections to identify and remove derelict fishing gear and other trash and debris attached to offshore structures. Other future projects are expected to include similar measures in their O&M plans. This O&M effort would benefit invertebrates by removing potential sources of bycatch and benthic habitat structure by removing a source of potential damage to habitat-forming invertebrates. This O&M effort would continue over the life of the Project and other future wind energy projects and would therefore constitute a long-term **minor** beneficial effect on invertebrates and benthic habitat structure.

Climate change: In addition to the impacts described in the No Action Alternative (see Section 3.6.1.2), climate change has also resulted in a measurable increase in precipitation on the East Coast, increasing the amount of runoff and stormwater pollutants delivered by rivers to coastal and estuarine habitats. These trends are expected to continue under the Proposed Action. The intensity of climate change cumulative impacts on invertebrates are uncertain and are likely to vary considerably between species, resulting in **moderate** adverse effects.

EMF: Under the Proposed Action the Project would generate EMF and substrate heating effects of varying intensity along the combined 252 miles of IAC, OSS-link cable, and RWEC length. These effects would combine with those generated by the 13,717 miles of transmission cables from other future offshore wind facilities and existing transmission cables present within the invertebrate GAA. These cumulative effects would be similar in nature to those described for the No Action Alternative in Section 3.6.1.1.1. In summary, measurable effects on invertebrates from EMF exposure would be limited to individuals that occur in the immediate proximity (i.e., within 20 feet) of Project cables and range from short-term changes in behavior with no significant long-term consequences to potential physiological changes with prolonged exposure. Substrate heating effects could render small amounts of habitat unsuitable for certain benthic invertebrate species at locations where buried cables are within 2 feet of the bed surface. Effects to individuals are unlikely to have a measurable impact on any invertebrate species at the population level and would therefore range from negligible to minor adverse depending on the type of exposure. BOEM anticipates that future offshore wind energy projects in the GAA would use HVAC (versus HVDC) transmission and apply similar design measures to those included in the Proposed Action avoid and minimize EMF effects on the environment. While uncertainties remain, cumulative adverse impacts to invertebrates from EMF and substrate heating effects resulting from past, planned, and potential future actions are likely to be **minor** adverse.

Light: The Proposed Action would result in noticeable but negligible adverse impacts to invertebrates through the installation of up to 102 lighted structures (100 WTGs and two OSSs). The Proposed Action and all future projects would be expected to comply with BOEM design guidance for avoiding and minimizing adverse lighting impacts on the environment (BOEM 2021a), meaning that effects to invertebrates would be negligible and adverse. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be similar to those impacts described under the No Action Alternative and would be **negligible** adverse, mostly attributable to existing, ongoing activities.

Noise: The Proposed Action would generate underwater noise effects during Project construction, throughout the operational life of the Project, and during Project decommissioning. These effects would combine with similar effects resulting from the construction, O&M, and decommissioning of other planned offshore wind projects on the Mid-Atlantic OCS. Sound-sensitive invertebrate species occurring near UXO detonation and impact pile-driving and vibratory pile-driving activities could suffer noise-related injury to sensory cells, resulting in reduced survival. The number of individuals affected is unlikely to have any measurable effect on those species at the population level. Less sensitive species may be temporarily disturbed by vibration effects, but any such effects would be short term in duration and are unlikely to have a measurable effect on any invertebrate population. Given this, cumulative effects on invertebrates resulting from underwater noise caused by the Proposed Action are likely to be **negligible** to **minor** adverse, varying by species.

Presence of structures: The Proposed Action would result in long-term alteration of water column and seafloor habitats, resulting in a diversity of effects on benthic habitat and invertebrates, including EFH species. The 102 monopile foundations and other hard surfaces installed as part of the Proposed Action would create an artificial reef effect. The new offshore structures would also cause hydrodynamic effects that would influence primary and secondary productivity within and around the artificial reef and effects on planktonic invertebrates, eggs, and larvae. Reef effects would alter biological community structure, producing an array of effects on invertebrates, and would create an artificial reef effect. The new offshore structures would also cause hydrodynamic effects that would influence primary and secondary productivity within and around the artificial reef, influencing the dispersal and survival of planktonic invertebrates and eggs and larvae. Reef effects would alter biological community structure, producing an array of effects on invertebrates. The affected invertebrates and habitats would interact with construction and O&M impacts caused by other planned offshore wind projects within the GAA. These projects would individually result in similar effects to those described for the Proposed Action, but the potential for synergistic cumulative effects at regional scales is not presently known. Those cumulative effects could be beneficial or adverse, varying by species, and would likely range from **minor** adverse and beneficial to **moderate** adverse and beneficial in terms of overall impact.

The Proposed Action is comparable in scale compared to some of the offshore renewable energy projects planned in the GAA. BOEM estimates the Proposed Action and other planned future projects will result in the development of 3,190 WTG and OSS foundations within the invertebrate GAA. Many of these projects will or could be developed in adjacent lease areas. Depending on how they are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential impacts of these broader cumulative effects on invertebrates in general.

Sediment deposition and burial: The Proposed Action would result in localized short-term **minor** adverse sediment deposition and burial effects on benthic habitat and invertebrates. Short-term burial effects exceeding 10 mm would occur over an estimated 3,412 acres within the invertebrate GAA. Similar sediment deposition and burial impacts would result from the estimated 105,390 cumulative acres of cabling-related disturbance for the Proposed Action plus other future offshore wind projects within the invertebrate GAA. While suspended sediment effects from future projects cannot be predicted without area-specific modeling, these effects are expected to be similar in magnitude and extent to those described for the Proposed Action. More extensive suspended sediment and deposition effects could occur in areas where mud and silts are more prevalent in bed sediments. Some future projects could include dredging for O&M facility development or related port improvements. When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would result in **minor** adverse cumulative impacts on benthic habitats and invertebrates.

The development of the Proposed Action in combination with other future offshore wind projects would generate similar sediment deposition and burial effects to those described above under project construction and installation (Section 3.6.2.3.1), but those effects would be more extensive and distributed across offshore WEAs within the GAA. As stated, these effects would be short term in duration and would range in severity from negligible to minor adverse at any given location. Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any invertebrate species; therefore, cumulative adverse effects from sediment deposition and burial would be **minor** adverse.

#### 3.6.2.5.4 Conclusions

The construction and installation, O&M, and decommissioning of the Proposed Action would impact invertebrates through several mechanisms, including direct disturbance and mortality from seafloor disturbance during construction, entrainment of eggs and larvae, permanent habitat conversion, and changes in invertebrate community structure and food web interactions caused by reef effects. Reef effects would occur on and around RWF foundations and on portions of the RWEC corridor where cable protection would create new biological hotspots that would benefit some invertebrate species and reduce habitat suitability for others. Benthic infauna and other relatively immobile invertebrates within the 6,656-acre overall disturbance footprint of the Project would unavoidably be injured or killed during Project construction. This impact alone constitutes a **moderate** adverse effect on invertebrate species. Some of these adverse effects would be offset by **moderate** beneficial effects to some invertebrate species that benefit from the reef effects formed by new offshore structures.

Collectively, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **moderate** adverse to **moderate** beneficial impacts on invertebrates in the GAA because a notable and measurable impact is anticipated, but the resource would likely recover completely when the impacting agents were gone and remedial or mitigating action were taken.

### 3.6.2.6 Alternatives C, D, E, and F: Benthic Habitat

#### 3.6.2.6.1 Construction and Installation

#### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Alternatives C through F would result in the installation of a reduced total length of IAC and a reduced extent of anchoring impacts relative to the Proposed Action. These alternatives would reduce the overall impact footprint and change the distribution of impacts by benthic habitat type. Differences in the extent of benthic habitat impacts between the Proposed Action and alternate configurations of Alternatives C through E are shown in Table 3.6-11, Table 3.6-12, and Table 3.6-13. The proposed configuration and installation requirements for the RWEC and OSS-link cables would not change under Alternatives C through F; therefore, the difference between impacts presented in each table reflect the reduction in IAC length and reduced anchoring requirements relative to the Proposed Action.

While Alternatives C through F would noticeably reduce the extent of adverse impacts to benthic habitat relative to the Proposed Action, the general scale, nature, and duration of impacts are broadly comparable to those described for the Proposed Action and would therefore be **minor** adverse, applying the impact criteria defined in Section 3.3, Table 3.3-2. However, these criteria do not fully capture the benefits of avoiding long-term impacts to specific habitat types. For example, Alternative C emphasizes avoiding and minimizing impacts to complex benthic habitat and reducing the overall impact footprint. This alternative would reduce overlapping benthic habitat impacts from 5,247 total acres to 3,542 to 3,597 total acres, depending on the configuration selected. Impacts to large-grained complex and complex benthic habitats from vessel anchoring, cable installation and cable protection, seafloor preparation for foundation installation, and the presence of foundations and scour protection would decrease from an estimated 2,214 acres to 1,101 to 1,144 acres, depending on configuration. Impacts to these habitat types would be long term to permanent in duration. Alternatives D and E would similarly reduce the overall footprint of impacts in these habitat types relative to the Proposed Action, from 2,214 acres to 1,763 to 2,135 acres for Alternative D, and from 2,214 to 1,792 to 2,029 acres for Alternative E. However, while total acres of impacts would decrease under each of these alternatives, the proportional distribution of impacts in these habitat types would increase relative to the Proposed Action.

The proposed configurations of Alternative C were developed to avoid impacts to specific high-value complex habitats. Therefore, in addition to the net reduction in impact footprint, the overall footprint and relative distribution of impacts in complex and large-grained complex habitats would decrease relative to the Proposed Action. Moreover, these two alternative configurations would avoid or minimize impacts to the highest-priority habitats identified for protection in the EFH assessment. The distribution of WTG and OSS foundations relative to large-grained complex and complex habitats under the proposed configurations of Alternative C are shown in Appendix L, Figures L-2 and L-3. The differences between alternatives in terms of impacts to habitat suitability for fish species of concern are addressed in greater detail in Section 3.13.2.4.1.

Anchoring and cable installation impacts from Alternative D are broadly similar but noticeably reduced in extent compared to the Proposed Action. The various configurations of Alternative D would reduce the overall benthic habitat impact footprint by 362 to 967 acres relative to the Proposed Action, but the proportional distribution of impacts in large-grained complex habitat would increase (see Table 3.6-12). However, because Alternative D would selectively remove rows of WTG foundations from the perimeter of the RWF, it would not avoid impacts to the high-value large-grained complex and complex habitats in the center of the RWF to the same degree as Alternative C.

Alternative E emphasizes avoidance and minimization of impacts to culturally important viewsheds by removing WTG sites at the north end of the RWF. The affected sites are located predominantly in soft-bottom habitats. Given this, although the two configurations of this alternative would reduce the overall benthic habitat impact footprint by 940 to 1,613 acres and overall impact acreage in large-grained complex and complex habitats compared to the Proposed Action, the proportional distribution of impacts in those habitat types would increase. Alternative E1 would noticeably reduce impacts to large-grained complex and complex habitats by removing some foundation sites from the highest-priority habitats identified for protection in the EFH assessment. In contrast, Alternative E2 would not reduce impacts to these habitats relative to the Proposed Action.

While the initial placement and maintenance of cable protection are elements of this IPF, the concrete mattresses or similar cable protection features are structures that would remain in place throughout the operational life of the Project and would have long-term effects on benthic habitat composition and structure. These effects are addressed in Section 3.6.2.4.2 under presence of structures.

**Table 3.6-11. Acres of Benthic Habitat Disturbance from Revolution Wind Export Cable, Offshore Substation-Link Cable, and Inter-Array Cable Installation and Vessel Anchoring and Proportional Distribution of Impacts by Habitat Type under the Proposed Action and Proposed Configurations for Alternative C**

| Alternative | Maximum Construction Disturbance Footprint (acres)* | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|
| Proposed Action | 5,247 | 14.9% | 27.3% | 57.8% |
| C1 | 3,597 | 6.2% | 24.4% | 69.4% |
| C2 | 3,542 | 7.4% | 24.9% | 67.7% |

* Estimated total acres of seafloor disturbance, accounting for overlapping impacts from anchoring disturbance, seafloor preparation, and placement of foundations and scour protection. Anchoring disturbance assumes 13.7 to 21.1 acres of jack-up vessel anchoring for foundation installation, 16.1 acres of pull-ahead anchoring for OSS-link cable and RWEC installation, and 2,320 to 3,167 acres of general construction vessel anchoring impacts based on the number of foundations. The latter could occur anywhere within a 656-foot (200-m) radius around each foundation site. Actual anchoring requirements are not currently known, and certain anchoring activities would overlap; therefore, the impacted habitat footprint would be less than this total area. IAC configurations for Alternatives C through E have not been developed. IAC impacts for these alternatives are based on the same assumption.

**Table 3.6-12. Acres of Benthic Habitat Disturbance from Revolution Wind Export Cable, Offshore Substation-Link Cable, and Inter-Array Cable Installation and Vessel Anchoring and Proportional Distribution of Impacts by Habitat Type under the Proposed Action and Proposed Configurations for Alternative D**

| Alternative | Maximum Construction Disturbance Footprint (acres)* | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|
| Proposed Action | 5,247 | 14.9% | 27.3% | 57.8% |
| D1 | 4,885 | 15.2% | 25.0% | 59.7% |
| D2 | 4,845 | 15.7% | 26.1% | 58.2% |
| D3 | 4,885 | 15.3% | 28.4% | 56.3% |
| D1+D2 | 4,562 | 16.0% | 23.7% | 60.3% |
| D1+D3 | 4,603 | 15.6% | 26.0% | 58.3% |
| D2+D3 | 4,562 | 16.1% | 27.3% | 56.7% |
| D1+D2+D3 | 4,280 | 16.5% | 24.7% | 58.8% |

* Estimated total acres of seafloor disturbance, accounting for overlapping impacts from anchoring disturbance, seafloor preparation, and placement of foundations and scour protection. Anchoring disturbance assumes 16.6 to 21.1 acres of jack-up vessel anchoring for foundation installation, 16.1 acres of pull-ahead anchoring for OSS-link cable and RWEC installation, and 2,484 to 3,167 acres of general construction vessel anchoring impacts based on the number of foundations. The latter could occur anywhere within a 656-foot (200-m) radius around each foundation site. Actual anchoring requirements are not currently known, and certain anchoring activities would overlap; therefore, the impacted habitat footprint would be less than this total area. IAC configurations for Alternatives C through E have not been developed. Therefore, the benthic habitat impacts presented for Alternative D are based on a hypothetical configuration that underestimates the likely extent and distribution of benthic habitat impacts and are presented here for comparison to impacts from Alternatives C and E. IAC impacts for these alternatives are based on the same assumption.

**Table 3.6-13. Acres of Benthic Habitat Disturbance from Revolution Wind Export Cable, Offshore Substation-Link Cable, and Inter-Array Cable Installation and Vessel Anchoring and Proportional Distribution of Impacts by Habitat Type under the Proposed Action and Proposed Configurations for Alternative E**

| Alternative | Maximum Construction Disturbance Footprint (acres)* | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|
| Proposed Action | 5,247 | 14.9% | 27.3% | 57.8% |
| E1 | 3,634 | 16.3% | 33.0% | 50.7% |
| E2 | 4,307 | 16.5% | 30.6% | 52.9% |

* Estimated total acres of seafloor disturbance, accounting for overlapping impacts from anchoring disturbance, seafloor preparation, and placement of foundations and scour protection. Anchoring disturbance assumes 13.5 to 21.1 acres of jack-up vessel anchoring for foundation installation, 16.1 acres of pull-ahead anchoring for OSS-link cable and RWEC installation, and 2,494 to 3,167 acres of general construction vessel impacts based on the number of foundations. The latter could occur anywhere within a 656-foot (200-m) radius around each foundation site. Actual anchoring requirements are not currently known, and certain anchoring activities would overlap; therefore, the impacted habitat footprint would be less than this total

area. IAC configurations for Alternatives C through E have not been developed. Therefore, the benthic habitat impacts presented for Alternative E are based on a hypothetical configuration that underestimates the likely extent and distribution of benthic habitat impacts and are presented here for comparison to impacts from Alternatives C and D.

Presence of structures: Alternatives C through F would result in the installation of fewer monopile foundations than the Proposed Action, resulting in a noticeable reduction in the extent of construction-related impacts on benthic habitat composition and structure. However, the distribution of those impacts would vary by benthic habitat type and habitat priority.

Alternative C seafloor preparation impacts would decrease from approximately 734 acres under the Proposed Action to between 475 and 482 acres depending on configuration selected. Acres of habitat affected by placement of foundations and scour protection would decrease from 81.4 acres to 52.7 to 53.5 acres (see Table 3.6-14). Given this, this alternative would result in an appreciable reduction in the overall impact footprint compared to the Proposed Action. Moreover, the two configurations of Alternative C would distribute those features to minimize impacts to large-grained complex and complex habitats. The proportional distribution of impacts in these habitat types would decrease from a combined 47.5% of the total impact footprint under the Proposed Action to 33.2% to 36.0% under Alternative C (see Table 3.6-14). As stated, these impacts would also be distributed to minimize impacts to the highest priority benthic habitats identified for impact avoidance in the EFH assessment (see Section 3.13.2.7).

Alternatives D and E would also reduce the total impact footprint from foundation installation relative to the Proposed Action. However, the reduction in impact would be smaller, and, unlike Alternative C, these alternatives have not been configured to minimize impacts to high-priority benthic habitats. Differences in the extent of benthic habitat impacts between the Proposed Action and alternate configurations of Alternatives D through E are shown by construction element in Table 3.6-15 and Table 3.6-16. As shown, each configuration would result in a reduced impact footprint. However, because most foundation sites removed are located in soft-bottom habitat, the proportional distribution of impacts in complex and large-grained complex habitat as a percentage of total impact footprint would increase under these alternatives compared to the Proposed Action. Habitat impacts from these alternatives would result in short- to long-term or permanent effects on benthic habitat composition and long-term to permanent effects on benthic habitat structure that extend beyond the footprint of the installed structures. As stated, Alternative F would use one of the configurations described for Alternatives C through E. Therefore, benthic habitat impacts resulting from this alternative would be similar to those resulting from the selected configuration. For example, if Alternative C1 were selected as a model configuration, then the extent and distribution of benthic habitat impacts under Alternative F would be essentially the same as those described for Alternative C1.

The affected areas would eventually regain full habitat function without mitigation, which constitutes a **minor** adverse impact on benthic habitat composition and structure using the impact criteria defined in Section 3.3, Table 3.3-2. As discussed above for anchoring and new cable emplacement and maintenance, the proposed configurations of Alternative C were specifically selected to avoid and minimize impacts to high-priority habitats identified for protection in the EFH assessment. The differences between alternatives in terms of impacts to habitat suitability for fish species of concern are addressed in greater detail in Section 3.13.2.4.1. While installation of foundations, scour, and cable protection occurs during construction, these features would remain in place throughout the operational life of the Project and would have long-term to permanent effects on habitat composition and structure. These effects are described in Section 3.6.2.4.2.

### Table 3.6-14. Acres of Benthic Habitat Disturbance from Wind Turbine Generator and Offshore Substation Foundation Installation and Proportional Distribution of Impacts by Habitat Type for the Proposed Action and Proposed Configurations of Alternative C

| Alternative | Seafloor Preparation Footprint (acres)* | Monopile Foundations and Scour Protection (acres)† | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|---|
| Proposed Action | 734 | 81.4 | 19.0% | 29.7% | 51.3% |
| C1 | 482 | 53.5 | 9.7% | 23.5% | 66.8% |
| C2 | 475 | 52.7 | 11.7% | 24.3% | 64.0% |

* Revolution Wind estimates that seafloor preparation could be required within approximately 23% of a 656-foot radius around each WTG and OSS foundation, totaling 7.2 acres. The habitat composition shown is based on the mapped habitat composition within a circular seafloor preparation radius of 7.2 acres around each foundation location, and monopile footprints of 0.03 and 0.04 acre for the WTG and OSS foundations, respectively.

† Monopile footprints of 0.03 and 0.04 acre for the WTG and OSS foundations, respectively. An estimated 0.7 acre of rock scour protection would be placed in a circular area around each monopile. All monopile and scour protection impacts occur within the seafloor preparation footprint and are overlapping impacts. This total includes additional impacts from cable protection systems at WTG and OSS foundations that extend beyond the scour protection footprint (approximately 0.07 additional acre per foundation). These impacts will occur within the broader seafloor preparation footprint.

### Table 3.6-15. Acres of Benthic Habitat Disturbance from Wind Turbine Generator and Offshore Substation Foundation Installation and Proportional Distribution of Impacts by Habitat Type for the Proposed Action and Proposed Configurations of Alternative D

| Alternative | Seafloor Preparation Footprint (acres)* | Monopile Foundations and Scour Protection (acres)† | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|---|
| Proposed Action | 734 | 81.4 | 19.0% | 29.7% | 51.3% |
| D1 | 684 | 75.8 | 20.0% | 25.9% | 54.1% |
| D2 | 677 | 75.0 | 20.2% | 28.4% | 51.4% |
| D3 | 684 | 75.8 | 19.7% | 31.3% | 49.0% |
| D1+D2 | 626 | 69.5 | 21.4% | 24.1% | 54.4% |
| D1+D3 | 634 | 70.3 | 20.9% | 27.3% | 51.8% |
| D2+D3 | 626 | 69.5 | 21.1% | 30.1% | 48.8% |
| D1+D2+D3 | 576 | 63.9 | 22.5% | 25.6% | 52.0% |

* Revolution Wind estimates that seafloor preparation could be required within approximately 23% of a 656-foot radius around each WTG and OSS foundation, totaling 7.2 acres. The habitat composition shown is based on the mapped habitat composition within a circular seafloor preparation radius of 7.2 acres around each foundation location and monopile footprints of 0.03 and 0.04 acre for the WTG and OSS foundations, respectively.

† Monopile footprints of 0.03 and 0.04 acre for the WTG and OSS foundations, respectively. An estimated 0.7 acre of rock scour protection would be placed in a circular area around each monopile. Monopile and scour protection impacts all occur within the seafloor preparation footprint and are overlapping impacts. This total includes additional impacts from cable protection systems at WTG and OSS foundations that extend beyond the scour protection footprint (approximately 0.07 additional acre per foundation). These impacts will occur within the broader seafloor preparation footprint.

**Table 3.6-16. Acres of Benthic Habitat Disturbance from Wind Turbine Generator and Offshore Substation Foundation Installation and Proportional Distribution of Impacts by Habitat Type for the Proposed Action and Proposed Configurations of Alternative E**

| Alternative | Seafloor Preparation Footprint (acres)* | Monopile Foundations and Scour Protection (acres)† | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|---|
| Proposed Action | 734 | 81.4 | 19.0% | 29.7% | 51.3% |
| E1 | 475 | 52.7 | 22.5% | 39.5% | 38.0% |
| E2 | 598 | 66.3 | 21.6% | 34.6% | 43.7% |

* Revolution Wind estimates that seafloor preparation could be required within approximately 23% of a 656-foot radius around each WTG and OSS foundation, totaling 7.2 acres. The habitat composition shown is based on the mapped habitat composition within a circular seafloor preparation radius of 7.2 acres around each foundation location, and monopile footprints of 0.03 and 0.04 acre for the WTG and OSS foundations, respectively.

† Monopile footprints of 0.03 and 0.04 acre for the WTG and OSS foundations, respectively. An estimated 0.7 acre of rock scour protection would be placed in a circular area around each monopile. All monopile and scour protection impacts occur within the seafloor preparation footprint and are overlapping impacts. This total includes additional impacts from cable protection systems at WTG and OSS foundations that extend beyond the scour protection footprint (approximately 0.07 additional acre per foundation). These impacts will occur within the broader seafloor preparation footprint.

#### 3.6.2.6.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

Presence of structures: Alternatives C through F would result in the installation of fewer monopile foundations than the Proposed Action and would reduce the total length of IAC. This would noticeably reduce the extent of long-term to permanent impacts on benthic habitat and habitat-forming invertebrates. However, the alternatives vary appreciably in terms of the extent and distribution of these impacts between benthic habitat types.

Differences between the Proposed Action and alternate configurations of Alternatives C through E in benthic habitat occupied by new structures are shown in Table 3.6-17, Table 3.6-18, and Table 3.6-19. As shown, the two configurations of Alternative C would reduce long-term to permanent impacts from structure presence from approximately 210 acres to 143 to 146 acres compared to the Proposed Action. The proportional distribution of those impacts would also shift toward soft-bottom habitat. Approximately 59.5% of long-term to permanent impacts from structure presence would occur in soft-bottom habitat under the Proposed Action. Under Alternative C, the proportion of impacts in soft-bottom habitat would increase to 68.5% to 70.0% (see Table 3.6-17). Alternative C would also minimize structure presence in the highest-priority habitats identified for impact avoidance in the EFH assessment. Should one of these configurations be selected under Alternative F, that alternative would produce a similar reduction and redistribution of benthic habitat impacts.

Alternatives D and E would also reduce the number of WTG foundations and the total acres of IAC cable relative to the Proposed Action, resulting in a commensurate reduction in the acres of benthic habitat exposed to long-term impacts. Long-term to permanent impacts from structure presence would decrease from approximately 210 acres under the Proposed Action to 173 to 193 acres under Alternative D and to 149 to 171 acres under Alternative E (see Table 3.6-18 and Table 3.6-19). However, the proportional distribution of effects in soft-bottom habitat could increase or decrease, ranging from 58.4% to 63.6%

under Alternative D and from 53.3% to 55.7% under Alternative E compared to 59.5% under the Proposed Action. Should one of these configurations be selected for Alternative F, that alternative would produce a similar impact footprint and distribution of impacts by habitat type.

Alternatives C through F would produce reef and hydrodynamic effects from structure presence similar in nature but reduced in extent relative to those described for the Proposed Action in Sections 3.6.2.2.2 and 3.6.2.3.2. These effects would be reduced in extent under each alternative configuration commensurate with the number of structures and acres of cable protection installed (see Table 3.6-17, Table 3.6-18, and Table 3.6-19 for Alternatives C through E) but would be of the same general scale and overall impact as those produced by the Proposed Action and would therefore be **minor** to **moderate** adverse or **moderate** beneficial, as measured by potential effects on the broader biological community associated with benthic habitats using the significance criteria defined in Section 3.3, Table 3.3-2.

As discussed for Project construction, these impact determinations do not differentiate potentially important differences in impacts between alternatives. Specifically, the proposed configurations of Alternative C were specifically selected to avoid and minimize impacts to large-grained complex and complex habitats of particular value for certain fish species of concern. These potential benefits are acknowledged and discussed in greater detail in terms of potential effects on habitat suitability for certain fish species of concern in Section 3.13.2.4.1.

**Table 3.6-17. Acres and Proportional Distribution of Benthic Habitat Affected by the Presence of Wind Turbine Generator and Offshore Substation Foundations and Cable and Scour Protection under the Proposed Action and Proposed Configurations of Alternative C**

| Alternative | Wind Turbine Generator and Offshore Substation Foundations (total number) | Maximum Seafloor Footprint Occupied by Foundations (acres)* | Cable Protection (acres)† | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|---|---|
| Proposed Action | 102 | 81.4 | 128.2 | 13.9% | 26.6% | 59.5% |
| C1 | 67 | 53.5 | 92.7 | 6.2% | 23.7% | 70.0% |
| C2 | 66 | 52.7 | 90.5 | 7.7% | 23.8% | 68.5% |

* The habitat composition shown is based on the mapped habitat composition within monopile and scour protection footprints of 0.03 and 0.7 acre and 0.04 and 0.7 acre for the WTG and OSS foundations, respectively. Total includes an additional 0.07 acre per foundation of cable protection system area that extends beyond the scour protection footprint.

† Cable protection would be along 10% of the cable length on the OCS and 14.5% of the cable length in state waters, comprising 4.4 acres for the OSS-link cable and 49.6 acres for the RWEC routes under the Proposed Action. IAC cable protection acres vary by alternative. The precise location of cable protection is not known. Cable protection is most likely to be placed in large-grained complex and complex habitats but could also be required in soft-bottom habitats. Total cable protection acreage varies between alternative configurations based on the number of foundations and IAC length. IAC configurations have not been developed for Alternatives C, D, and E. Cable protection acreage for Alternative C is based on a hypothetical configuration that underestimates the likely extent and distribution of benthic habitat impacts. These values are used as a basis of comparison to impacts from Alternatives D and E.

### Table 3.6-18. Acres and Proportional Distribution of Benthic Habitat Affected by the Presence of Wind Turbine Generator and Offshore Substation Foundations and Cable and Scour Protection under the Proposed Action and Proposed Configurations of Alternative D

| Alternative | Wind Turbine Generator and Offshore Substation Foundations (total number) | Maximum Seafloor Footprint Occupied by Foundations (acres)* | Cable Protection (acres)† | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|---|---|
| Proposed Action | 102 | 81.4 | 128.2 | 13.9% | 26.6% | 59.5% |
| D1 | 95 | 75.8 | 116.8 | 11.2% | 25.2% | 63.6% |
| D2 | 96 | 75.0 | 116.3 | 14.2% | 25.6% | 60.2% |
| D3 | 95 | 75.8 | 116.8 | 14.0% | 27.6% | 58.4% |
| D1+D2 | 89 | 69.5 | 112.4 | 14.4% | 23.6% | 62.1% |
| D1+D3 | 88 | 70.3 | 113.0 | 14.2% | 25.7% | 60.1% |
| D2+D3 | 89 | 69.5 | 112.4 | 14.5% | 26.7% | 58.9% |
| D1+D2+D3 | 82 | 63.9 | 108.6 | 11.6% | 26.7% | 61.7% |

* The habitat composition shown is based on the mapped habitat composition within monopile and scour protection footprints of 0.03 and 0.7 acre and 0.04 and 0.7 acre for the WTG and OSS foundations, respectively. Total includes an additional 0.07 acre per foundation of cable protection system area that extends beyond the scour protection footprint.

† Cable protection would be along 10% of the cable length on the OCS and 14.5% of the cable length in state waters, comprising 4.4 acres for the OSS-link cable and 49.6 acres for the RWEC routes under the Proposed Action. IAC cable protection acres vary by alternative. The precise location of cable protection is not known. Cable protection is most likely to be placed in large-grained complex and complex habitats but could also be required in soft-bottom habitat (e.g., at cable crossings). Total cable protection acreage varies between alternative configurations based on the number of foundations and IAC length. IAC configurations have not been developed for Alternatives C, D, and E. Cable protection acreage for Alternative D is based on a hypothetical configuration that underestimates the likely extent and distribution of benthic habitat impacts. These values are used as a basis of comparison to impacts from Alternatives C and E.

### Table 3.6-19. Acres and Proportional Distribution of Benthic Habitat Affected by the Presence of Wind Turbine Generator and Offshore Substation Foundations and Cable and Scour Protection under the Proposed Action and Proposed Configurations of Alternative D

| Alternative | Wind Turbine Generator and Offshore Substation Foundations (total number) | Maximum Seafloor Footprint Occupied by Foundations (acres)* | Cable Protection (acres)† | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|---|---|
| Proposed Action | 102 | 81.4 | 128.2 | 13.9% | 26.6% | 59.5% |
| E1 | 66 | 52.7 | 95.9 | 14.9% | 30.8% | 54.3% |
| E2 | 83 | 66.3 | 104.4 | 14.9% | 29.3% | 55.7% |

* The habitat composition shown is based on the mapped habitat composition within monopile and scour protection footprints of 0.03 and 0.7 acre and 0.04 and 0.7 acre for the WTG and OSS foundations, respectively. Cable protection would be placed in complex benthic habitat along 10% of the cable length, totaling 74.1 acres for the IAC, 4.4 acres for the OSS-link cable, and 49.6

acres for the RWEC routes under the Proposed Action. Cable protection acreage would vary between alternative configurations based on IAC length and elimination of the OSS-link cable and RWEC #2 under E1 and E2.

† Cable protection total includes an additional 0.07 acre per foundation of cable protection system footprint extending beyond the scour protection around each foundation. Total cable protection acreage varies between alternative configurations based on the number of foundations and IAC length. IAC configurations have not been developed for Alternatives C, D, and E. Cable protection acreage for Alternative E is based on a hypothetical configuration that underestimates the likely extent and distribution of benthic habitat impacts. These values are used as a basis of comparison to impacts from Alternatives C and D.

#### 3.6.2.6.3 Cumulative Impacts

#### Offshore Activities and Facilities

The benthic habitat cumulative impacts analysis for Alternatives C, D, E, and F is provided in Table 3.6-3.

#### 3.6.2.6.4 Conclusions

The construction and installation, O&M, and decommissioning of Alternatives C through F would impact benthic habitat through the same mechanisms described for the Proposed Action. Changes in the composition and structure of benthic habitats would occur at specific locations within the RWF and portions of the RWEC corridor where cable protection is used, creating new biological hotspots that would benefit some fish and invertebrate species. Long-term to permanent habitat conversion effects on seafloor from boulder relocation and presence of structures would constitute a **moderate** adverse effect on benthic habitat. Some of these adverse effects would be offset by **moderate** beneficial effects on benthic habitat structure and productivity resulting from reef effects. While the overall extent of offshore impacts to benthic habitat would be reduced under Alternatives C through F relative to the Proposed Action, the overall level of impact would be broadly similar across all alternatives. This finding is specific to impacts to the composition and physical structure of benthic habitat and does not reflect the importance of specific habitats to fish species of particular concern. These effects are addressed in Section 3.13.2.4.1.

Collectively, BOEM anticipates that the overall impacts from offshore activities associated with Alternatives C through F when combined other with past, present, and reasonably foreseeable activities would be similar to the Proposed Action: a **moderate** adverse impact on benthic habitat composition and **moderate** adverse to **moderate** beneficial effects on benthic habitat structure in the GAA.

### 3.6.2.7 Alternatives C, D, E, and F: Invertebrates

#### 3.6.2.7.1 Construction and Installation

#### Offshore Activities and Facilities

Noise: Construction of Alternatives C through F would result in similar underwater noise and vibration impacts to invertebrates as those described in Section 3.6.2.3.2 for the Proposed Action, but those impacts would be reduced in extent and duration because fewer foundations would be installed. The total area exposed to noise and vibration effects would vary between alternatives depending on the configuration selected.

Differences in the area of potential exposure to harmful cumulative noise impacts between the Proposed Action and the proposed configurations of Alternatives C through E are summarized in Table 3.6-20, Table 3.6-21, and Table 3.6-22. The values presented in these tables represent 1) the estimated threshold distance from the source for exposure to potentially injurious effects on invertebrate eggs and larvae and behavioral effects on adults, and 2) the difference in the number of sites and total duration of noise-producing activities between alternatives. As shown, while noise effects would vary slightly in extent between layouts; they are similar in magnitude and general scale to the Proposed Action.

As stated in 3.6.2.5.1, UXO detonation is not currently anticipated but could potentially be required should additional devices be identified prior to or during construction. In the event that devices are encountered that require detonation in place, the nature and potential extent of impacts are summarized in Table 3.6-20, Table 3.6-21, and Table 3.6-22. The largest UXO devices are most likely to be found within the central portion of the RWF and in state waters on the RWEC corridor at the mouth and outside of Narragansett Bay (Ordtek 2021), but the probable area of occurrence covers a large enough portion of the RWF such that it is not currently possible to assess potential differences in associated noise impacts between alternatives and the area of potential adverse effects from UXO detonation would be the same across alternatives. Similarly, while reducing the number of foundations and IAC length would also likely reduce HRG survey requirements, insufficient information is available to quantify differences in noise exposure area between alternatives. However, any difference in UXO- or HRG-related noise exposure would not be sufficient to alter the noise impact determination for invertebrates. Applying the impact criteria defined in Section 3.3, Table 3.3-2, construction noise effects on invertebrates from Alternatives C through F would be the same as the Proposed Action: **minor** adverse.

**Table 3.6-20. Comparison of Invertebrate Exposure to Construction-Related Noise Impacts between the Proposed Action and Proposed Configurations for Alternative C**

| Type of Noise Exposure | Activity | Threshold Distance (feet)* | Exposure Parameter | Proposed Action (number) | C1 (number) | C2 (number) |
|---|---|---|---|---|---|---|
| Potentially lethal effects on eggs and larvae | Foundation installation | 16–6,000[¥] | No. of sites | 102 | 66 | 67 |
| | | | Total days | 35 | 23 | 23 |
| | UXO detonation | 49–1,385[†] | No. of sites | Undetermined[‡] | | |
| Behavioral effects on subadults and adults | Foundation installation | 6–1,500[¥] | No. of sites | 102 | 66 | 67 |
| | | | Total days | 35 | 23 | 23 |
| | HRG survey | 6 | Linear miles | 7,386-7,616[Δ] | | |
| | | | Total days | 170-175[Δ] | | |
| | UXO detonation | 6–1,500[§] | No. of sites | Undetermined[‡] | | |

* Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur.

¥ Threshold distances are anticipated to vary between invertebrate species groups. The low end of ranges represents estimated threshold distances for insensitive species (e.g., crustaceans), and the high end of ranges represents threshold distances for potentially sensitive species (e.g., squid) (Edmonds et al. 2016; Jézéquel et al. 2022; Jones et al. 2020, 2021; Payne et al. 2007).

† The safety setbacks derived from Keevan and Hempen (1997) for explosive devices range from 1.1 to 1,000 pounds. UXO detonation impacts could occur anywhere within a 114,769-acre area within the RWF and/or along the RWEC corridor.

Δ Survey length and duration estimates assume 3,547 linear miles and 82 days of HRG survey effort for RWEC and OSS-link cables, and 50 HRG survey miles per linear mile of IAC cable at 43 miles of survey effort per day.

‡ UXO risk mitigation requirements are not currently known; therefore, it is not possible to evaluate differences in detonation requirements between alternatives and alternative configurations.

§ Available evidence indicates that certain invertebrates, such as crustaceans, are generally insensitive to pressure-related damage from explosions (Keevin and Hempen 1997; Popper et al. 2014). Particle motion effects would likely result in behavioral impacts for individuals in proximity to each detonation. Detonation impacts on invertebrates are therefore anticipated to be generally comparable to impact pile driving.

**Table 3.6-21. Comparison of Invertebrate Exposure to Construction-Related Noise Impacts between the Proposed Action and Proposed Configurations for Alternative D**

| Type of Noise Exposure | Activity | Threshold Distance (feet)* | Exposure Parameter | Number by Alternative | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Proposed Action | D1 | D2 | D3 | D1+ D2 | D1+ D3 | D2+ D3 | D1+ D2+ D3 |
| Potentially lethal effects on eggs and larvae | Foundation installation | 16–6,000[¥] | No. of sites | 102 | 95 | 94 | 95 | 87 | 88 | 87 | 80 |
| | | | Total days | 35 | 33 | 33 | 33 | 30 | 31 | 30 | 28 |
| | UXO detonation | 49–1,385[†] | No. of sites | Undetermined[‡] | | | | | | | |
| Behavioral effects on subadults and adults | Foundation installation | 6–1,500[¥] | No. of sites | 102 | 95 | 94 | 95 | 87 | 88 | 87 | 80 |
| | | | Total days | 35 | 33 | 33 | 33 | 30 | 31 | 30 | 28 |
| | HRG survey | 6 | Linear miles | 9,279-10,142[Δ] | | | | | | | |
| | | | Total days | 213-233[Δ] | | | | | | | |
| | UXO detonation | 6–16[§] | No. of sites | Undetermined[‡] | | | | | | | |

***** Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur.

¥ Threshold distances are anticipated to vary between invertebrate species groups. The low end of ranges represents estimated threshold distances for insensitive species (e.g., crustaceans), and the high end of ranges represents threshold distances for potentially sensitive species (e.g., squid) (Edmonds et al. 2016; Jézéquel et al. 2022; Jones et al. 2021; Payne et al. 2007).

† The safety setbacks derived from Keevan and Hempen (1997) for explosive devices range from 1.1 to 1,000 pounds. UXO detonation impacts could occur anywhere within a 114,769-acre area within the RWF and/or along the RWEC corridor.

Δ Survey length and duration estimates assume 3,547 linear miles and 82 days of HRG survey effort for RWEC and OSS-link cables, and 50 HRG survey miles per linear mile of IAC cable at 43 miles of survey effort per day.

‡ UXO risk mitigation requirements are not currently known; therefore, it is not possible to evaluate differences in detonation requirements between alternatives and alternative configurations.

§ Available evidence indicates that certain invertebrates, such as crustaceans, are generally insensitive to pressure-related damage from explosions (Keevin and Hempen 1997; Popper et al. 2014). Particle motion effects would likely result in behavioral impacts for individuals in proximity to each detonation. Detonation impacts on invertebrates are therefore anticipated to be generally comparable to impact pile driving.

**Table 3.6-22. Comparison of Invertebrate Exposure to Construction-Related Noise Impacts between the Proposed Action and Proposed Configurations for Alternative E**

| Type of Noise Exposure | Activity | Threshold Distance (feet)* | Exposure Parameter | Number by Alternative | | |
|---|---|---|---|---|---|---|
| | | | | Proposed Action | E1 | E2 |
| Potentially lethal effects on eggs and larvae | Foundation installation | 16–6,000[¥] | No. of sites | 102 | 66 | 83 |
| | | | Total days | 35 | 23 | 29 |
| | UXO detonation | 49–1,385[†] | No. of sites | Undetermined[‡] | | |
| Behavioral effects on subadults and adults | Foundation installation | 6–1,500[¥] | No. of sites | 102 | 66 | 83 |
| | | | Total days | 35 | 23 | 29 |
| | HRG survey | 6 | Linear miles | 7,951-8,846[Δ] | | |
| | | | Total days | 183-204[Δ] | | |
| | UXO detonation | 6–16[§] | No. of sites | Undetermined[‡] | | |

* Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur.

[¥] Threshold distances are anticipated to vary between invertebrate species groups. The low end of ranges represents estimated threshold distances for insensitive species (e.g., crustaceans), and the high end of ranges represents threshold distances for potentially sensitive species (e.g., squid) (Edmonds et al. 2016; Jézéquel et al. 2022; Jones et al. 2021; Payne et al. 2007).

[†] The safety setbacks derived from Keevan and Hempen (1997) for explosive devices range from 1.1 to 1,000 pounds. UXO detonation impacts could occur anywhere within a 114,769-acre area within the RWF and/or along the RWEC corridor.

[Δ] Survey length and duration estimates assume 3,547 linear miles and 82 days of HRG survey effort for RWEC and OSS-link cables, and 50 HRG survey miles per linear mile of IAC cable at 43 miles of survey effort per day.

[‡] UXO risk mitigation requirements are not currently known; therefore, it is not possible to evaluate differences in detonation requirements between alternatives and alternative configurations.

[§] Available evidence indicates that certain invertebrates, such as crustaceans, are generally insensitive to pressure-related damage from explosions (Keevin and Hempen 1997; Popper et al. 2014). Particle motion effects would likely result in behavioral impacts for individuals in proximity to each detonation. Detonation impacts on invertebrates are therefore anticipated to be generally comparable to impact pile driving.

Sediment deposition and burial: Alternatives C through F would result in sediment deposition and burial impacts on invertebrates, including habitat-forming invertebrates that contribute to benthic habitat structure that are similar but reduced in extent to those described in Section 3.6.2.3.1 for the Proposed Action.

Differences in potential sediment deposition and burial exposure between the Proposed Action and the different configurations proposed for Alternatives C through E are summarized in Table 3.6-23, Table 3.6-24, and Table 3.6-25 in terms of the estimated total acres exposed to sediment deposition and burial effects greater than 0.4 inch (10 mm) for each cable component.

As shown, the various configurations of Alternatives C through F would modify the installation length for the IAC. This would reduce the extent of sediment deposition and burial effects for IAC installation relative to the Proposed Action. Alternative C would also alter the distribution of sediment deposition impacts by avoiding large blocks of complex and large-grained complex habitat, meaning that invertebrates associated with those habitats would be less likely to experience deposition effects. As currently designed, Alternatives C through F would not change the proposed configurations of the OSS-link cable and RWEC; therefore, sediment deposition and burial effects for these Project components would be similar to those produced by the Proposed Action. While these alternatives would result in a slightly smaller area exposed to potentially harmful sediment deposition impacts, the level of impact would be the same as under the Proposed Action. Therefore, short-term sediment deposition and burial effects on invertebrates would range from **negligible** to **minor** adverse.

**Table 3.6-23. Comparison of Area Exposed to Sediment Deposition Levels Greater Than 0.4 Inch between the Proposed Action and Proposed Configurations for Alternative C Based on Cable Length**

| Component | Proposed Action (acres) | C1 (acres) | C2 (acres) |
|---|---|---|---|
| IAC | 273 | 142 | 142 |
| OSS-link cable | 9 | 9 | 9 |
| RWEC | 3,724 | 3,724 | 3,724 |

**Table 3.6-24. Comparison of Area Exposed to Sediment Deposition Levels Greater Than 0.4 Inch between the Proposed Action and Proposed Configurations for Alternative D Based on Cable Length**

| Component | Proposed Action | D1 (acres) | D2 (acres) | D3 (acres) | D1+D2 (acres) | D1+D3 (acres) | D2+D3 (acres) | D1+D2+ D3 (acres) |
|---|---|---|---|---|---|---|---|---|
| IAC | 273 | 231 | 229 | 231 | 214 | 217 | 215 | 201 |
| OSS-link cable | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| RWEC | 3,724 | 3,724 | 3,724 | 3,724 | 3,724 | 3,724 | 3,724 | 3,724 |

**Table 3.6-25. Comparison of Area Exposed to Sediment Deposition Levels Greater Than 0.4 Inch between the Proposed Action and Proposed Configurations for Alternative E Based on Cable Length**

| Component | Proposed Action (acres) | E1 (acres) | E2 (acres) |
|---|---|---|---|
| IAC | 273 | 154 | 185 |
| OSS-link cable | 9 | 9 | 9 |
| RWEC | 3,724 | 3,724 | 3,724 |

### 3.6.2.7.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

EMF: Alternatives C through F would result in similar EMF impacts on invertebrates to those described in Section 3.6.2.3.2 for the Proposed Action, but those impacts would be reduced in extent and the total area exposed would vary depending on the configuration selected. Modeled magnetic and induced electrical field effects for buried and exposed cable segments are described in Section 3.6.2.3.2. As shown, these effects vary in magnitude depending on whether the cable is buried to a minimum depth of 3.3 feet (1 m) or is laid on the bed surface under protective armoring. Differences in potential EMF exposure between the Proposed Action and the different configurations proposed for Alternatives C through E are summarized in Table 3.6-26, Table 3.6-27, and Table 3.6-28 in terms of the differences in the total length of buried versus exposed cable segments. While the linear extent of cable-generated EMF effects would decrease, the resulting adverse effects would be of the same intensity and general geographic scale as those produced by the Proposed Alternative, ranging from **negligible** to **minor** adverse.

<u>Presence of structures</u>: As discussed for benthic habitat in Section 3.6.2.4.2, Alternatives C through F would result in the installation of fewer monopile foundations than the Proposed Action and would reduce the total length of IAC. This would noticeably reduce the extent of long-term to permanent impacts on invertebrates, including structure-forming invertebrates associated with benthic habitat.

Differences between the Proposed Action and alternate configurations of Alternatives C through E in benthic habitat occupied by new structures are shown in Section 3.6.2.4.2, Table 3.6-17, Table 3.6-18, and Table 3.6-19. Alternative F would employ one of the proposed Alternative C through E configurations and would otherwise be identical except that it would use higher capacity WTGs. As such, impacts from this IPF would be identical to those described for the selected alternative configuration. As shown, Alternatives C through F would reduce the number of WTG foundations and the total acres of IAC cable relative to the Proposed Action. This would result in a commensurate reduction in the acres of benthic habitat exposed to short- and long-term impacts from the presence of foundations and scour and cable protection and the resulting effects on invertebrates that associate with these habitats.

Alternatives C through F would produce reef and hydrodynamic effects from structure presence similar in nature but reduced in extent relative to those described for the Proposed Action in Section 3.6.2.3.2. The resulting effects on invertebrates would be reduced in extent under each alternative configuration commensurate with the number of structures and acres of cable protection installed (see Table 3.6-17, Table 3.6-18, and Table 3.6-19 for Alternatives C through E) but would be of the same general scale and overall impact as those produced by the Proposed Action. These effects would therefore range from **minor** to **moderate** adverse or **moderate** beneficial, as measured by potential effects on the broader biological community associated with benthic habitats, using the significance criteria defined in Section 3.3, Table 3.3-2.

As discussed for Project construction, these impact determinations do not differentiate potentially important differences in impacts between alternatives. Specifically, the proposed configurations of Alternative C were specifically selected to avoid and minimize impacts to large-grained complex and complex habitats of value for certain fish species of concern. This would in turn reduce the extent of impacts for invertebrate species that associate with complex benthic habitat. These potential benefits are acknowledged and discussed in greater detail in terms of potential effects on habitat suitability for certain fish and EFH invertebrate species of concern in Sections 3.13.2.4.1.

**Table 3.6-26. Comparison of Exposure to Electromagnetic Field and Substrate Heating Exposure between the Proposed Action and Proposed Configurations for Alternative C Based on Total Cable Length**

| Component | Electromagnetic Field Exposure | Proposed Action Cable Length (linear miles) | C1 Cable Length (linear miles) | C2 Cable Length (linear miles) |
|---|---|---|---|---|
| IAC | Buried to 3.3 feet | 139.8 | 72.8 | 68.7 |
| | On bed surface | 15.5 | 8.1 | 7.6 |
| OSS-link cable | Buried to 3.3 feet | 8.4 | 8.4 | 8.4 |
| | On bed surface | 0.9 | 0.9 | 0.9 |
| RWEC | Buried to 3.3 feet | 70.6 | 70.6 | 70.6 |
| | On bed surface | 12.7 | 12.7 | 12.7 |

**Table 3.6-27. Comparison of Exposure to Electromagnetic Field and Substrate Heating Exposure between the Proposed Action and Proposed Configurations for Alternative D Based on Total Cable Length**

| Component | Electromagnetic Field Exposure | Proposed Action | D1 | D2 | D3 | D1+D2 | D1+D3 | D2+D3 | D1+D2 +D3 |
|---|---|---|---|---|---|---|---|---|---|
| IAC | Buried to 3.3 feet | 139.8 | 118.3 | 102.7 | 110.0 | 117.2 | 110.0 | 111.0 | 118.3 |
| | On bed surface | 15.5 | 13.1 | 11.4 | 12.2 | 13.0 | 12.2 | 12.3 | 13.1 |
| OSS-link cable | Buried to 3.3 feet | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 |
| | On bed surface | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| RWEC | Buried to 3.3 feet | 70.6 | 70.6 | 70.6 | 70.6 | 70.6 | 70.6 | 70.6 | 70.6 |
| | On bed surface | 12.7 | 12.7 | 12.7 | 12.7 | 12.7 | 12.7 | 12.7 | 12.7 |

**Table 3.6-28. Comparison of Exposure to Electromagnetic Field and Substrate Heating Exposure between the Proposed Action and Proposed Configurations for Alternative E Based on Total Cable Length**

| Component | Electromagnetic Field Exposure | Proposed Action | E1 | E2 |
|---|---|---|---|---|
| IAC | Buried to 3.3 feet | 139.8 | 78.8 | 95.0 |
| | On bed surface | 15.5 | 8.8 | 10.6 |
| OSS-link cable | Buried to 3.3 feet | 8.4 | 8.4 | 8.4 |
| | On bed surface | 0.9 | 0.9 | 0.9 |

| Component | Electromagnetic Field Exposure | Proposed Action | E1 | E2 |
|---|---|---|---|---|
| RWEC | Buried to 3.3 feet | 70.6 | 70.6 | 70.6 |
| | On bed surface | 12.7 | 12.7 | 12.7 |

#### 3.6.2.7.3 Cumulative Impacts

##### Offshore Activities and Facilities

The invertebrates cumulative impacts analysis for Alternatives C, D, E, and F is provided in Table 3.6-3.

#### 3.6.2.7.4 Conclusions

The construction and installation, O&M, and decommissioning of Alternatives C through F would impact invertebrates through several mechanisms, including short-term and long-term habitat disturbance, permanent habitat conversion, and changes in substrate composition and nutrient cycling from reef effects caused by colonization of structures by habitat-forming invertebrates. These effects would occur on and around the RWF and portions of the RWEC corridor where cable protection is used and create new biological hotspots that would benefit some invertebrate species. Long-term to permanent habitat conversion effects on seafloor from boulder relocation and the presence of structures would constitute a **moderate** adverse effect on invertebrates. Some of these adverse effects would be offset by **moderate** beneficial effects on some invertebrate species that benefit from reef effects. While the overall extent of effects to invertebrates would be reduced under Alternatives C through F relative to the Proposed Action, the significance of those effects would be the same.

Collectively, BOEM anticipates that the overall impacts associated with Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in **moderate** adverse to **moderate** beneficial impacts on invertebrates in the GAA because a notable and measurable impact is anticipated, but the resource would likely recover completely when the impacting agents were gone and remedial or mitigating action were taken.

### 3.6.2.8 Alternative G: Impacts of the Preferred Alternative on Benthic Habitat

#### 3.6.2.8.1 Construction and Installation Offshore Activities and Facilities

##### Offshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> Alternative G would reduce the extent and distribution of impacts from this IPF by decreasing the total length of IAC and the anticipated extent of anchoring impacts relative to the Proposed Action. Differences in the extent of benthic habitat impacts between the Proposed Action and alternate configurations of Alternative G are shown in Table 3.6-29. The proposed configuration and installation requirements for the RWEC and OSS-link cables would not change under Alternative G; therefore, the difference between impacts presented in each table reflect the reduction in IAC length and reduced anchoring requirements relative to the Proposed Action.

While the base Alternative G and Alternatives G1 through G3 would noticeably reduce the extent of adverse impacts to benthic habitat relative to the Proposed Action, the general scale, nature, and duration of impacts are broadly comparable to those described for the Proposed Action and would therefore be

**minor** adverse, applying the impact criteria defined in Section 3.3, Table 3.3-2. However, these criteria do not fully capture the benefits of avoiding long-term impacts to specific habitat types. For example, Alternative G would reduce impacts in large-grained complex and complex habitats by up to 1,444 acres compared to the Proposed Action. That would include avoidance and minimization of certain high-priority habitats identified in the EFH assessment for the Project.

**Table 3.6-29. Acres of Benthic Habitat Disturbance from Revolution Wind Export Cable, Offshore Substation-Link Cable, and Inter-Array Cable Installation and Vessel Anchoring and Proportional Distribution of Impacts by Habitat Type under the Proposed Action and Proposed Configurations for the Alternative G**

| Alternative | Maximum Construction Disturbance Footprint (acres)* | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|
| Proposed Action | 5,247 | 14.9% | 27.3% | 57.8% |
| Alternative G | 4,291 | 6.7% | 25.9% | 67.4% |
| Alternative G1† | 3,812 | 5.1% | 29.0% | 65.4% |
| Alternative G2† | 3,803 | 5.2% | 29.1% | 65.3% |
| Alternative G3† | 3.803 | 5.2% | 29.0% | 65.3% |

* Estimated total acres of seafloor disturbance, accounting for overlapping impacts from anchoring disturbance, seafloor preparation, and placement of foundations and scour protection. Anchoring disturbance assumes 13.5 to 21.1 acres of jack-up vessel anchoring for foundation installation, 16.1 acres of pull-ahead anchoring for OSS-link cable and RWEC installation, and 2,515 to 3,167 acres of general construction vessel anchoring impacts based on the number of foundations. The latter could occur anywhere within a 656-foot (200-m) radius around each foundation site. Actual anchoring requirements are not currently known, and certain anchoring activities would overlap; therefore, the impacted habitat footprint would be less than this total area.

† Approximately 0.5% of impact acreage from IAC installation under Alternatives G1, G2, and G3 would occur in uncategorized habitats.

<u>Presence of structures:</u> Alternative G would result in the installation of fewer monopile foundations than the Proposed Action, resulting in a noticeable reduction in the extent of construction-related impacts on benthic habitat composition and structure. Specifically, seafloor preparation impacts would decrease from approximately 734 acres under the Proposed Action to approximately 583 acres under Alternative G and 482 acres under Alternatives G1 through G3.

Differences in the extent of benthic habitat impacts between the Proposed Action, the base Alternative G, and Alternatives G1 through G3 are shown by construction element in Table 3.6-30. As shown, each configuration would result in seafloor preparation impacts on varying amounts of soft-bottom, complex, and large-grained complex habitats, producing short- to long-term or permanent effects on benthic habitat composition and long-term to permanent effects on benthic habitat structure that extend beyond the footprint of the installed structures.

The affected areas would eventually regain full habitat function without mitigation, which constitutes a **minor** adverse impact on benthic habitat composition and structure using the impact criteria defined in Section 3.3, Table 3.3-2. Alternative G would reduce impacts to high-value large-grained complex and complex habitats compared to the Proposed Action, producing reductions comparable to the two configurations of Alternative C. The meaningful differences between alternatives in terms of impacts to habitat suitability are for fish species of concern and are addressed in greater detail in Section 3.13.2.4.1. While installation of foundations and scour and cable protection occurs during construction, these features would remain in place throughout the operational life of the Project and would have long-term to permanent effects on habitat composition and structure. These effects are described in Section 3.6.2.8.2.

**Table 3.6-30. Acres of Benthic Habitat Disturbance from Wind Turbine Generator and Offshore Substation Foundation Installation and Proportional Distribution of Impacts by Habitat Type for the Proposed Action and Proposed Configurations of Alternative G**

| Alternative | Seafloor Preparation Footprint (acres)* | Monopile Foundations and Scour Protection (acres)† | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|---|
| Proposed Action | 734 | 81.4 | 19.0% | 29.7% | 51.3% |
| Alternative G | 583 | 64.7 | 5.4% | 30.5% | 64.1% |
| Alternative G1 | 482 | 53.5 | 1.1% | 29.1% | 69.7% |
| Alternative G2 | 482 | 53.5 | 1.2% | 32.1% | 66.7% |
| Alternative G3 | 482 | 53.5 | 1.2% | 32.1% | 66.7% |

* Revolution Wind estimates that seafloor preparation could be required within approximately 23% of a 656-foot radius around each WTG and OSS foundation, totaling 7.2 acres. The habitat composition shown is based on the mapped habitat composition within a circular seafloor preparation radius of 7.2 acres around each foundation location, and monopile footprints of 0.03 and 0.04 acre for the WTG and OSS foundations, respectively.

† Monopile footprints of 0.03 and 0.04 acre for the WTG and OSS foundations, respectively. An estimated 0.7 acre of rock scour protection would be placed in a circular area around each monopile. All monopile and scour protection impacts occur within the seafloor preparation footprint and are overlapping impacts. This total includes additional impacts from cable protection systems at WTG and OSS foundations that extend beyond the scour protection footprint (approximately 0.07 additional acre per foundation). These impacts will occur within the broader seafloor preparation footprint.

### 3.6.2.8.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

Presence of structures: Alternative G would result in the installation of fewer monopile foundations than the Proposed Action and would reduce the total length of IAC. This would noticeably reduce the extent of long-term to permanent impacts on benthic habitat and habitat-forming invertebrates.

Differences in the extent of benthic habitat occupied by human-made structures between the Proposed Action and Alternative G are shown in Table 3.6-31. As shown, Alternative G would result in a commensurate reduction in the acres of benthic habitat exposed to long-term impacts from the presence of foundations, scour protection, and cable protection, from approximately 210 acres under the Proposed Action to 158 to 174 acres depending on the configuration selected. Alternative G would produce reef and hydrodynamic effects from structure presence similar in nature but reduced in extent relative to those described for the Proposed Action in Sections 3.6.2.2.2 and 3.6.2.3.2. These effects would be reduced in extent under each alternative configuration commensurate with the number of structures and acres of cable protection installed (see Table 3.6-17, Table 3.6-18, and Table 3.6-19 for Alternatives C through E) but would be of the same general scale and overall impact as those produced by the Proposed Action and would therefore be **minor** to **moderate** adverse or **moderate** beneficial, as measured by potential effects on the broader biological community associated with benthic habitats using the significance criteria defined in Section 3.3, Table 3.3-2.

As discussed for Project construction, these impact determinations do not differentiate potentially important differences in impacts between alternatives. Specifically, the proposed configurations of Alternative C were specifically selected to avoid and minimize impacts to large-grained complex and complex habitats of particular value for certain fish species of concern. These potential benefits are acknowledged and discussed in greater detail in terms of potential effects on habitat suitability for certain fish species of concern in Section 3.13.2.4.1.

**Table 3.6-31. Acres and Proportional Distribution of Benthic Habitat Affected by the Presence of Wind Turbine Generator and Offshore Substation Foundations and Cable and Scour Protection under the Proposed Action and Proposed Configurations of Alternative G**

| Alternative | Wind Turbine Generator and Offshore Substation Foundations (total number) | Maximum Seafloor Footprint Occupied by Foundations (acres)* | Cable Protection (acres)† | Large-Grained Complex (%) | Complex (%) | Soft Bottom (%) |
|---|---|---|---|---|---|---|
| Proposed Action | 102 | 81.4 | 128.2 | 13.9% | 26.6% | 59.5% |
| Alternative G | 81 | 64.7 | 109.5 | 5.4% | 30.5% | 64.1% |
| Alternative G1 | 67 | 53.5 | 104.8 | 1.1% | 29.1% | 69.7% |
| Alternative G2 | 67 | 53.5 | 104.0 | 1.2% | 32.1% | 66.7% |
| Alternative G3 | 67 | 53.5 | 104.0 | 1.2% | 32.1% | 66.7% |

* The habitat composition shown is based on the mapped habitat composition within monopile and scour protection footprints of 0.03 and 0.7 acre and 0.04 and 0.7 acre for the WTG and OSS foundations, respectively. Total includes an additional 0.07 acre per foundation of cable protection system area that extends beyond the scour protection footprint.

† Cable protection would be required along 10% of the cable length on the OCS and 14.5% of the cable length in state waters, comprising 4.4 acres for the OSS-link cable and 49.6 acres for the RWEC routes under the Proposed Action. Total cable protection acreage varies between alternative configurations based on the number of foundations and IAC length. Alternative G would require an estimated 50.0 to 55.5 acres of cable protection for the IAC. While precise locations are not yet known, cable protection is most likely to be placed in large-grained complex and complex habitats. However, it will also be used in soft-bottom habitats where required (e.g., at cable crossings).

### 3.6.2.8.3 Cumulative Impacts

### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Alternative G would result in localized minor to moderate adverse impacts to benthic habitats and invertebrates through an estimated 3,204 acres of anchoring and mooring-related disturbance and 3,452 acres of cabling-related seafloor disturbance within the benthic habitat GAA. Actual anchoring requirements have not been fully specified, and the former represents an overestimate of probable effects. Further, an appreciable portion of anchoring and cable installation impacts would overlap. Therefore, total acres of benthic habitat impacted by this IPF would likely be smaller than the total 6,656 acres from these two sources. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to benthic habitats and habitat-forming invertebrates based on the same rationale presented for the Proposed Action.

<u>Climate change:</u> The types of impacts from climate change trends described for the No Action Alternative would occur under Alternative G, but Alternative G could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would be expected to help reduce climate change impacts. When combined with other past, present, and reasonably foreseeable actions, climate change trends would result in **moderate** adverse cumulative impacts to benthic habitat and invertebrates under Alternative G.

<u>Presence of structures:</u> Alternative G would result in the installation of 67 new offshore wind energy structures and associated scour and cable protection in the benthic habitat GAA, resulting in the long-term alteration of benthic habitat composition on approximately 189.7 acres of seafloor. That total would comprise approximately 2.3 and 54.3 acres of seafloor displaced by foundations and associated scour protection, respectively; 5.7 acres of cable protection system impacts extending beyond the scour protection footprint; and 120.5 acres affected by cable protection. The foundations would effectively displace benthic habitat, with each foundation replacing 0.03 to 0.04 acre of seafloor with a vertical structure extending from the seafloor to the surface. Impacts to habitat composition from scour and cable protection would vary depending on the type of habitat affected (Causon and Gill 2018; Degraer et al. 2020; Langhamer 2012; Taormina et al. 2018). When placed in soft-bottom habitat, these structures would effectively change the habitat type. When placed in large-grained complex or complex habitats, these structures would either alter the habitat type or modify benthic habitat structure through burial and damage to habitat-forming invertebrates. That habitat structure would recover and would evolve over time into functional benthic habitat as reef effects mature. In all cases, the presence of structures would constitute a long-term to permanent impact to benthic habitat. When reef effects are considered, long-term impacts to benthic habitat composition and structure could be **minor** to **moderate** adverse or **moderate** beneficial depending on how benthic habitat change influences the broader biological community.

Once operational, the WTG and OSS foundations and associated scour protection would produce artificial reef effects that influence benthic habitat structure within and in proximity to the Project footprint. While reef effects would largely be limited to the areas within and in proximity to foundation footprints, the development of individual or contiguous wind energy facilities in nearby areas could produce cumulative effects. For example, large quantities of shell hash created by mussels and other colonizing organisms can alter the composition of soft-bottom sediments in the surrounding area. These alterations in substrate composition would be limited in extent to the area of influence around each foundation but would be long term in duration, as changes in substrate composition from the accumulation of shell hash and altered substrate chemistry would continue to persist after the structures are removed during decommissioning. As such, reef effects from the presence of structures would result in cumulative long-term effects on benthic habitat and would range from **moderate** beneficial to **minor** to **moderate** adverse.

#### 3.6.2.8.4 Conclusions

The construction and installation, O&M, and decommissioning of Alternative G would impact benthic habitat through the same mechanisms described for the Proposed Action, but those effects would be reduced in extent and would be distributed differently in terms of the types of habitats affected. These effects would alter the structure and function of benthic habitats within the maximum work area, including where cable protection is used, and create new biological hotspots that would benefit some fish and invertebrate species.

Long-term to permanent habitat disturbance effects on an estimated 1,740 acres of large-grained complex and complex habitats from vessel anchoring, cable installation and cable protection, seafloor preparation for foundation installation, and the presence of foundation and scour protection would result from Alternative G. An estimated 125 acres of soft-bottom habitat would be converted to hard bottom by the presence of structures, scour protection, and cable protection compared to 131 acres for Alternative G. Collectively, these effects would constitute a **moderate** adverse effect on benthic habitat, resulting from habitat conversion and long-term impacts to certain types of habitat-forming organisms. These adverse effects would be partially offset by **moderate** beneficial effects on benthic habitat structure and productivity resulting from reef effects. The colonization of artificial structures by a complex community of habitat-forming organisms would increase the structural complexity of benthic habitat in and around WTG and OSS foundations. Some benthic habitat effects could persist even after the Project is decommissioned. For example, reef effects would result in shell hash accumulation around foundations that would remain after the structures are removed. This would alter the composition of sediments within the RWF beyond the life of the Project but would not be expected to negatively affect the ability of benthic habitats to support ecosystem function after the Project is decommissioned.

Collectively, BOEM anticipates that the overall impacts from offshore activities associated with Alternative G when combined other with past, present, and reasonably foreseeable activities would result in notable and measurable impacts on benthic habitat. Some of these impacts could persist after the Project is decommissioned, but they would not prevent full recovery of ecosystem function. These findings would constitute a **moderate** adverse impact on benthic habitat composition and **moderate** adverse to **moderate** beneficial effects on benthic habitat structure in the GAA.

### 3.6.2.9 Alternative G: Impacts of the Preferred Alternative on Invertebrates

#### 3.6.2.9.1 Construction and Installation

##### Offshore Activities and Facilities

<u>Noise:</u> Construction of Alternative G would result in similar underwater noise and vibration impacts to invertebrates as those described in Section 3.6.2.3.2 for the Proposed Action, but those impacts would be reduced in extent and duration because fewer foundations would be installed.

Differences in the area of potential exposure to harmful cumulative noise impacts between the Proposed Action and Alternative G are summarized in Table 3.6-32. The values presented in this table represents the estimated threshold distance from the source for exposure to potentially injurious effects on invertebrate eggs and larvae and behavioral effects on adults, and the difference in the number of sites and total duration of noise producing activities between alternatives. As shown, while noise effects would vary slightly in extent and duration between layouts; they are similar in magnitude and general scale to the Proposed Action. As summarized in Table 3.6-20, Table 3.6-21, and Table 3.6-22, UXO detonation may be required during site preparation for construction. The largest UXO devices are most likely to be found within the central portion of the RWF and in state waters on the RWEC corridor at the mouth and outside of Narragansett Bay (Ordtek 2021), but the probable area of occurrence covers a large enough portion of the RWF such that it is not currently possible to assess potential differences in associated noise impacts between alternatives and the area of potential adverse effects from UXO detonation would be the same across alternatives. Similarly, while reducing the number of foundations and IAC length would also likely reduce HRG survey requirements, insufficient information is available to quantify differences in the noise exposure area between alternatives. However, any difference in UXO- or HRG-related noise exposure would not be sufficient to alter the noise impact determination for invertebrates. Applying the impact criteria defined in Section 3.3, Table 3.3-2, construction noise effects on invertebrates from Alternative G would be the same as the Proposed Action: **minor** adverse.

**Table 3.6-32. Comparison of Invertebrate Exposure to Construction-Related Noise Impacts between the Proposed Action and Proposed Configurations for Alternative G**

| Type of Noise Exposure | Activity | Threshold Distance (feet)* | Exposure Parameter | Proposed Action | Alternative G | Alternatives G1-G3 |
|---|---|---|---|---|---|---|
| Potentially lethal effects on eggs and larvae | Foundation installation | 16–6,000¥ | No. of sites | 102 | 81 | 67 |
| | | | Total days | 35 | 28 | 24 |
| | UXO detonation | 49–1,385† | No. of sites | Undetermined‡ | | |
| Behavioral effects on subadults and adults | Foundation installation | 6–1,500¥ | No. of sites | 102 | 81 | 67 |
| | | | Total days | 35 | 28 | 24 |
| | HRG survey | 6 | Linear miles | 8,777-9,457Δ | | |
| | | | Total days | 202-219Δ | | |
| | UXO detonation | 6–16§ | No. of sites | Undetermined ‡ | | |

* Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur.

¥ Threshold distances are anticipated to vary between invertebrate species groups. The low end of ranges are estimated threshold distances for insensitive species (e.g., crustaceans), and the high end of ranges represents threshold distances for potentially sensitive species (e.g., squid) (Edmonds et al. 2016; Jézéquel et al. 2022; Jones et al. 2021; Payne et al. 2007).

† The safety setbacks derived from Keevan and Hempen (1997) for explosive devices range from 1.1 to 1,000 pounds. UXO detonation impacts could occur anywhere within a 114,769-acre area within the RWF and/or along the RWEC corridor.

Δ Survey length and duration estimates assume 3,547 linear miles and 82 days of HRG survey effort for RWEC and OSS-link cables, and 50 HRG survey miles per linear mile of IAC cable at 43 miles of survey effort per day.

‡ As of February 2023, 16 UXOs have been identified in the RWEC corridor. None will require detonation. UXO risk mitigation requirements are not currently known; therefore, it is not possible to evaluate differences in detonation requirements between alternatives and alternative configurations.

§ Available evidence indicates that certain invertebrates, such as crustaceans, are generally insensitive to pressure-related damage from explosions (Keevin and Hempen 1997; Popper et al. 2014). Particle motion effects would likely result in behavioral impacts for individuals in proximity to each detonation. Detonation impacts on invertebrates are therefore anticipated to be generally comparable to impact pile driving.

Sediment deposition and burial: Alternative G would result in sediment deposition and burial impacts on invertebrates, including habitat-forming invertebrates that contribute to benthic habitat structure that are similar but reduced in extent to those described in Section 3.6.2.3.1 for the Proposed Action. Alternative G would reduce total IAC length, reducing the overall footprint of sediment impacts. Alternative G would also reduce cable installation length in sediments with a high proportion of mud and silt from 3.2 to 2.8 miles relative to the Proposed Action.

Differences in potential sediment deposition and burial exposure between the Proposed Action and Alternative G are summarized in Table 3.6-33 in terms of the estimated total acres exposed to sediment deposition and burial effects greater than 0.4 inch (10 mm) for each cable component. As shown, Alternative G would reduce the total acreage exposed to sediment deposition and burial effects above this threshold from 217 to 162 acres relative to the Proposed Action, commensurately reducing the extent of biologically significant sediment burial effects. Alternative G would also alter the distribution of sediment deposition impacts by avoiding large blocks of complex and large-grained complex habitats, meaning that invertebrates associated with those habitats would be less likely to experience deposition effects. As currently designed, Alternative G would not change the proposed configurations of the OSS-link cable and RWEC; therefore, sediment deposition and burial effects for these Project components would be similar to those produced by the Proposed Action. While this alternative would result in a slightly smaller area exposed to potentially harmful sediment deposition impacts, the level of impact would be the same as under the Proposed Action. Therefore, short-term sediment deposition and burial effects on invertebrates would range from **negligible** to **minor** adverse.

**Table 3.6-33. Comparison of Area Exposed to Sediment Deposition Levels Greater Than 0.4 Inch between the Proposed Action and Proposed Configurations for Alternative G Based on Cable Length**

| Component | Proposed Action (acres) | Alternative G (acres) | Alternative G1 (acres) | Alternative G2 (acres) | Alternative G3 (acres) |
|---|---|---|---|---|---|
| IAC | 273 | 204 | 187 | 184 | 184 |
| OSS-link cable | 9 | 9 | 9 | 9 | 9 |
| RWEC | 3,717 | 3,717 | 3,717 | 3,717 | 3,717 |

#### 3.6.2.9.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

EMF: Alternative G would result in similar EMF impacts on invertebrates to those described in Section 3.6.2.3.2 for the Proposed Action, but those impacts would be reduced in extent commensurate with the reduction in IAC length. Modeled magnetic and induced electrical field effects for buried and exposed cable segments are described in Section 3.6.2.3.2. As shown, these effects vary in magnitude depending on whether the cable is buried to a minimum depth of 3.3 feet (1 m) or is laid on the bed surface under protective armoring. Differences in potential EMF exposure between the Proposed Action and the different configurations proposed for Alternatives C through E are summarized in Table 3.6-26, Table 3.6-27, and Table 3.6-28 in terms of the differences in the total length of buried versus exposed cable segments. While the linear extent of cable-generated EMF effects would decrease, the resulting adverse effects would be of the same intensity and general geographic scale as those produced by the Proposed Alternative, ranging from **negligible** to **minor** adverse.

**Table 3.6-34. Comparison of Exposure to Electromagnetic Field and Substrate Heating Exposure between the Proposed Action and Proposed Configurations of Alternative G Based on Total Length of Buried and Exposed Cable Segments (linear miles)**

| Component | Electromagnetic Field Exposure | Proposed Action Cable Length | Alternative G Cable Length (miles) | Alternative G1 Cable Length (miles) | Alternative G2 Cable Length (miles) | Alternative G3 Cable Length (miles) |
|---|---|---|---|---|---|---|
| IAC | Buried to 3.3 feet | 139.8 | 104.5 | 95.6 | 94.1 | 94.1 |
| | On bed surface | 15.5 | 11.6 | 10.6 | 10.5 | 10.5 |
| OSS-link cable | Buried to 3.3 feet | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 |
| | On bed surface | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| RWEC | Buried to 3.3 feet | 70.6 | 70.6 | 70.6 | 70.6 | 70.6 |
| | On bed surface | 12.7 | 12.7 | 12.7 | 12.7 | 12.7 |

<u>Presence of structures:</u> As discussed for benthic habitat in Section 3.6.2.4.2, Alternative G would result in the installation of fewer monopile foundations than the Proposed Action and would reduce the total length of IAC. This would noticeably reduce the extent of long-term to permanent impacts on invertebrates, including structure-forming invertebrates associated with benthic habitat.

Differences between the Proposed Action and Alternative G in terms of benthic habitat occupied by new structures are shown in Section 3.6.2.8.2, Table 3.6-31. As such, impacts from this IPF would be identical to those described for the selected alternative configuration. As shown, Alternatives C through F would reduce the number of WTG foundations and the total acres of IAC relative to the Proposed Action. This would result in a commensurate reduction in the acres of benthic habitat exposed to short- and long-term impacts from the presence of foundations and scour and cable protection and the resulting effects on invertebrates that associate with these habitats.

Alternatives C through F would produce reef and hydrodynamic effects from structure presence similar in nature but reduced in extent relative to those described for the Proposed Action in Section 3.6.2.3.2. The resulting effects on invertebrates would be reduced in extent commensurate with the number of structures and acres of cable protection installed (see Table 3.6-31) but would be of the same general scale and overall impact as those produced by the Proposed Action. These effects would therefore range from **minor** to **moderate** adverse or **moderate** beneficial, as measured by potential effects on the broader biological community associated with benthic habitats, using the significance criteria defined in Section 3.3, Table 3.3-2.

As discussed for Project construction, these impact determinations do not differentiate potentially important differences in impacts between alternatives. The proposed Alternative G would avoid portions of the RWF composed predominantly of large-grained complex and complex habitats of value for certain fish species of concern. This would in turn reduce the extent of impacts for invertebrate species that associate with complex benthic habitat compared to the Proposed Action. These potential benefits are acknowledged and discussed in greater detail in terms of potential effects on habitat suitability for certain fish and EFH invertebrate species of concern in Section 3.13.2.4.1.

#### 3.6.2.9.3 Cumulative Impacts

#### Offshore Activities and Facilities

Accidental releases and discharges: Based on compliance with environmental regulations, Alternative G when combined with past, present, and reasonably foreseeable projects would result in negligible adverse cumulative effects on invertebrates from accidental releases and discharges. The rationale for this conclusion is the same as described for the Proposed Action.

When the Project is combined with other future offshore wind projects, up to approximately 34 million gallons of coolants, fuels, oils, and lubricants could cumulatively be stored within WTGs and the OSSs within the invertebrate GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. Additionally, training and awareness of EPMs (see Table G-1 in Appendix G) proposed for waste management and marine debris would be required of RWF Project personnel. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and impacts would be minimized through planned EPMs and other mitigation measures detailed in Tables F-1 and F-2, respectively, in Appendix F. Impacts to invertebrates, including habitat-forming species, from small-volume spills are therefore expected to be **negligible** adverse and short term in duration. While unlikely, unanticipated events could result in larger spill events, leading to cumulative impacts of greater severity and duration, similar to those described for the Proposed Action.

Anchoring and new cable emplacement/maintenance: BOEM estimates a cumulative total of 10,520 acres of anchoring and mooring-related disturbance and 104,781 acres of cabling-related disturbance for Alternative G plus all other future offshore wind projects within the invertebrate GAA. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitat and associated fish and invertebrate species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could take up to a decade to fully recover.

On this basis, Alternative G when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to invertebrates and on benthic habitat structure through impacts to habitat-forming invertebrates.

Bycatch: Like the Proposed Action, Alternative G would include implementation of the FRMP proposed to evaluate the effects of Project construction and O&M on economically valuable fish and shellfish resources (Revolution Wind and Inspire Environmental 2023). No revisions to the FRMP are proposed based on changes in alternative configuration. As such, cumulative impacts from bycatch associated with monitoring activities under Alternative G in combination with other planned and future offshore wind projects would be **negligible** to **minor** adverse, with the impacts ranging from short term to long term in duration.

Alternative G would also include regular inspections to identify and remove derelict fishing gear and other trash and debris attached to offshore structures. Other future projects are expected to include similar measures in their O&M plans. This O&M effort would benefit invertebrates by removing potential sources of bycatch and benthic habitat structure by removing a source of potential damage to habitat-forming invertebrates. This O&M effort would continue over the life of the Project and other future wind energy projects and would therefore constitute a long-term **minor** beneficial effect on invertebrates and benthic habitat structure.

Climate change: Cumulative impacts to invertebrates and benthic habitat structure from climate change trends under Alternative G are expected to be of similar magnitude to those described for the Proposed Action. As for the Proposed Action, the intensity of climate change cumulative impacts on invertebrates are uncertain but are likely to result in **moderate** adverse effects that vary considerably between species.

EMF: Under Alternative G, the Project would generate EMF and substrate heating effects of varying intensity on up to 198 to 210 miles of combined IAC, OSS-link cable, and RWEC length (compared to 248 miles for the Proposed Action). These effects would combine with those generated by the 13,717 miles of transmission cables from other future offshore wind facilities and existing transmission cables present within the invertebrate GAA. These cumulative effects would be similar in nature to those described for the No Action Alternative in Section 3.6.2.3.2 and the Proposed Action in Section 3.6.2.5.2. In summary, measurable effects on invertebrates from EMF exposure would be limited to individuals that occur in the immediate proximity (i.e., within 20 feet) of Project cables and range from short-term changes in behavior with no significant long-term consequences to potential physiological changes in individuals having prolonged exposure. Substrate heating effects could render small amounts of habitat unsuitable for certain benthic invertebrate species at locations where buried cables are within 2 feet of the bed surface. Effects to individuals are unlikely to have a measurable impact on any invertebrate species at the population level and would therefore range from negligible to minor adverse depending on the type of exposure. BOEM anticipates that future offshore wind energy projects in the invertebrate GAA would use HVAC (versus HVDC) transmission and apply similar design measures to those included in the Proposed Action to avoid and minimize EMF effects on the environment. While uncertainties remain, cumulative adverse impacts to invertebrates from EMF and substrate heating effects resulting from past, planned, and potential future actions are likely to be **minor** adverse.

Light: The Proposed Action would result in noticeable but negligible adverse impacts to invertebrates through the installation of up to 67 lighted structures (65 WTGs and two OSSs). Alternative G and all future projects would be expected to comply with BOEM design guidance for avoiding and minimizing adverse lighting impacts on the environment (BOEM 2021a), meaning that effects to invertebrates would be negligible and adverse. Therefore, the cumulative impacts associated with Alternative G when combined with past, present, and reasonably foreseeable future activities would be similar to those impacts described under the No Action Alternative and would be **negligible** adverse, mostly attributable to existing, ongoing activities.

Noise: Alternative G would generate underwater noise effects during Project construction, throughout the operational life of the Project, and during Project decommissioning. Those impacts would be similar in magnitude and distribution but reduced in extent relative to the Proposed Action. These effects would combine with similar effects resulting from the construction, O&M, and decommissioning of other planned offshore wind projects on the Mid-Atlantic OCS. Sound-sensitive invertebrate species occurring in proximity to impact or vibratory pile driving and/or UXO detonation, if required, could suffer noise-related injury to sensory cells, resulting in reduced survival. The number of individuals affected are unlikely to have any measurable effect on those species at the population level. Less sensitive species may be temporarily disturbed by vibration effects, but any such effects would be short term in duration and are unlikely to have a measurable effect on any invertebrate population. On this basis, cumulative effects on invertebrates resulting from underwater noise caused by Alternative G are likely to be **negligible** to **minor** adverse, varying by species.

Presence of structures: Alternative G would result in long-term alteration of water column and seafloor habitats, resulting in a diversity of effects on benthic habitat and invertebrates, including EFH species. The 67 monopile foundations and other hard surfaces proposed under the configurations of Alternatives G1, G2, and G3 would create an artificial reef effect and cause hydrodynamic effects. The long-term to permanent effects of these structures would influence primary and secondary productivity within and around the artificial reef and influence the distribution and productivity of planktonic invertebrates, eggs, and larvae. Reef effects would alter biological community structure, producing an array of effects on invertebrates. Those cumulative effects could be beneficial or adverse, varying by species, and would likely range from **minor** adverse and beneficial to **moderate** adverse and beneficial in terms of overall impact.

Sediment deposition and burial: Alternative G would result in localized short-term **minor** adverse sediment deposition and burial effects on benthic habitat and invertebrates. Short-term burial effects exceeding 10 mm would occur over an estimated 3,350 acres within the invertebrate GAA, a reduction of approximately 55 acres compared to the Proposed Action. Similar sediment deposition and burial impacts would result from the estimated 104,781 cumulative acres of cabling-related disturbance for Alternative G plus other future offshore wind projects within the invertebrate GAA. When combined with other past, present, and reasonably foreseeable actions, Alternative G would result in **minor** adverse cumulative impacts on benthic habitats and invertebrates based on the same rationale presented for the Proposed Action in Section 3.6.2.5.3.

#### 3.6.2.9.4 Conclusions

The construction and installation, O&M, and decommissioning of Alternative G would impact invertebrates through the same mechanisms described for the Proposed Action, but those impacts would be reduced in extent and would have a different distribution by habitat type. Benthic infauna and other relatively immobile invertebrates within the estimated 5,454-acre overall disturbance footprint of the Project would unavoidably be injured or killed during Project construction. This impact alone constitutes a **moderate** adverse effect on invertebrate species. Some of these adverse effects would be offset by **moderate** beneficial effects to some invertebrate species that benefit from the reef effects formed by new offshore structures.

Collectively, BOEM anticipates that the overall impacts associated with Alternative G when combined with past, present, and reasonably foreseeable activities would result in **moderate** adverse to **moderate** beneficial impacts on invertebrates in the GAA because a notable and measurable impact is anticipated, but the resource would likely recover completely when the impacting agents were gone and remedial or mitigating action were taken.

#### 3.6.2.10 Mitigation

Mitigation measures resulting from agency consultations for benthic habitat and invertebrates are identified in Appendix F, Table F-2, and addressed in Table 3.6-35. Additional mitigation measures identified by BOEM and cooperating agencies are listed in Appendix F, Table F-3, and addressed in Table 3.6-36.

**Table 3.6-35. Mitigation and Monitoring Measures Resulting from Consultations for Benthic Habitat and Invertebrates (Appendix F, Table F-2)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| NMFS EFH Conservation Recommendations* | NMFS EFH Conservation Recommendations were issued to BOEM for consideration on June 16, 2023 (NMFS, NOAA, and GARFO 2023).<br>EFH Conservation Recommendations for activities under BOEM's jurisdiction were provided identifying proposed removal and relocation (micrositing) of selected WTG foundations and cable segments removal and relocation; construction timing restrictions to avoid potential adverse impacts to Atlantic cod; habitat alteration minimization; noise mitigation; and minimization of impacts during construction, O&M, and decommissioning. EFH Conservation Recommendations for activities under USACE's jurisdiction were provided for in-water work; offshore impact minimization; impact to scientific surveys minimization; and identification and facilitated access to mapping of relocated boulders, berms, scour, and cable protection. | Implementation of Conservation Recommendations, including eliminating WTG foundations, micrositing WTGs and cable segments, scour protection avoidance, anchoring avoidance, minimizing boulder/cobble relocation distance, and cable re-routing, would minimize known or reasonably foreseeable adverse impacts on benthic habitat and invertebrates, including habitat-forming invertebrates. These measures would reduce impacts to large-grained complex and complex benthic habitats. Conservation recommendations for timing restrictions on all construction activity in the Lease Area from November 1 to April 30, and noise mitigation during construction, such as soft starts, use of noise-dampening equipment, and noise mitigation protocols in consultation with resource agencies prior to construction activities, would avoid and minimize potential noise impacts on invertebrates that have sensitive life stages during the restricted period. Implementation of Conservation Recommendations to revise the Fisheries and Benthic Habitat Monitoring Plan and develop monitoring plans for EMF and operational noise and vibration effects would benefit invertebrates by ensuring robust experimental design, methods, and data collection/analysis to assess changes in habitat conditions. Although implementation of the Conservation Recommendations would provide incremental reductions in impacts on large-grained complex and complex habitats and associated EFH, reductions in the overall impact rating are not anticipated for any of the Proposed Action's IPFs. |
| Live and hard-bottom impact monitoring | Revolution Wind would develop and implement a monitoring plan for live and hard-bottom features that may be impacted by proposed activities. The monitoring plan would also include assessing the recovery time for these sensitive habitats. BOEM recommends that all monitoring reports classify substrate conditions following Coastal and Marine Ecological Classification Standard (CMECS) standards, including live bottoms (e.g., | This measure would not modify the impact determination for finfish or EFH or reduce the potential impacts from the project, but it would provide information that can be used to inform the development of future mitigations and/or monitoring programs for the Project and other projects in the region. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | submerged aquatic vegetation and corals and topographic features). The plan would also include a means of recording observations of any increased coverage of invasive species in the impacted hard-bottom areas. | |
| Live and hard-bottom mapping and avoidance, and impact monitoring | Vessel operators would be provided with maps of sensitive hard-bottom habitat in OSW project areas, as well as a proposed anchoring plan that would avoid or minimize impacts on the hard-bottom habitat to the greatest extent practicable. These plans would be provided for all anchoring activity, including construction, maintenance, and decommissioning. | This measure would not modify the impact determination for benthic habitat or invertebrates, but it would reduce impacts to sensitive and slow-to-recover large-grained complex and complex habitats used by habitat-forming invertebrate species. |
| Marine debris awareness training | The Lessee would ensure that vessel operators, employees, and contractors engaged in offshore activities pursuant to the approved COP complete marine trash and debris awareness training annually. The training consists of two parts: 1) viewing a marine trash and debris training video or slide show (described below) and 2) receiving an explanation from management personnel that emphasizes their commitment to the requirements. The marine trash and debris training videos, training slide packs, and other marine debris related educational material may be obtained at https://www.bsee.gov/debris or by contacting BSEE. The training videos, slides, and related material may be downloaded directly from the website. Operators engaged in marine survey activities must continue to develop and use a marine trash and debris awareness training and certification process that reasonably assures that their employees and contractors are in fact trained. The training process must include the following elements:<br>• Viewing of either a video or slide show by the personnel specified above | This measure would not modify the impact determination for benthic habitat or invertebrates, but it would provide the training, reporting, and enforcement mechanisms necessary to ensure that effects from accidental releases and discharges do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | • An explanation from management personnel that emphasizes their commitment to the requirements<br>• Attendance measures (initial and annual)<br>• Recordkeeping and the availability of records for inspection by DOI<br>By January 31 of each year, the Lessee would submit to the DOI an annual report that describes its marine trash and debris awareness training process and certifies that the training process has been followed for the previous calendar year. The Lessee would send the reports via email to BOEM (at renewable_reporting@boem.gov) and to BSEE via TIMSWeb with a notification email (at marinedebris@bsee.gov). | |
| Marine debris elimination | Materials, equipment, tools, containers, and other items used in OCS activities that could be lost or discarded overboard must be clearly marked with the vessel or facility identification. All markings must clearly identify the owner and must be durable enough to resist the effects of the environmental conditions to which they may be exposed. Materials, equipment, tools, containers, and other items used in OCS activities which could be lost or discarded overboard must be properly secured to prevent loss overboard. | This measure would not modify the impact determination for benthic habitat or invertebrates, but it would provide an enforcement mechanism to ensure that effects from accidental releases and discharges do not exceed the levels analyzed herein. |
| Data collection BA BMPs | BOEM and BSEE would ensure that all Project design criteria and best management practices incorporated in the Atlantic Data Collection Consultation for Offshore Wind Activities (BOEM 2021b) shall be applied to activities associated with the construction, maintenance and operations of the Project as applicable. | This measure would not modify the impact determination for benthic habitat or invertebrates, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |
| Sampling gear | All sampling gear would be hauled out at least once every 30 days, and all gear must be removed from the water and all gear must be removed from the water and stored on land | This measure would not modify the impact determination for benthic habitat or invertebrates, but it would ensure that impacts to sensitive |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | between survey seasons to minimize risk of entanglement. | habitats and species are avoided and minimized to the extent practicable. |
| Lost survey gear | If any survey gear is lost, all reasonable efforts that do not compromise human safety must be undertaken to recover the gear. All lost gear must be reported to NMFS (nmfs.gar.incidental-take@noaa.gov) and BSEE (via TIMSWeb and notification email at marinedebris@bsee.gov) within 24 hours of the documented time of missing or lost gear. This report must include information on any markings on the gear and any efforts undertaken or planned to recover the gear. | This measure would not modify the impact determination for benthic habitat or invertebrates, but it would provide a reporting and enforcement mechanism to ensure that impacts to sensitive habitats and species are avoided and minimized to the extent practicable. |
| Pile-driving restrictions | BOEM would restrict pile driving from January through April, with the addition of December with contingencies. Revolution Wind would be required to develop an adaptive acoustic monitoring plan for spawning Atlantic cod from November through March, including restrictions on Project activities if Atlantic cod aggregations indicative of spawning are detected. | This measure would not modify the impact determination for invertebrates, but it could further avoid and minimize impacts to invertebrate species having sensitive life stages during the expanded contingency period. |
| Micrositing | All WTG and OSS foundations would be positioned within micrositing windows to avoid impacts to large-grained complex and complex habitats to the extent practicable. | This measure would not modify the impact determination for benthic habitat or invertebrates, but it would ensure that impacts to sensitive habitats and species are avoided and minimized to the extent practicable. |
| Anchoring plan | BOEM would require Revolution Wind to develop an anchoring plan to avoid minimize adverse impacts on benthic habitat during Project construction and from O&M activities throughout the life of the Project. The anchoring plan must delineate sensitive large-grained complex and complex habitats, including eelgrass and kelp beds, and identify areas where anchoring activities are restricted. | This measure would not modify the impact determination for benthic habitat or invertebrates, but it would effectively minimize long-term impacts to large-grained complex and complex habitats and limit the extent of long-term impacts on habitat-forming invertebrates and benthic habitat structure. |
| Scour and cable protection | To the extent technically and economically feasible, the Lessee must ensure that all materials used for scour and cable protection consist of natural or engineered stone | This measure would not modify the impact determination for benthic habitat or invertebrates, but it would enhance the quality of artificial habitats created by the installation of scour and cable protection |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | that does not inhibit epibenthic growth. The materials selected for protective purposes should mirror the natural environment and provide similar habitat functions. | through the support of epibenthic growth and the addition of three-dimensional complexity in height and interstitial spaces. |
| Post-installation cable monitoring | Revolution Wind would be required to inspect all cables after construction is completed to document exact location, burial depth, and post-installation benthic habitat conditions. Inspections must be completed within 6 months of Project commissioning, annually for the first 3 years following construction and as needed following major storm events. Monitoring reports must be submitted to BOEM within 45 days of survey completion. | This measure would not modify the impact determination for benthic habitat or invertebrates, but it would validate the location and burial depth of installed cables and allow for the timely identification of cables that become unburied and pose shallow hazard risks to the resource. |
| Sound field verification (SFV) | BOEM would require Revolution Wind to develop an SFV plan. The purpose of SFV is to document that modeled acoustic injury threshold distances and associated monitoring requirements are sufficiently protective for sensitive marine species.<br>The SFV process must be sufficient to assess sound propagation from each foundation and attenuation distances to potential injury and harassment thresholds for marine mammals, sea turtles, and fish.<br>To validate the estimated sound field, SFV measurements would be conducted during pile driving of the first three monopiles installed over the course of the Project, with noise attenuation activated. A SFV plan would be submitted to NMFS, BOEM, USACE, and BSEE for review and approval preferably 180 days but no later than 120 days prior to planned start of pile driving. This plan would describe how Revolution Wind would ensure that the first three monopile installation sites selected for sound field are representative of the rest of the monopile installation sites and, in the case that they are not, how additional sites would be selected for SFV. This plan would also include methodology for collecting, analyzing, and preparing SFV data for submission to NMFS. The plan | This measure would not modify the impact determination for invertebrates but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | would describe how the effectiveness of the sound attenuation methodology would be evaluated based on the results. In the event that Revolution Wind obtains technical information that indicates a subsequent monopile is likely to produce larger sound fields, SFV would be conducted for those subsequent monopiles. | |

NMFS EFH Conservation Recommendations were issued to BOEM for consideration on June 16, 2023.

* Information in these rows was taken directly from NMFS (2023) and has not been edited.

### Table 3.6-36. Additional Mitigation and Monitoring Measures Under Consideration for Benthic Habitat and Invertebrates (Appendix F, Table F-3)

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Anchoring plan | BOEM would require Revolution Wind to develop an anchoring plan to ensure anchoring is avoided and minimized in complex habitats, archaeological resources, and UXOs during Project construction and all O&M activities throughout the operational life of the Project. The anchoring plan is required to be provided for review and comment prior to BOEM approval. | This measure requires that anchoring plan implementation covers O&M and decommissioning activities. It would not modify the impact determination for benthic habitat or invertebrates, but it would help to ensure that long-term impacts to large-grained complex and complex habitats, habitat-forming invertebrates, and benthic habitat structure are effectively minimized. |
| Post-installation cable monitoring | Revolution Wind must provide BOEM with a cable monitoring report following each IAC and RWEC inspection to determine cable location, burial depths, state of the cable, and site conditions. An inspection of the IAC and RWEC is expected to include HRG methods, such as a multi-beam bathymetric survey equipment, and is expected to identify seafloor features, natural and human-made hazards, and site conditions along federal sections of the cable routing.<br>In federal waters, the initial IAC and RWEC inspection would be carried out within 6 months of commissioning and subsequent inspections would be carried out at years 1, 2, and every 3 thereafter | This measure would not modify the impact determinations for invertebrates but would provide a process to ensure that impacts to benthic habitat and invertebrates are limited to the levels considered in this Final EIS. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | and after a major storm event. Major storm events are defined as when metocean conditions at the facility meet or exceed the 1 in 50-year return period calculated in the metocean design basis, to be submitted to BOEM with the facility design report (FDR). If conditions warrant adjustment to the frequency of inspections following the Year 2 survey, a revised monitoring plan may be provided to BOEM for review.<br>In addition to inspection, the RWEC would be monitored continuously with the as-built Distributed Temperature Sensing System. If distributed temperature sensing data indicate that burial conditions have deteriorated or changed significantly and remedial actions are warranted, the distributed temperature sensing data, a seafloor stability analysis, and report of remedial actions taken or scheduled must be provided to BOEM within 45 calendar days of the observations.<br>The distributed temperature sensing data, cable monitoring survey data, and cable conditions analysis for each year must be provided to BOEM as part of the annual compliance reports, required by 30 CFR 285.633(b). | |

#### 3.6.2.10.1 Measures Incorporated into the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits listed in Table 3.6-35 and in Appendix F, Table F-2, are incorporated into Alternative G (Preferred Alternative). BOEM has also identified the additional measures in Table 3.6-36. These measures, if adopted, would further define how the effectiveness and enforcement of EPMs would be ensured and improve accountability for compliance with EPMs by requiring the submittal of plans for approval by the enforcing agency(ies) and by defining reporting requirements. Because these measures ensure the effectiveness of and compliance with EPMs that are already analyzed as part of the Proposed Action, implementation of these measures would not further reduce the impact level of the Proposed Action from what is described in Section 3.6.2.

## 3.7 Birds

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to birds from implementation of the Proposed Action and other considered alternatives.

## 3.8 Coastal Habitats and Fauna

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to coastal habitats and fauna from implementation of the Proposed Action and other considered alternatives.

# 3.9 Commercial Fisheries and For-Hire Recreational Fishing

## 3.9.1 Description of the Affected Environment for Commercial Fisheries and For-Hire Recreational Fishing

Geographic analysis area: The GAA for commercial fisheries and for-hire recreational fishing is shown in Figure 3.9-1 and includes all marine waters out to 200 nm offshore that are used by vessels authorized to operate under fisheries managed by the NEFMC, MAFMC, and NMFS Greater Atlantic Regional Fisheries Office (GARFO). In addition, the GAA includes all marine waters of the State of Rhode Island (0–3 nm from the coastline), including landings from fisheries managed by the state. State waters from Maine to the northern portion of South Carolina are also in the GAA, but state water landings are only included if they were made by GARFO-permitted vessels.

Affected environment:

### 3.9.1.1 Commercial Fisheries

This analysis focuses on commercial fishing activity in the GAA, including the Lease Area and a 1,640-foot-wide corridor centered along the RWEC. The primary data used for this analysis were two batches of summarized vessel trip report (VTR) data provided by NMFS GARFO: 1) data summarizing U.S. Atlantic coastwide landings and revenues (NMFS 2021a) and 2) landings and revenue data specific to areas directly associated with the Project (NMFS 2022a; 2023a). The VTR data include catch estimates by fishing location combined with NMFS estimates of revenue using ex-vessel price data drawn from commercial fisheries dealer reports. VTR data describe most commercial fishing activity in both state and federal waters by vessels that have a federal fishing permit or both a state and federal permit. Fishing vessels with only state permits are not included in the federal VTR data. In addition, vessels with only a federal American lobster permit and no other federal fishery permits do not have a VTR requirement, and many vessels with Atlantic highly migratory species permits also do not have a VTR requirement (NMFS 2021b).[21]

Other sources of catch and effort data used in this analysis were online NMFS resources (NMFS 2021b, 2022a, 2023b), which contain commercial fisheries data for each proposed WEA on the U.S. Atlantic Coast. In addition, this analysis includes 1) figures showing the directionality of VMS-enabled fishing vessels developed by BOEM based on data provided by NMFS (2019), and 2) figures showing the distribution of fishing revenue intensity that were adapted from maps in NMFS (2020).

This analysis predominantly uses 2008–2019 fisheries data. For comparative purposes, Tables G-CF62 through G-CF65 in Appendix G present commercial fishing revenue information for the 1) Lease Area and 2) Lease Area and along the RWEC under Alternative G based on the data for 2008–2019 and 2008–2021.

[21] Under the Jonah Crab FMP, participation in the directed Jonah crab fishery is tied to a American lobster permit. As a result, the FMP extends the reporting requirements in the lobster fishery to the Jonah crab fishery (Atlantic States Marine Fisheries Commission 2018). According to BOEM (2022), species like Jonah crab and lobster have good representation in the GARFO data in southern New England, which include the GAA for commercial fisheries and for-hire recreational fishing.

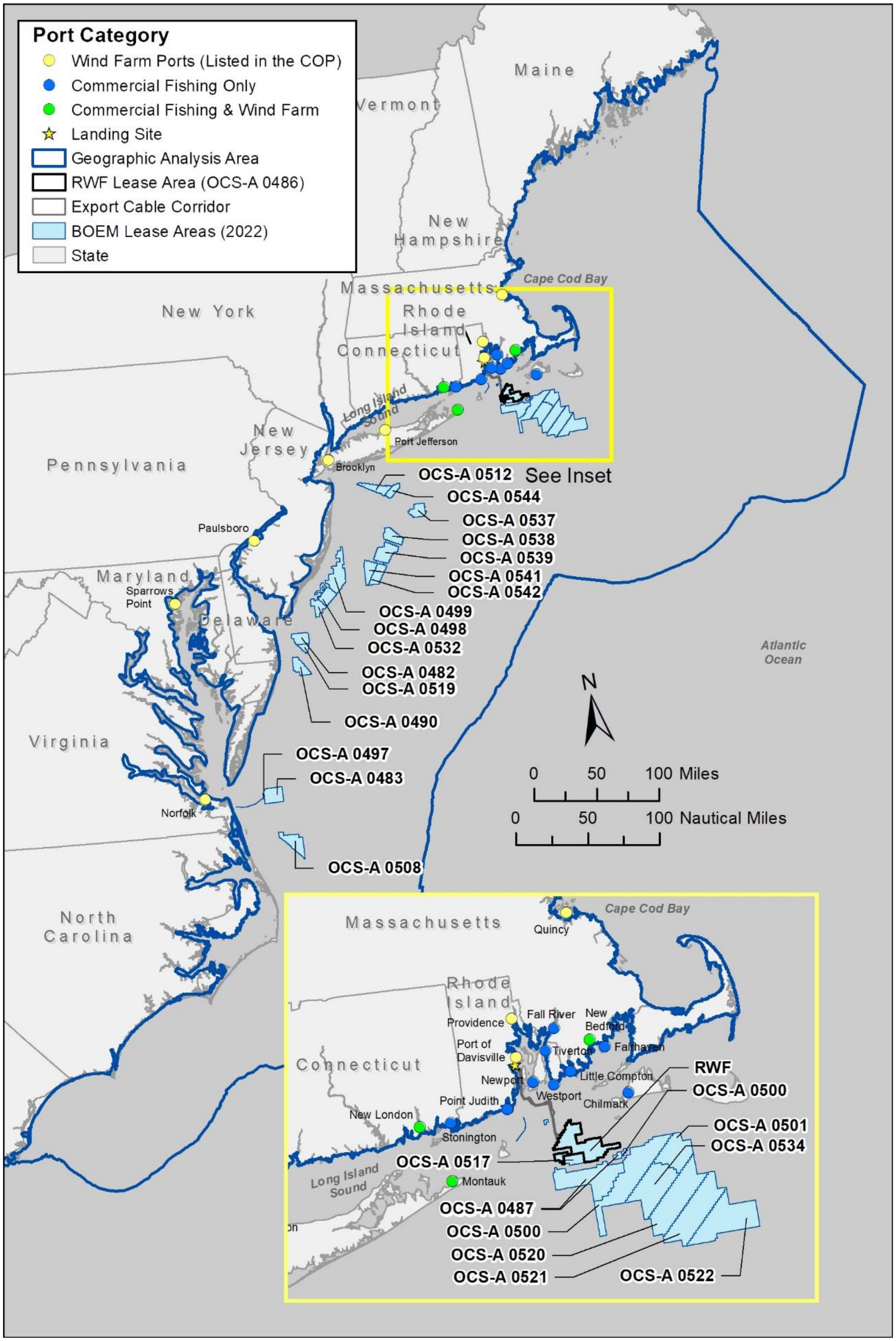



**Figure 3.9-1. Geographic analysis area for commercial fisheries.**

To understand the relative importance of the Lease Area and RWEC corridor to fisheries in the Mid-Atlantic and New England regions, the commercial fishing revenue sourced from each area is compared to the total commercial fishing revenue reported by GARFO for federally permitted commercial fishing activity in the Mid-Atlantic and New England regions. These two regions include all coastal states from Maine to North Carolina. In addition, to provide a more localized geographical context, the analysis describes commercial fishing revenue in the Regional Fisheries Area (RFA) for the Project, which comprises Greater Atlantic Region Statistical Areas 537, 538, 539, 611, and 613. The description of commercial fishing in the RFA also includes a discussion of the area of high-value fisheries that was excluded by BOEM from possible leasing for wind energy development in order to reduce conflict with both commercial and recreational fishing activities.

To the extent that data are available, the commercial fishing described here includes federally permitted fishing activity in both state and federal waters. Data on the average annual revenue of federally permitted vessels by fishery management plan (FMP) fishery (i.e., a fishery managed under a federal FMP), gear type, and port of landing are summarized in the tables in this section. Fishing revenue intensity maps for 2016 through 2018 are provided in Appendix G for 12 FMP fisheries. Appendix G also includes a figure of the distribution of all fishing revenue for 2013 through 2015. In general, the data presented focus on those FMP fisheries, species, gear types, and ports that are relevant to commercial fishing activity in the Lease Area and along the RWEC. Additional details on the data sources and methodology used to develop the tables and figures are provided in Appendix G.

#### 3.9.1.1.1 Mid-Atlantic and New England Regional Setting

Commercial fisheries operating in federal waters off the Mid-Atlantic and New England regions are known for large catches of a variety of species, including Atlantic herring (*Clupea harengus*), surfclam (*Spisula solidissima*), quahog (*Arctica islandica*), squid (Decapodiformes), sea scallop (*Placopecten magellanicus*), skates (Rajidae), summer flounder (*Paralichthys dentatus*), monkfish (*Lophius americanus*), lobster (*Homarus americanus*), Jonah crab (*Cancer borealis*), and various groundfish species.[3]. These fishery resources are harvested with an assortment of fishing gear, including mobile gear (e.g., bottom trawl, dredge, and midwater trawl) and fixed gear (e.g., gillnet, pot, bottom longline, seine, and hand line), and are managed under several FMPs[22]:

- Atlantic Sea Scallop FMP, Monkfish FMP, Northeast Multispecies (large- and small-mesh) FMP,[23] Northeast Skate Complex FMP, Atlantic Herring FMP, and Red Crab FMP (NEFMC 2022)
- Surfclam/Ocean Quahog FMP, Mackerel/Squid/Butterfish FMP, Spiny Dogfish FMP, Bluefish FMP, Golden and Blueline Tilefish FMP, Summer Flounder/Scup/Black Sea Bass FMP, and River Herring FMP (MAFMC 2023)

[22] These FMP fisheries are referred to frequently throughout the EIS, and therefore the author-date citations are provided here at first mention only.

[23] The Northeast Multispecies (large-mesh) FMP fishery is composed of the following groundfish species: Atlantic cod, haddock, Atlantic pollock, yellowtail flounder, witch flounder, winter flounder, windowpane flounder, American plaice (*Hippoglossoides platessoides*), Atlantic halibut (*Hippoglossus hippoglossus*), Acadian redfish (*Sebastes fasciatus*), Atlantic wolffish (*Anarhichas lupus*), ocean pout, and white hake (*Urophycis tenuis*). The Northeast Multispecies small-mesh FMP fishery is composed of five stocks of three species of hakes: northern silver hake and southern silver hake (*Merluccius bilinearis*), northern red hake and southern red hake (*Urophycis chuss*), and offshore hake (*Merluccius albidus*). Southern silver hake and offshore hake are often grouped together and collectively referred to as “southern whiting.”

- Consolidated Atlantic Highly Migratory Species FMP(NMFS 2006)
- Lobster FMP and Jonah Crab FMP (Atlantic States Marine Fisheries Commission [ASMFC] 2023)[24]

One way that fishery resources contribute to regional economies is through direct ex-vessel revenue or through revenue generated when a commercial fishing boat lands or unloads a catch. Table 3.9-1 shows the average annual revenue by FMP fishery (sorted alphabetically) from 2008 through 2019, the time period for which the most recent data are available. Although there is substantial variability in the year-to-year harvest of various species, on average, federally permitted commercial fishing activity generated approximately $952.4 million in average revenue annually from 2008 through 2019, with the Atlantic Sea Scallop FMP fishery accounting for more than half (54%) of the total, the American Lobster FMP fishery accounting for 10% of the total, and the Northeast Multispecies (large-mesh) FMP fishery accounting for 8% of the total. "Other FMPs, non-disclosed species, and non-FMP fisheries" accounted for 10% of the total average annual revenue.

**Table 3.9-1. Commercial Fishing Revenue of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries by FMP Fishery (2008–2019)**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) |
|---|---|---|
| American Lobster | $117,251.0 | $93,250.1 |
| Atlantic Herring | $32,856.3 | $25,929.7 |
| Bluefish | $1,820.4 | $1,275.3 |
| Golden and Blueline Tilefish | $6,583.4 | $5,553.9 |
| Highly Migratory Species | $4,008.4 | $2,219.4 |
| Jonah Crab | $17,082.7 | $9,607.8 |
| Mackerel/Squid/Butterfish | $74,576.6 | $51,911.7 |
| Monkfish | $28,943.7 | $20,597.3 |
| Northeast Multispecies (large-mesh) | $105,418.2 | $73,331.4 |
| Northeast Multispecies (small-mesh) | $13,499.5 | $11,261.1 |
| Atlantic Sea Scallop | $661,233.5 | $518,891.6 |
| Northeast Skate Complex | $10,217.1 | $7,448.4 |
| Spiny Dogfish | $5,237.2 | $2,975.4 |

[24] The regional setting includes the jurisdictions of two regional fishery management councils created under the Magnuson-Stevens Fishery Conservation and Management Act: the MAFMC manages fisheries in federal waters off the coasts of New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina, and the NEFMC manages fisheries in federal waters off the coasts of Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut. The two councils manage species with many FMPs that are frequently updated, revised, and amended, and they coordinate with each other to jointly manage species across jurisdictional boundaries. Some of the managed fisheries of each council extend into state waters. Therefore, the councils work with the ASMFC, which comprises the 15 Atlantic Coast states and coordinates the management of marine and anadromous resources found in the states' marine waters. In addition, the lobster and Jonah crab fisheries are cooperatively managed by the states and the NMFS under the framework of the ASMFC (ASMFC 2023).

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) |
|---|---|---|
| Summer Flounder/Scup/Black Sea Bass | $45,205.7 | $39,807.4 |
| Surfclam/Ocean Quahog | $63,152.0 | $60,087.2 |
| Other FMPs, non-disclosed species and non-FMP fisheries* | $33,646.8 | $28,290.4 |
| **Total** | $1,132,912.7 | $952,438.3 |

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows, including the Total row.

* The "Other FMPs, non-disclosed species, and non-FMP fisheries" category includes revenue from two FMP fisheries: Red Crab and River Herring. It also includes a) revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions and b) revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table 3.9-2 shows the average annual landings for the top 20 FMP fishery species by weight from 2008 through 2019. Atlantic herring and sea scallop accounted for 41% and 13% of the total landings, respectively, whereas *Loligo* squid and skates each accounted for 6%.

**Table 3.9-2. Commercial Fishing Landings of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries by Top 20 Species (2008–2019)**

| Species | FMP Fishery | Peak Annual Landings (pounds) | Average Annual Landings (pounds) |
|---|---|---|---|
| American lobster | American Lobster | 22,227,430 | 19,334,031 |
| Atlantic herring | Atlantic Herring | 217,820,607 | 155,541,858 |
| Atlantic mackerel | Mackerel/Squid/Butterfish | 48,873,977 | 18,789,264 |
| Black sea bass | Summer Flounder/Scup/Black Sea Bass | 3,093,459 | 1,806,872 |
| Bluefish | Bluefish | 2,886,624 | 1,825,725 |
| Butterfish | Mackerel/Squid/Butterfish | 7,852,044 | 3,242,538 |
| Cod | Northeast Multispecies (large-mesh) | 16,920,601 | 7,477,847 |
| Jonah crab | Jonah Crab | 17,874,506 | 11,855,186 |
| *Loligo* squid | Mackerel/Squid/Butterfish | 38,654,405 | 24,653,366 |
| Monkfish | Monkfish | 12,188,795 | 9,732,966 |
| Red hake | Northeast Multispecies (small-mesh) | 1,908,985 | 1,357,856 |
| Rock crab | No federal FMP | 3,707,631 | 943,811 |
| Scup | Summer Flounder/Scup/Black Sea Bass | 14,551,815 | 10,859,288 |
| Sea scallop | Atlantic Sea Scallop | 59,057,105 | 49,948,027 |

| Species | FMP Fishery | Peak Annual Landings (pounds) | Average Annual Landings (pounds) |
|---|---|---|---|
| Silver hake | Northeast Multispecies (small-mesh) | 17,316,860 | 14,078,640 |
| Skates | Northeast Skate Complex | 26,811,281 | 21,310,278 |
| Spiny dogfish | Spiny Dogfish | 22,843,386 | 13,376,198 |
| Summer flounder | Summer Flounder/Scup/Black Sea Bass | 14,999,293 | 9,289,256 |
| Winter flounder | Northeast Multispecies (large-mesh) | 5,875,684 | 3,631,996 |
| Yellowtail flounder | Northeast Multispecies (large-mesh) | 3,915,379 | 2,172,206 |

Source: Developed using data from NMFS (2021a).

Notes: The table shows landings of the top 20 species landed (by pounds) in the combined Lease Area and RWEC.

Table 3.9-3 shows the average annual revenue by gear type from 2008 through 2019 (sorted alphabetically). Scallop dredge gear accounted for 51% of the revenue generated by all gear in the Mid-Atlantic and New England regions. Bottom trawl gear and pot gear (including pot gear used in the Lobster FMP fishery) also each generated over $115 million in average annual revenue.

**Table 3.9-3. Commercial Fishing Revenue of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries by Gear Type (2008–2019)**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) |
|---|---|---|
| Dredge-clam | $65,768.2 | $61,333.5 |
| Dredge-scallop | $615,168.5 | $489,410.9 |
| Gillnet-sink | $44,624.9 | $30,031.6 |
| Handline | $6,222.2 | $4,754.5 |
| Pot-other | $146,203.6 | $115,055.2 |
| Trawl-bottom | $229,153.5 | $187,199.3 |
| Trawl-midwater | $26,600.8 | $18,995.8 |
| All other gear* | $62,406.3 | $47,305.8 |
| **Total** | **$1,135,221.1** | **$954,086.5** |

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the Total row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Commercial fishing fleets are important to coastal communities in the Mid-Atlantic and New England regions because they generate employment and income for vessel owners and crews, as well as create demand for shoreside products and services to maintain vessels and process seafood. In 2017, total seafood landings in the Mid-Atlantic and New England regions, including landings from non-federally permitted vessels, were valued at $1.80 billion. The regions are also home to aquaculture production and research that provide employment and business opportunities for coastal communities. In New England, the seafood industry generated $5.6 billion in personal and proprietor income, whereas that impact totaled $3.8 billion in the Mid-Atlantic (NMFS 2021d).

Table 3.9-4 shows the average annual revenue by port of landing from 2008 through 2019.[25] New Bedford accounted for approximately 40% of the total commercial fishing revenue in the Mid-Atlantic and New England regions, and Cape May and Narragansett/Point Judith accounted for 9% and 5%, respectively.

[25] The ports shown are the 16 ports (or port groups) that had disclosed revenue and landings data received from NMFS (2022b) from within the Lease Area and/or along the RWEC for at least five of the 12 years from 2008 through 2019.

**Table 3.9-4. Commercial Fishing Revenue of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries and Level of Fishing Dependence by Port**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Commercial Fishing Engagement Categorical Ranking* | Commercial Fishing Reliance Categorical Ranking† |
|---|---|---|---|---|
| Beaufort, NC | $5,210.8 | $2,654.1 | High | Medium |
| Chilmark/Menemsha, MA‡ | $656.1 | $470.9 | Medium | High |
| Fairhaven, MA | $17,395.3 | $11,282.5 | High | Low |
| *Fall River, MA* | *$5,123.6* | *$1,135.6* | *Medium* | *Low* |
| Hampton, VA | $19,482.0 | $14,379.2 | High | Low |
| Little Compton, RI | $3,007.4 | $1,992.2 | Medium | Medium |
| Montauk, NY | $24,549.9 | $18,496.4 | High | Medium |
| New Bedford, MA | $458,246.7 | $378,792.6 | High | Medium |
| New London, CT | $11,117.1 | $6,646.6 | Medium–High | Low |
| Newport News, VA | $54,540.1 | $30,970.8 | High | Low |
| Newport, RI | $16,111.1 | $8,896.3 | High | Low |
| Point Judith, RI | $58,531.0 | $46,076.7 | High | Medium |
| Point Pleasant Beach, NJ | $37,321.9 | $30,986.2 | High | Medium |
| Stonington, CT | $11,946.4 | $10,273.8 | High | Low |
| Tiverton, RI | $1,603.1 | $1,148.8 | Medium | Low |
| Westport, MA | $1,905.8 | $1,305.2 | Low | Low |
| **Revenues by Port State‡‡** | | | | |
| All Connecticut ports | $23,063.5 | $16,983.9 | N/A | N/A |
| All Massachusetts ports | $598,628.2 | $498,180.5 | N/A | N/A |
| All New Jersey ports | $236,221.6 | $173,939.2 | N/A | N/A |

| **Port and State** | **Peak Annual Revenue ($1,000s)** | **Average Annual Revenue ($1,000s)** | **Commercial Fishing Engagement Categorical Ranking*** | **Commercial Fishing Reliance Categorical Ranking†** |
|---|---|---|---|---|
| All New York ports | $57,846.0 | $32,406.4 | N/A | N/A |
| All Rhode Island ports | $83,083.4 | $68,916.3 | N/A | N/A |
| Ports in all other states | $153,530.8 | $116,778.7 | N/A | N/A |
| Port data withheld for confidentiality§ | $64,272.8 | $46,227.3 | N/A | N/A |
| **Total** | **$1,135,221.1** | **$953,432.4** | N/A | N/A |

Source: NEFMC (2021); NMFS (2021a)

Notes: Commercial fishing revenue data are from 2008 through 2019; levels of fishing dependency are for 2018. Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows, including the Total row. Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates.

MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* Commercial fishing engagement measures the presence of commercial fishing through fishing activity as shown through permits, fish dealers, and vessel landings. A high rank indicates more engagement. N/A indicates that no information is available.

† Commercial fishing reliance measures the presence of commercial fishing in relation to the population size of a community through fishing activity. A high rank indicates more reliance. N/A indicates that no information is available.

‡ Reported landings are divided evenly between the two communities.

‡‡ Revenues by Port State include all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

§ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

Table 3.9-4 also presents the level of commercial fishing engagement and reliance of the community in which the port is located. These rankings portray the level of dependence the community has on commercial fishing. As shown in the table, the rankings differ across communities, with Cape May ranking high for both commercial fishing engagement and reliance, and Westport ranking low for the two indices. Information regarding how the rankings were determined for each community is provided in the community profiles available at NEFMC (2021). These profiles present the most recent data available for key indicators for Mid-Atlantic and New England fishing communities related to dependence on fisheries and other economic and demographic characteristics. Selected socioeconomic characteristics of communities with fishing ports that could be affected by the Project are also presented in Section 3.11 and Section 3.12. Additional community-specific information on the historic, demographic, cultural, and economic context for understanding the involvement in fishing of the communities included in this analysis can be found in Colburn et al. (2010).

### 3.9.1.1.2 Regional Fisheries Area

The Lease Area and RWEC are located in the RFA, which, as noted above and shown in Figure 3.9-2, includes Greater Atlantic Region Statistical Areas 537, 538, 539, 611, and 613.

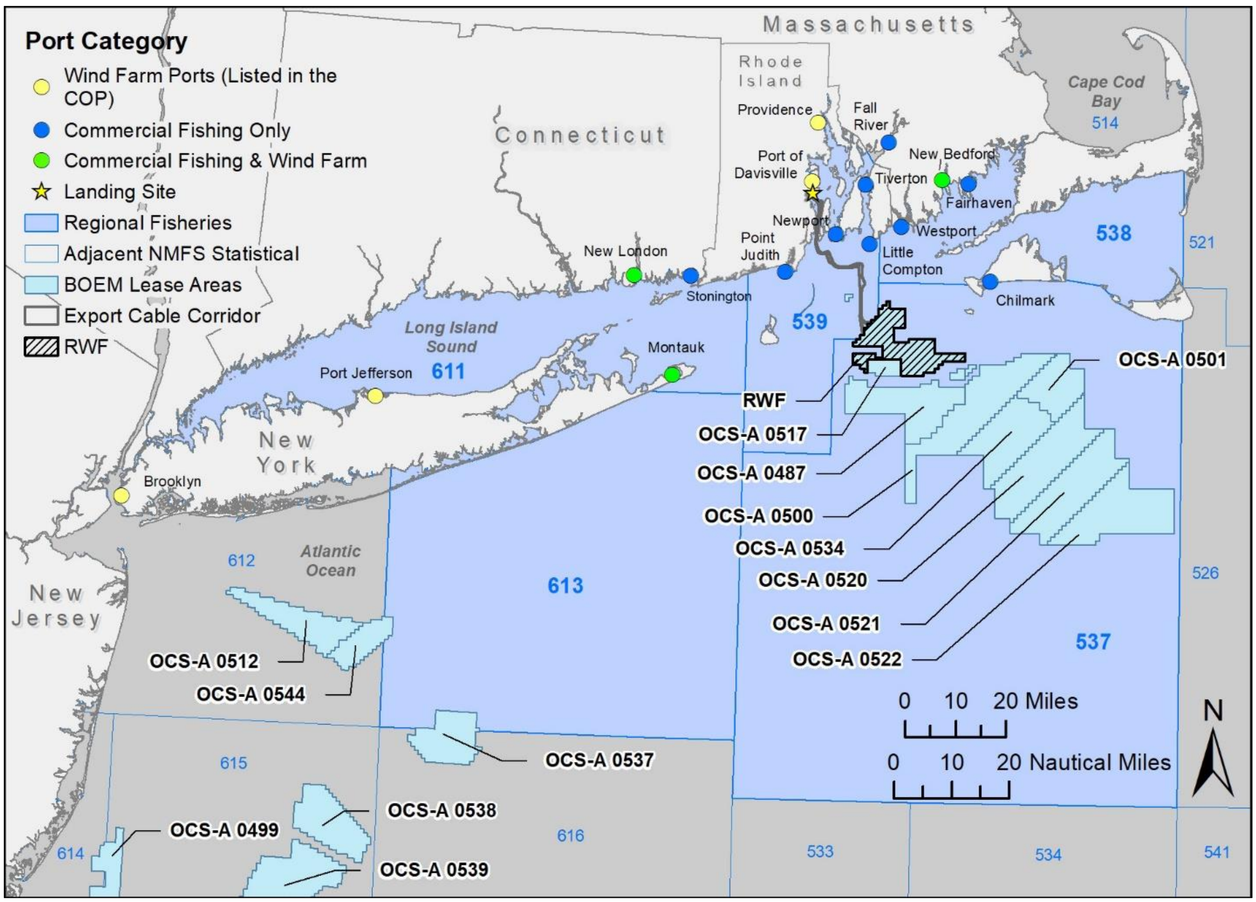



**Figure 3.9-2. Regional Fisheries Area.**

Table 3.9-5 shows the average annual revenue in the RFA by FMP fishery from 2008 through 2019. On average, federally permitted commercial fishing activity in the RFA annually generated $143.9 million in revenue, with the Atlantic Sea Scallop FMP fishery accounting for 35% of the total, the Mackerel/Squid/Butterfish FMP fishery accounting for 11% of the total, and the Summer Flounder/Scup/Black Sea Bass FMP fishery accounting for 8% of the total. "Other FMPs, non-disclosed species, and non-FMP fisheries" accounted for 23% of the average annual revenue for all FMP and non-FMP fisheries. Table 3.9-5 also shows the percentage of each FMP fishery's total revenue in the Mid-Atlantic and New England regions that came from the RFA from 2008 through 2021. The RFA accounted for a large share of the total revenue of the Jonah Crab FMP fishery (61%), Northeast Skate Complex FMP fishery (48%), Bluefish FMP fishery (46%), and Monkfish FMP fishery (36%). Across all FMP and non-FMP fisheries, the RFA accounted for approximately 15% of the total revenue in the Mid-Atlantic and New England regions.

**Table 3.9-5. Commercial Fishing Revenue of Federally Permitted Vessels in the Regional Fisheries Area by FMP Fishery (2008–2019)**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* |
|---|---|---|---|
| American Lobster | $11,498.0 | $7,799.0 | 8.4% |
| Atlantic Herring | $6,853.8 | $2,994.1 | 11.5% |
| Bluefish | $816.3 | $582.6 | 45.7% |
| Highly Migratory Species | $315.5 | $219.7 | 9.9% |
| Jonah Crab | $11,244.6 | $5,871.9 | 61.1% |
| Mackerel/Squid/Butterfish | $29,544.7 | $15,424.7 | 29.7% |
| Monkfish | $11,610.7 | $7,520.2 | 36.5% |
| Northeast Multispecies (large-mesh) | $4,616.6 | $2,389.4 | 3.3% |
| Northeast Multispecies (small-mesh) | $3,928.6 | $2,823.6 | 25.1% |
| Atlantic Sea Scallop | $107,023.3 | $49,741.2 | 9.6% |
| Northeast Skate Complex | $5,671.1 | $3,579.6 | 48.1% |
| Spiny Dogfish | $546.8 | $244.0 | 8.2% |
| Summer Flounder/Scup/Black Sea Bass | $14,327.2 | $10,999.8 | 27.6% |
| Other FMPs, non-disclosed species, and non-FMP fisheries† | $42,517.3 | $33,757.3 | N/A |
| **Total** | **$213,098.9** | **$143,947.2** | **15.1%** |

Source: Developed using NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the Total row.

* See Table 3.9-1 for Mid-Atlantic and New England fisheries data by FMP fishery.

† The "Other FMPs, non-disclosed species, and non-FMP fisheries" category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. It also includes a) revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions and b) revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table 3.9-6 shows the average annual landings by individual species from 2008 through 2019. The top three species were Atlantic herring, skates, and *Loligo* squid accounting for 27%, 16%, and 12% of the total landings, respectively. Table 3.9-6 also shows the percentage of each species' total landings in the Mid-Atlantic and New England regions that came from the RFA from 2008 through 2019. The RFA accounted for a large share of the total landings of rock crab (71%), skates (65%), scup (65%), Jonah crab (54%), red hake (*Urophycis chuss*) (48%), monkfish (44%), *Loligo* squid (41%), butterfish (38%), and summer flounder (37%).

**Table 3.9-6. Commercial Fishing Landings of Federally Permitted Vessels in the Regional Fisheries Area by Species (2008–2019)**

| Species | FMP Fishery | Peak Annual Landings (pounds) | Average Annual Landings (pounds) | Average Annual Landings as a Percentage of Total Landings in the Mid-Atlantic and New England Regions* |
|---|---|---|---|---|
| American lobster | American Lobster | 1,930,635 | 1,334,642 | 6.9% |
| Atlantic herring | Atlantic Herring | 49,580,526 | 23,065,828 | 14.8% |
| Atlantic mackerel | Mackerel/Squid/Butterfish | 16,142,814 | 2,803,012 | 14.9% |
| Black sea bass | Summer Flounder/Scup/Black Sea Bass | 944,309 | 422,898 | 23.4% |
| Bluefish | Bluefish | 1,000,463 | 730,175 | 40.0% |
| Butterfish | Mackerel/Squid/Butterfish | 2,761,688 | 1,230,067 | 37.9% |
| Cod | Northeast Multispecies (large-mesh) | 386,358 | 201,932 | 2.7% |
| Jonah crab | Jonah Crab | 10,396,456 | 6,372,109 | 53.7% |
| *Loligo* squid | Mackerel/Squid/Butterfish | 21,451,952 | 10,224,109 | 41.5% |
| Monkfish | Monkfish | 4,975,969 | 4,302,449 | 44.2% |
| Red hake | Northeast Multispecies (small-mesh) | 1,030,911 | 658,114 | 48.5% |
| Rock crab | Other FMPs, non-disclosed species and non-FMP fisheries | 3,042,399 | 667,393 | 70.7% |
| Scup | Summer Flounder/Scup/Black Sea Bass | 9,912,424 | 7,105,610 | 65.4% |
| Sea scallop | Atlantic Sea Scallop | 11,529,926 | 4,685,271 | 9.4% |
| Silver hake | Northeast Multispecies (small-mesh) | 5,527,656 | 3,557,841 | 25.3% |
| Skates | Northeast Skate Complex | 15,472,505 | 13,964,696 | 65.5% |

| Species | FMP Fishery | Peak Annual Landings (pounds) | Average Annual Landings (pounds) | Average Annual Landings as a Percentage of Total Landings in the Mid-Atlantic and New England Regions* |
|---|---|---|---|---|
| Spiny dogfish | Spiny Dogfish | 2,168,519 | 1,061,854 | 7.9% |
| Summer flounder | Summer Flounder/Scup/Black Sea Bass | 5,161,839 | 3,425,527 | 36.9% |
| Winter flounder | Northeast Multispecies (large-mesh) | 947,933 | 357,060 | 9.8% |
| Yellowtail flounder | Northeast Multispecies (large-mesh) | 1,032,864 | 409,308 | 18.8% |

Source: Developed using data from NMFS (2021a, 2022b).

Notes: The table shows landings of the top 20 species landed (by pounds) in the combined Lease Area and RWEC.

* See Table 3.9-2 for Mid-Atlantic and New England fisheries data by species.

Table 3.9-7 shows the average annual revenue in the RFA by gear type from 2008 through 2019. Scallop dredge gear accounted for 34% of the revenue generated by all gear types, bottom trawl gear accounted for 30%, and clam dredge gear accounted for 14%. Table 3.9-7 also shows the percentage of each gear type's total revenue in the Mid-Atlantic and New England regions that came from the RFA from 2008 through 2019. The RFA accounted for a large share of the total revenue for clam dredge (34%), sink gillnet (32%), handline (29%), and bottom trawl (23%).

**Table 3.9-7. Commercial Fishing Revenue of Federally Permitted Vessels in the Regional Fisheries Area by Gear Type (2008–2019)**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* |
|---|---|---|---|
| *Dredge-clam* | *$25,562.9* | *$20,831.9* | *34.0%* |
| Dredge-scallop | $105,678.5 | $48,458.7 | 9.9% |
| Gillnet-sink | $13,149.3 | $9,615.9 | 32.0% |
| Handline | $1,673.2 | $1,369.0 | 28.8% |
| Pot-other | $19,272.8 | $16,089.3 | 14.0% |
| Trawl-bottom | $60,400.9 | $43,039.0 | 23.0% |
| Trawl-midwater | $5,373.1 | $2,348.8 | 12.4% |

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* |
|---|---|---|---|
| All other gear† | $4,061.1 | $2,665.0 | 5.6% |
| **Total** | **$213,098.9** | **$144,417.7** | **15.1%** |

Source: Developed using data from NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the Total row. Gear types shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates.

* See Table 3.9-3 for Mid-Atlantic and New England fisheries data by gear type.

† Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table 3.9-8 shows the ports at which fish and shellfish caught in the RFA from 2008 through 2019 were landed. New Bedford and Point Judith together accounted for 53% of the revenue generated by commercial fishing activity in the RFA. Table 3.9-8 also shows the percentage of each port's total revenue in the Mid-Atlantic and New England regions that came from the RFA from 2008 through 2019. The RFA accounted for a large share of the total revenue for Little Compton (97%), Westport (90%), Chilmark/Menemsha (89%), Montauk (64%), Point Judith (60%), and Tiverton (57%).

**Table 3.9-8. Commercial Fishing Revenue of Federally Permitted Vessels in the Regional Fisheries Area by Port (2008–2019)**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* |
|---|---|---|---|
| *Beaufort, NC* | *$2,031.2* | *$862.9* | *32.5%* |
| Chilmark/Menemsha, MA | $573.4 | $419.6 | 89.1% |
| *Fairhaven, MA* | *$4,142.1* | *$1,439.0* | *12.8%* |
| *Fall River, MA* | *$649.8* | *$445.9* | *39.3%* |
| *Hampton, VA* | *$3,478.3* | *$1,562.6* | *10.9%* |
| Little Compton, RI | $2,936.8 | $1,940.2 | 97.4% |
| Montauk, NY | $16,563.0 | $11,859.8 | 64.1% |
| New Bedford, MA | $90,794.6 | $48,503.9 | 12.8% |
| New London, CT | $5,375.6 | $2,679.5 | 40.3% |
| *Newport News, VA* | *$3,587.3* | *$1,698.9* | *5.5%* |
| Newport, RI | $5,302.2 | $2,880.8 | 32.4% |
| Point Judith, RI | $37,052.6 | $27,546.5 | 59.8% |
| *Point Pleasant Beach, NJ* | *$15,019.8* | *$8,593.3* | *27.7%* |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* |
|---|---|---|---|
| Stonington, CT | $4,407.6 | $3,163.5 | 30.8% |
| *Tiverton, RI* | *$880.0* | *$651.1* | *56.7%* |
| Westport, MA | $1,562.6 | $1,169.0 | 89.6% |
| **Revenues by Port State‡** | | | |
| All Connecticut ports | $9,630.8 | $5,843.0 | 34.4% |
| All Massachusetts ports | $106,063.5 | $56,741.1 | 11.4% |
| All New Jersey ports | $31,706.7 | $19,389.6 | 11.1% |
| All New York ports | $25,158.2 | $18,262.3 | 56.4% |
| All Rhode Island ports | $42,888.3 | $33,766.2 | 49.0% |
| Ports in all other states | $8,353.5 | $4,325.9 | 3.7% |
| Port data withheld for confidentiality† | $9,883.2 | $5,565.7 | 12.0% |
| **Total** | **$213,098.9** | **$144,391.8** | **15.1%** |

Source: Developed using data from NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows, including the Total row. Ports shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates.

MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.* See Table 3.9-4 for Mid-Atlantic and New England fisheries data by port.

‡ Revenues by Port State include all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

† Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

In 2010, during the first stage of the public process for BOEM's call for information and nominations to establish the WEA that would eventually become the RI/MA WEA, all of Cox Ledge was included in the area considered for leasing (i.e., call area). However, BOEM held a lengthy stakeholder and scientific review process that identified "high-value" fishing grounds and excluded those areas from the RI/MA WEA (BOEM 2012; Smythe et al. 2016). From 2008 through 2019, the excluded area accounted for approximately 22% of the revenue generated by all fisheries in the call area. It accounted for 32% of the Atlantic Sea Scallop FMP fishery revenue and 25% of the Monkfish FMP fishery revenue in the call area (NMFS 2022a). For the Atlantic Sea Scallop and Monkfish FMP fisheries combined, the revenue per square mile in the excluded area was approximately 50% higher than that in the RI/MA WEA in 2007 to 2018 (BOEM 2021a).

### 3.9.1.1.3 Lease Area and Revolution Wind Export Cable

The commercial fisheries that are most active in the Lease Area and along the RWEC encompass a wide range of FMP fisheries, species, gears, and landing ports (Tables 3.9-9 through 3.9-12). An overview of commercial fishing activity in the Lease Area and along the RWEC relative to that in surrounding waters was obtained from figures adapted from information available at NMFS (2020). As shown in Figures G-

CF1 through G-CF13 in Appendix G, the commercial fishing revenue for most FMP fisheries was at a low level of intensity within the Lease Area and along the RWEC compared to adjacent areas, although occasionally the revenue intensity in some localized spots inside the Lease Area was moderate for the American Lobster, Atlantic Herring, Mackerel/Squid/Butterfish, Monkfish, and Northeast Skate Complex FMP fisheries. In contrast, for some FMP fisheries, including the Monkfish, Northeast Skate Complex, and Summer Flounder/Scup/Black Sea Bass FMP fisheries, the revenue intensity levels were high in sizeable expanses of ocean outside the Lease Area and RWEC corridor but within 20 nm of the two areas.

Table 3.9-9 provides additional information on the average annual revenue in the Lease Area by FMP fishery. From 2008 through 2019, an average of 289 federally permitted commercial fishing vessels fished in the Lease Area annually, with a high of 331 vessels in 2008, and a low of 251 vessels in 2018 (NMFS 2023c). Approximately 96% of the fishing operations that engaged in commercial fishing in the Lease Area from 2019 to 2021 were small businesses, as defined by the Small Business Administration. Moreover, the fishing operations that engaged in commercial fishing in the Lease Area that are small businesses earned more of their total revenue from the area than did fishing operations that are large businesses, although for both types of businesses, the Lease Area accounted for less than 1% of their total revenue (NMFS 2023b).

On average, federally permitted commercial fishing activity in the Lease Area annually generated $1.06 million in revenue from 2008 through 2019, with the American Lobster FMP, Atlantic Sea Scallop FMP, and Monkfish FMP fisheries accounting for 20%, 14%, and 10% of the total, respectively. In terms of the percentage of each FMP fishery's total revenue in the Mid-Atlantic and New England regions that came from the Lease Area from 2008 through 2019, the area accounted for approximately 1.2% of the Northeast Skate Complex FMP fishery's total revenue and approximately 0.5% of the Monkfish FMP fishery's total revenue. In total, the Lease Area accounted for approximately 0.1% of the total revenue across all FMP and non-FMP fisheries in the Mid-Atlantic and New England regions. In terms of the percentage of each FMP fishery's total revenue in the RFA that came from the Lease Area from 2008 through 2019, the area accounted for approximately 3.8% of the Spiny Dogfish FMP fishery's total revenue, 2.7% of the American Lobster FMP fishery's total revenue, and 2.1% of the Northeast Multispecies (small-mesh) FMP fishery's total revenue. In total, the Lease Area accounted for approximately 0.7% of the total revenue across all FMP and non-FMP fisheries in the RFA. As shown in Table 3.9-9, the Monkfish, Summer Flounder/Scup/Black Sea Bass, and Northeast Skate Complex FMP fisheries accounted for the highest number of vessels fishing in the Lease Area. The average annual revenue of vessels fishing in the Lease Area was highest for vessels participating in the Atlantic Sea Scallop, Atlantic Herring, and American Lobster FMP fisheries.

**Table 3.9-9. Commercial Fishing Revenue of Federally Permitted Vessels in the Lease Area by FMP Fishery (2008–2019)**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† | Average Annual Number of Vessels‡ | Average Annual Revenue per Vessel |
|---|---|---|---|---|---|---|
| American Lobster | $364.7 | $211.3 | 0.23% | 2.71% | 107 | $1,972 |
| Atlantic Herring | $144.2 | $40.0 | 0.15% | 1.34% | 20 | $2,009 |
| Bluefish | $4.4 | $2.2 | 0.17% | 0.38% | 115 | $19 |
| Highly Migratory Species | $6.2 | $1.3 | 0.06% | 0.60% | 28 | $47 |
| Jonah Crab | $32.5 | $17.8 | 0.19% | 0.30% | 51 | $353 |
| Mackerel/Squid/Butterfish | $255.0 | $91.8 | 0.18% | 0.59% | 114 | $802 |
| Monkfish | $202.8 | $105.0 | 0.51% | 1.40% | 157 | $668 |
| Northeast Multispecies (large-mesh) | $105.8 | $45.6 | 0.06% | 1.91% | 95 | $479 |
| Northeast Multispecies (small-mesh) | $138.8 | $58.6 | 0.52% | 2.07% | 97 | $601 |
| Atlantic Sea Scallop | $405.4 | $148.1 | 0.03% | 0.30% | 58 | $2,553 |
| Northeast Skate Complex | $156.9 | $90.2 | 1.21% | 2.52% | 123 | $734 |
| Spiny Dogfish | $22.2 | $9.3 | 0.31% | 3.81% | 51 | $184 |
| Summer Flounder/Scup/Black Sea Bass | $88.5 | $46.7 | 0.12% | 0.42% | 144 | $324 |
| Other FMPs, non-disclosed species, and non-FMP fisheries§ | $483.8 | $191.1 | N/A | N/A | N/A | N/A |

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† | Average Annual Number of Vessels‡ | Average Annual Revenue per Vessel |
|---|---|---|---|---|---|---|
| **Total** | **$1,339.2** | **$1,059.0** | **0.11%** | **0.74%** | **289** | **N/A** |

Source: Developed using data from NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the Total row. N/A indicates that the number cannot be calculated with the available data.

* See Table 3.9-1 for Mid-Atlantic and New England fisheries data by FMP fishery.

† See Table 3.9-5 for RFA fisheries data by FMP fishery.

‡ The average number of vessels that fished in the Lease Area for "All FMP and non-FMP Fisheries" was calculated based on data in NMFS (2023c).

§ The "Other FMPs, non-disclosed species, and non-FMP fisheries" category includes revenue from the Surfclam/Ocean Quahog, Red Crab, and River Herring FMP fisheries as well as revenue from other FMP fisheries managed by the ASMFC and Southeast Regional Office of NMFS. This category also includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions.

In terms of pounds landed, the top species harvested in the Lease Area were skates (30% of the total landings in the area) and Atlantic herring (27% of the total landings in the area) (Table 3.9-10). The area accounted for approximately 1.7% of skate total landings and 1.4% of red hake total landings in the Mid-Atlantic and New England regions and approximately 4.2% of spiny dogfish total landings and 3.0% of skates, silver hake (*Merluccius bilinearis*), American lobster, red hake, and cod total landings in the RFA.

**Table 3.9-10. Commercial Fishing Landings of Federally Permitted Vessels in the Lease Area by Species (2008–2019)**

| Species | Peak Annual Landings (pounds) | Average Annual Landings (pounds) | Average Annual Landings as a Percentage of Total Landings in the Mid-Atlantic and New England Regions* | Average Annual Landings as a Percentage of Total Landings in the RFA† |
|---|---|---|---|---|
| American lobster | 65,969 | 40,356 | 0.21% | 3.02% |
| Atlantic herring | 1,098,682 | 325,365 | 0.21% | 1.41% |
| Atlantic mackerel | 693,500 | 62,883 | 0.33% | 2.24% |
| Black sea bass | 9,995 | 4,451 | 0.25% | 1.05% |
| Bluefish | 7,436 | 3,487 | 0.19% | 0.48% |
| Butterfish | 28,670 | 12,523 | 0.39% | 1.02% |
| Cod | 19,864 | 5,913 | 0.08% | 2.93% |
| Jonah crab | 41,670 | 23,907 | 0.20% | 0.38% |
| *Loligo* squid | 183,469 | 57,410 | 0.23% | 0.56% |
| Monkfish | 132,153 | 68,060 | 0.70% | 1.58% |
| Red hake | 47,244 | 19,245 | 1.42% | 2.92% |
| Rock crab | 10,061 | 3,830 | 0.41% | 0.57% |
| Scup | 81,771 | 45,075 | 0.42% | 0.63% |
| Sea scallop | 48,945 | 14,997 | 0.03% | 0.32% |
| Silver hake | 252,313 | 94,308 | 0.67% | 2.65% |
| Skates | 681,186 | 358,490 | 1.68% | 2.57% |
| Spiny dogfish | 95,550 | 44,507 | 0.33% | 4.19% |
| Summer flounder | 31,011 | 13,533 | 0.15% | 0.40% |
| Winter flounder | 11,334 | 4,898 | 0.13% | 1.37% |
| Yellowtail flounder | 28,513 | 6,920 | 0.32% | 1.69% |

Source: Developed using data from NMFS (2021a, 2022b).

Notes: The table shows landings of the top 20 species landed (by pounds) in the combined Lease Area and RWEC.

* See Table 3.9-2 for Mid-Atlantic and New England fisheries data by species.

† See Table 3.9-6 for RFA fisheries data by species.

Data provided in NMFS (2021b) were used to analyze differences in the economic importance of fishing grounds in the Lease Area across commercial fishing operations. These data summarize the number of federally permitted commercial fishing vessels fishing in the Lease Area each year from 2008 through 2019, as well as the percentage of each vessel's annual total fishing revenue that came from within the area. The complete analysis of differences in economic dependency on the Lease Area across vessels is provided in Appendix G. As shown in the appendix, the vessel-level annual revenue percentages were divided into quartiles, which were created by ordering the data from the lowest to highest percentage and then dividing the data into four groups of equal size. The first quartile represents the lowest 25% of ranked percentages, whereas the fourth quartile represents the highest 25%. In addition, the data provided in NMFS (2023c) reported the number of "outlier" vessels in the distribution of the percentage of revenue. In the context of this analysis, an outlier is a vessel that derived an exceptionally high proportion of its annual revenue from the Lease Area in comparison to other vessels that fished in the area.

As discussed above, an average of 289 vessels per year fished in the Lease Area from 2008 through 2019. The average annual number of outliers was 40.5 (14% of all vessels), with a high of 47 outliers in 2016 (14.6% of all vessels) and a low of 31 outliers in 2011 (12% of all vessels). From 2008 through 2019, the vessel ranked as the seventy-fifth percentile vessel (i.e., the vessel in the third quartile with the greatest dependence on the Lease Area over the 12-year period) derived 0.88% of its total revenue from the Lease Area (NMFS 2021b). Of the outliers, the vessel with the greatest dependence on the Lease Area derived 38% of its total revenue over the 12-year period from the area. Looking at individual years shown in Figure G-CF14 in Appendix G, in 2008, one vessel derived nearly 60% of its total revenue from the Lease Area. In that same year, the vessel with the greatest percentage of dependence in the third quartile generated approximately 2.2% of its revenue from the Lease Area. Figure G-CF14 shows that in any given year the revenue percentage for most of the outliers was below 10%. In short, some vessels depended heavily on the Lease Area, but most vessels derived a small percentage of their total annual revenue from the area.

Table 3.9-11 provides the average annual revenue in the Lease Area by gear type from 2008 through 2019. Together, scallop dredge, sink gillnet, bottom trawl, and pot gear accounted for approximately 79% of the total revenue generated by all gear types in the Lease Area. The area accounted for approximately 0.6% of the sink gillnet gear's total revenue in the Mid-Atlantic and New England regions, and approximately 1.8% of that gear's total revenue in the RFA. Approximately 1.9% of the midwater trawl gear's total revenue in the RFA came from the area.

**Table 3.9-11. Commercial Fishing Revenue of Federally Permitted Vessels in the Lease Area by Gear Type (2008–2019)**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Dredge-clam* | *$372.3* | *$111.7* | *0.18%* | *0.54%* |
| Dredge-scallop | $412.1 | $148.7 | 0.03% | 0.31% |
| Gillnet-sink | $253.3 | $169.3 | 0.56% | 1.76% |
| Handline | $14.6 | $2.7 | 0.06% | 0.19% |
| Pot-other | $389.9 | $258.8 | 0.22% | 1.61% |

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| Trawl-bottom | $467.3 | $314.7 | 0.17% | 0.73% |
| *Trawl-midwater* | *$132.8* | *$43.6* | *0.23%* | *1.86%* |
| All other gear‡ | $268.7 | $79.3 | 0.17% | 2.98% |
| **Total** | **$1,339.2** | **$1,128.8** | **0.12%** | **0.78%** |

Source: Developed using data from NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows, including the Total row. Gear types shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data

* See Table 3.9-3 for Mid-Atlantic and New England fisheries data by gear type.

† See Table 3.9-7 for RFA fisheries data by gear type.

‡ Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear, for years when they cannot be disclosed.

Table 3.9-12 shows the ports at which fish and shellfish caught in the Lease Area from 2008 through 2019 were landed. Together, Point Judith, New Bedford, and Little Compton accounted for approximately 79% of the revenue generated by commercial fishing activity in the Lease Area. Little Compton and Westport were the ports most dependent on the Lease Area, with 5.7% and 4.6%, respectively, of their total commercial fishing revenue in the Mid-Atlantic and New England regions derived from the Lease Area, and with 5.9% and 5.2%, respectively, of their total commercial fishing revenue in the RFA derived from the Lease Area.

**Table 3.9-12. Commercial Fishing Revenue of Federally Permitted Vessels in the Lease Area by Port (2008–2019)**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | $4.6 | $2.3 | 0.09% | 0.26% |
| Chilmark/Menemsha, MA | $28.2 | $16.7 | 3.55% | 3.98% |
| *Fairhaven, MA* | $28.1 | $14.9 | 0.13% | 1.03% |
| *Fall River, MA* | $8.3 | $5.4 | 0.48% | 1.21% |
| *Hampton, VA* | $7.3 | $3.4 | 0.02% | 0.22% |
| Little Compton, RI | $169.3 | $115.0 | 5.77% | 5.93% |
| Montauk, NY | $37.1 | $16.2 | 0.09% | 0.14% |
| New Bedford, MA | $530.5 | $326.5 | 0.09% | 0.67% |
| New London, CT | $18.9 | $8.6 | 0.13% | 0.32% |
| *Newport News, VA* | $14.7 | $3.7 | 0.01% | 0.22% |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| Newport, RI | $105.7 | $58.7 | 0.66% | 2.04% |
| Point Judith, RI | $510.2 | $379.1 | 0.82% | 1.38% |
| *Point Pleasant Beach, NJ* | $14.4 | $4.0 | 0.01% | 0.05% |
| Stonington, CT | $18.5 | $6.5 | 0.06% | 0.21% |
| *Tiverton, RI* | $16.7 | $7.1 | 0.61% | 1.08% |
| Westport, MA | $111.6 | $60.6 | 4.64% | 5.18% |
| **Revenues by Port State‡** | | | | |
| All Connecticut ports | $37.4 | $11.5 | 0.07% | 0.20% |
| All Massachusetts ports | $621.9 | $421.5 | 0.08% | 0.74% |
| *All New Jersey ports* | *$14.4* | *$4.2* | *0.00%* | *0.02%* |
| All New York ports | $37.1 | $16.2 | 0.05% | 0.09% |
| All Rhode Island ports | $715.8 | $559.1 | 0.81% | 1.66% |
| *Ports in all other states* | *$22.0* | *$7.3* | *0.01%* | *0.17%* |
| Port data withheld for confidentiality‡ | $98.8 | $43.8 | 0.09% | 0.79% |
| **Total** | $1,339.2 | $1,063.6 | 0.11% | 0.74% |

Source: Developed using data from NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Ports shown in *italics* indicate that fewer than 12 years more than 4 years of data were used to calculate the estimates of average revenue. Otherwise, estimates are based on 12 years of data.

MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 for Mid-Atlantic and New England fisheries data by port.

† See Table 3.9-8 for RFA fisheries data by port.

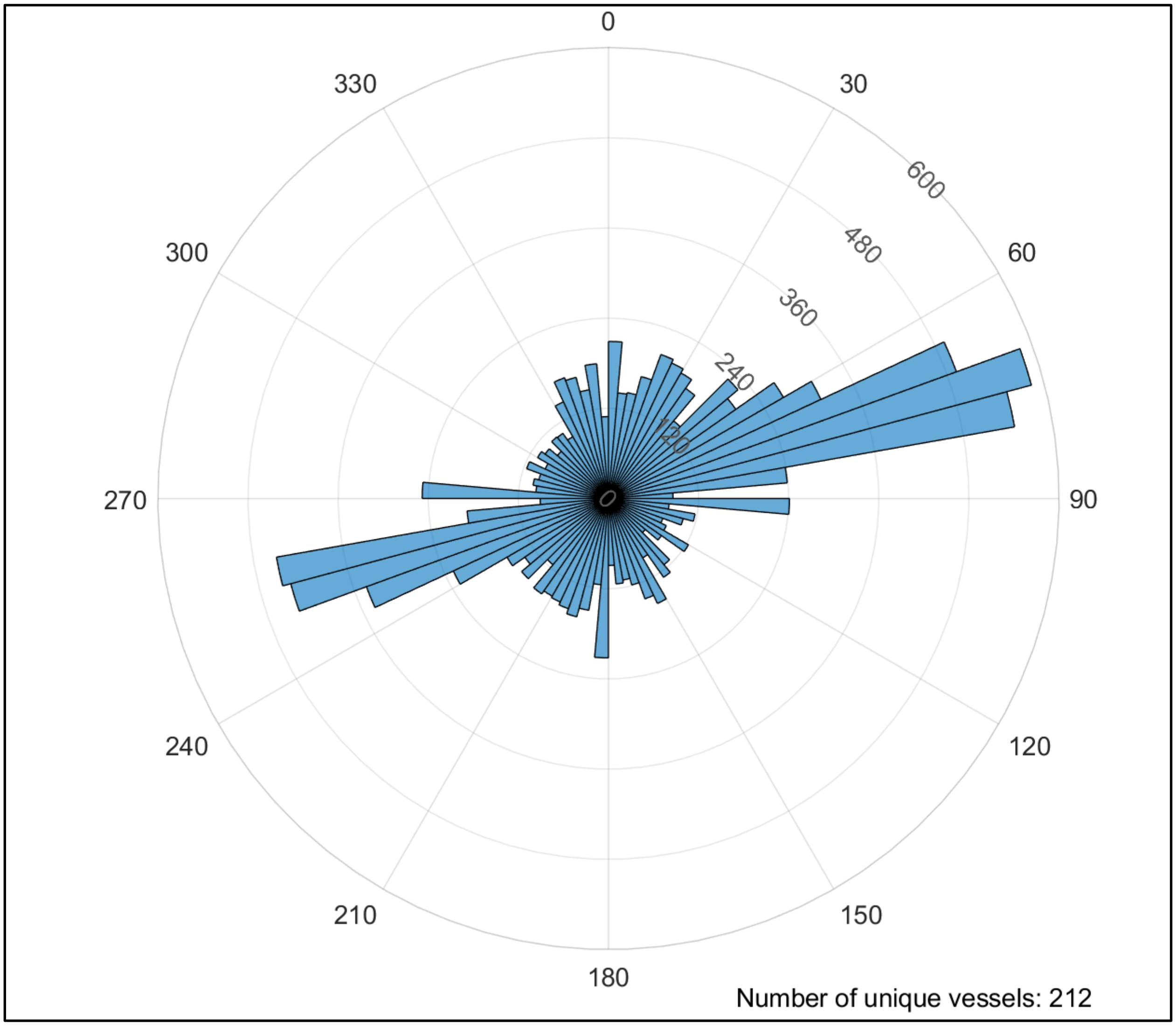
‡ Revenues by Port State include all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

The NMFS VMS data are a good source for understanding the spatial distribution of fishing vessels in the Lease Area. As discussed in Appendix G, from 2014 to 2019, vessels with VMS accounted for a substantial portion (90% or greater) of landings in several federally permitted fisheries in the Mid-Atlantic and New England regions, including the Atlantic Sea Scallop, Monkfish, Atlantic Herring, Mackerel/Squid/Butterfish, Northeast Multispecies (large- and small-mesh), Spiny Dogfish, Summer Flounder/Scup/Black Sea Bass, and Surfclam/Ocean Quahog FMP fisheries. VMS-enabled vessels represented approximately 11% of landings in the American Lobster and 14 % in the Jonah Crab FMP fisheries (NMFS 2019).

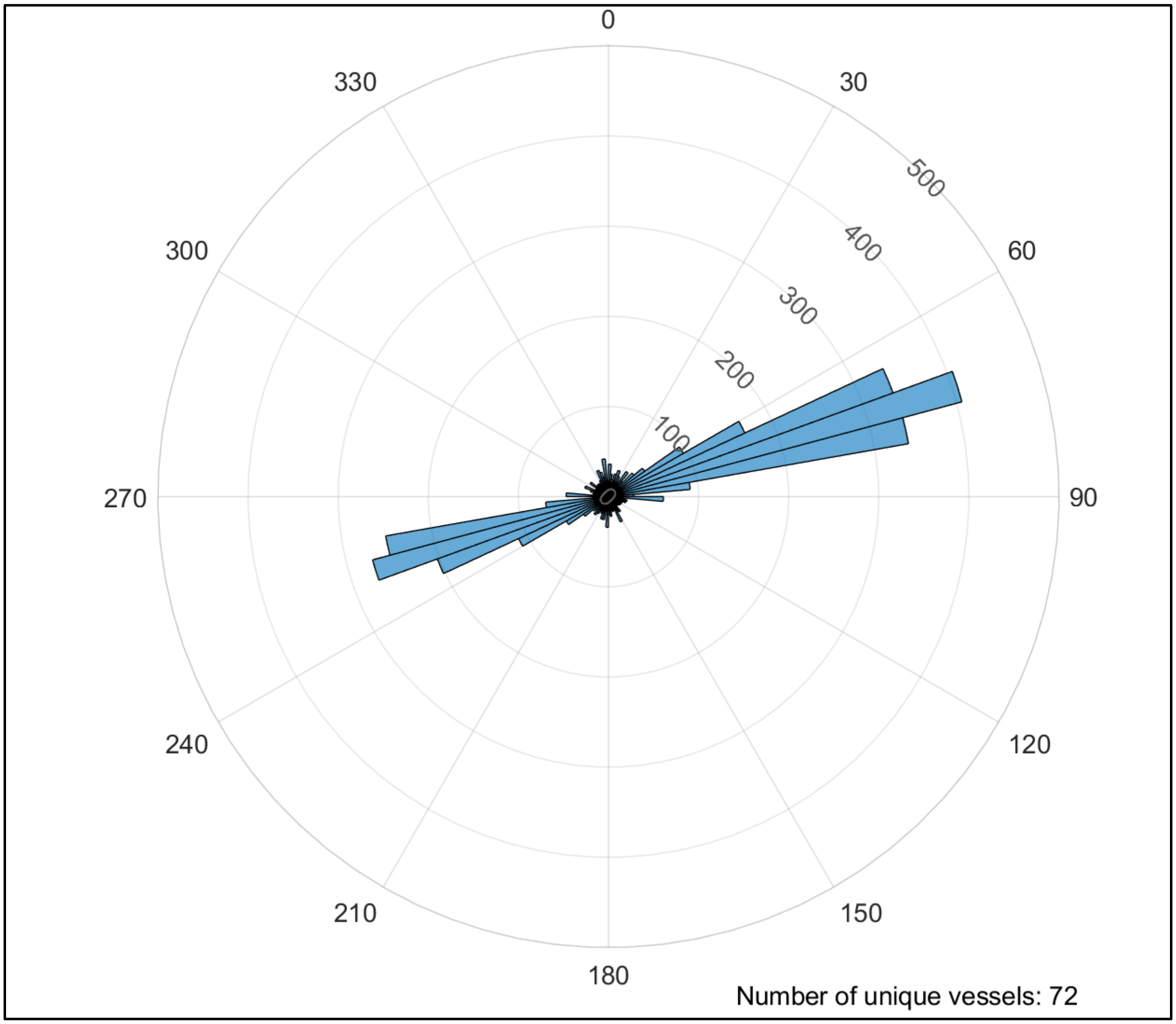
Based on data provided by NMFS (2019), polar histograms (Figure 3.9-3 through Figure 3.9-6) showing the directionality of VMS-enabled vessels fishing in the Lease Area were developed using the information conveyed in individual position reports (pings) from January 2014 to August 2019. Vessels moving at speeds less than 5 knots were assumed to be actively fishing. The larger bars in the polar histograms represent a greater number of position reports showing fishing vessels moving in a certain direction within the RI/MA WEA. The polar histograms differ with respect to their scales.

Figure 3.9-3 shows that most of the 212 unique vessels participating in FMP fisheries in the Lease Area followed a northeast–southwest fishing pattern. As shown in Figure 3.9-4, most of the 72 unique vessels participating in non-VMS fisheries in the Lease Area followed a similar fishing pattern. Figure 3.9-5 shows that the orientation of vessels fishing within the Lease Area varied by FMP fishery. Figure 3.9-6 shows the directionality of all activities (transiting and fishing combined) in the Lease Area. Most of the 488 unique vessels participating in a VMS fishery generally operated in a southwest–northeast pattern with a secondary pattern of northwest–southeast.




Source: Developed by BOEM using VMS data provided by NMFS (2019).

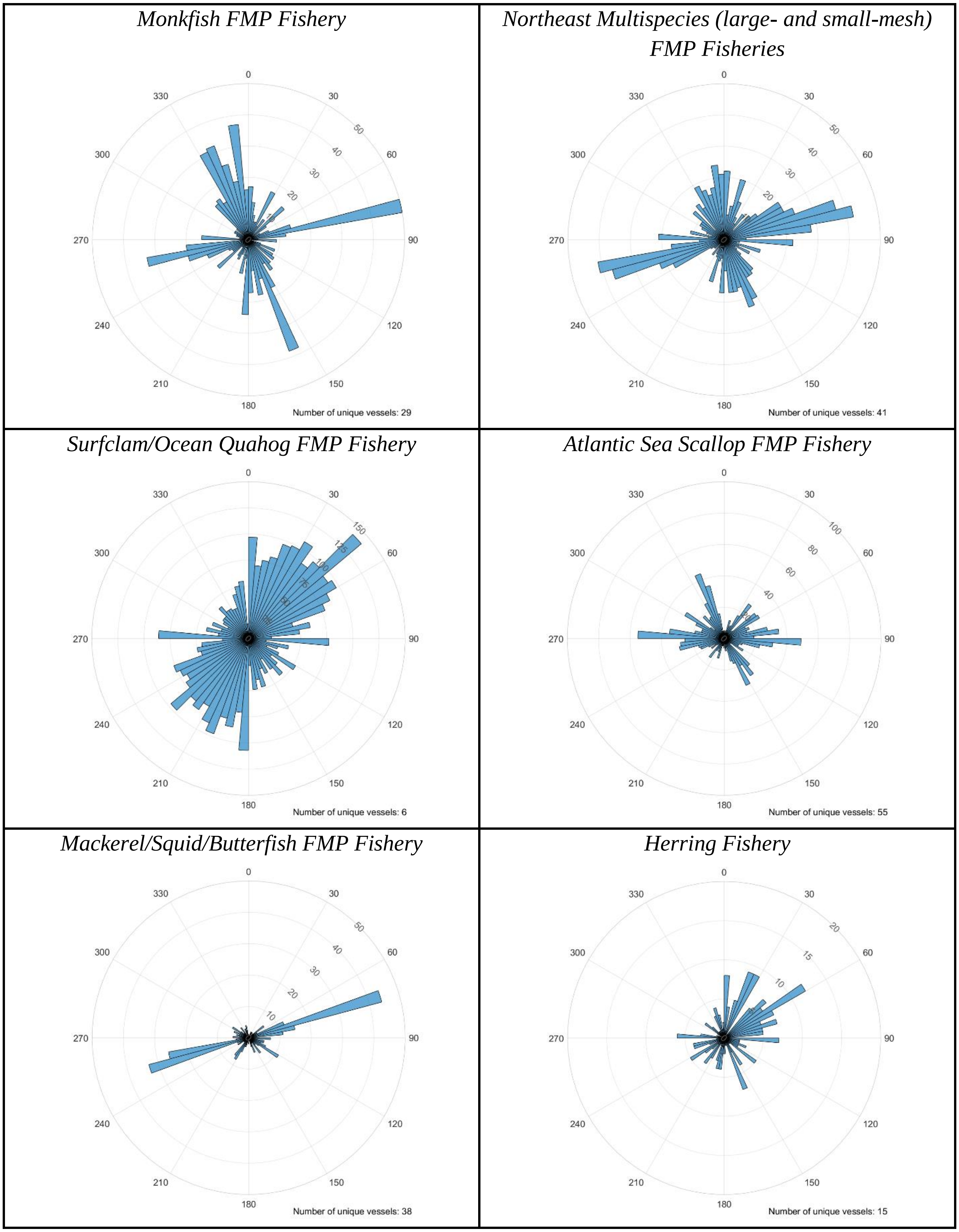
**Figure 3.9-3. Vessel monitoring system bearings of vessels actively fishing within the Lease Area, all FMP fisheries combined, January 2014 to August 2019.**




Notes: These are fishing vessels that are transmitting VMS data after having declared themselves as participating in a fishery that does not require VMS transmissions.

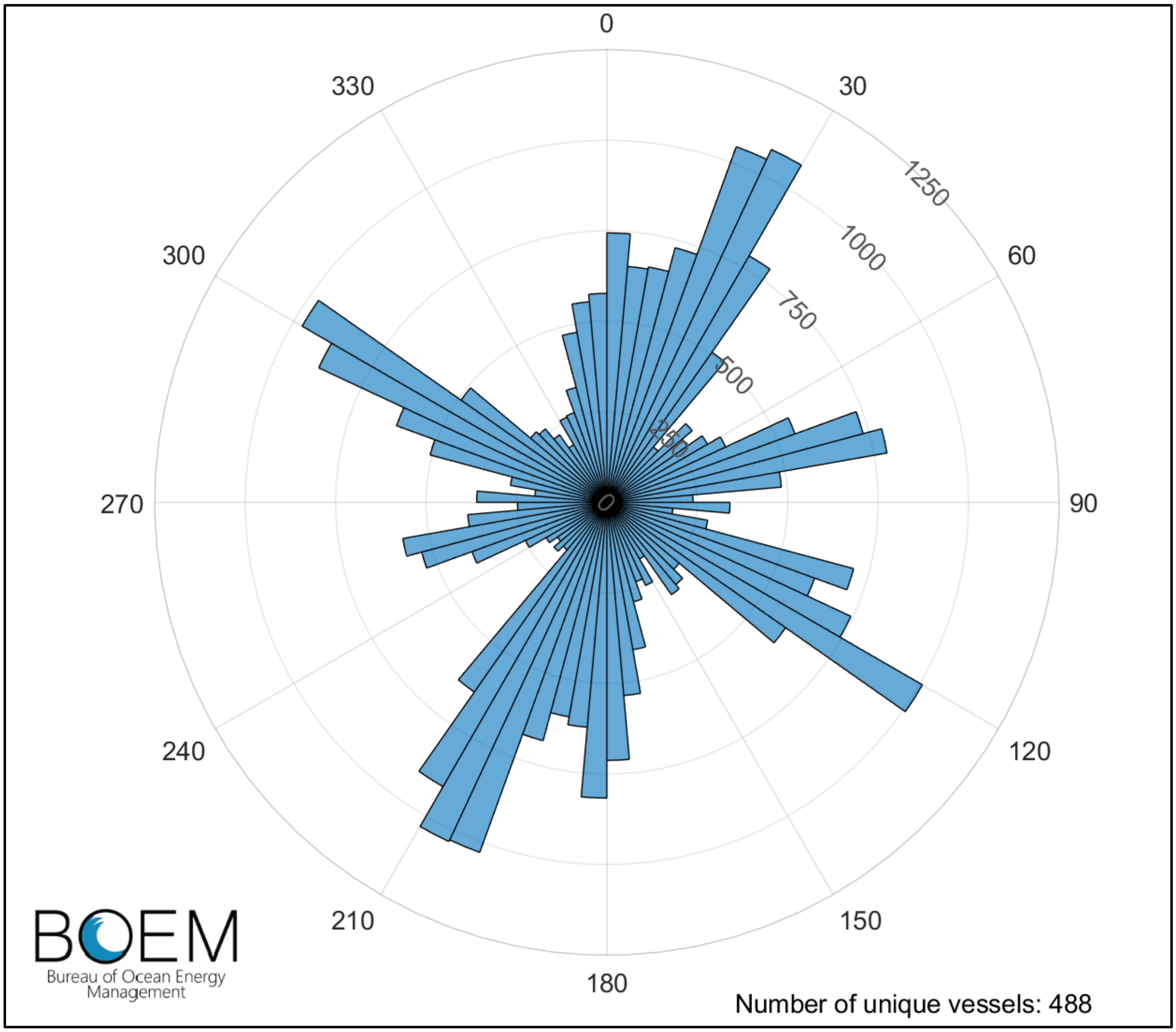
Source: Developed by BOEM using VMS data provided by NMFS (2019).

**Figure 3.9-4. Vessel monitoring system bearings of vessels actively fishing within the Lease Area, non–vessel monitoring system fisheries, January 2014 to August 2019.**




Source: Developed by BOEM using VMS data provided by NMFS (2019).

**Figure 3.9-5. Vessel monitoring system bearings of vessels actively fishing within the Lease Area by FMP fishery, January 2014 to August 2019**.




Source: Developed by BOEM using VMS data provided by NMFS (2019).

**Figure 3.9-6. Vessel monitoring system bearings for all activity within the Lease Area, January 2014 to August 2019.**

Table 3.9-13 presents the average annual revenue in the corridor along the RWEC by FMP fishery from 2008 through 2019. On average, federally permitted commercial fishing activity along the RWEC annually generated $359.7 thousand in revenue, with the American Lobster FMP fishery, Atlantic Herring FMP fishery, and Mackerel/Squid/Butterfish FMP fishery accounting for 20%, 17%, and 15% of the total revenue, respectively. In terms of the percentage of each FMP fishery's total revenue in the Mid-Atlantic and New England regions that came from the RWEC corridor from 2008 through 2019, the area accounted for approximately 0.5% of the Bluefish FMP fishery's total revenue, 0.3% of the Northeast Skate Complex FMP fishery's total revenue, and 0.2% of the Atlantic Herring FMP fishery's and Spiny Dogfish FMP fishery's total revenue. In total, the RWEC corridor accounted for approximately 0.04% of the total revenue across all FMP and non-FMP fisheries in the Mid-Atlantic and New England regions. In terms of the percentage of each FMP fishery's total revenue in the RFA that came from the RWEC corridor from 2008 through 2019, the area accounted for approximately 2.6% of the Spiny Dogfish FMP fishery's total revenue, 2.1% of the Atlantic Herring FMP fishery's total revenue, and 1.1% of the Bluefish FMP fishery's total revenue. In total, the RWEC corridor accounted for approximately 0.25% of the total revenue across all FMP and non-FMP fisheries in the RFA.

**Table 3.9-13. Commercial Fishing Revenue of Federally Permitted Vessels along the Revolution Wind Export Cable by FMP Fishery (2008–2019)**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| American Lobster | $143.1 | $72.5 | 0.08% | 0.93% |
| Atlantic Herring | $179.5 | $62.9 | 0.24% | 2.10% |
| Bluefish | $12.8 | $6.5 | 0.51% | 1.12% |
| Highly Migratory Species | $1.8 | $0.9 | 0.04% | 0.40% |
| Jonah Crab | $9.9 | $5.3 | 0.06% | 0.09% |
| Mackerel/Squid/Butterfish | $112.3 | $53.5 | 0.10% | 0.35% |
| Monkfish | $8.6 | $4.9 | 0.02% | 0.07% |
| Northeast Multispecies (large-mesh) | $11.7 | $6.9 | 0.01% | 0.29% |
| Northeast Multispecies (small-mesh) | $54.4 | $15.7 | 0.14% | 0.56% |
| Atlantic Sea Scallop | $20.7 | $9.0 | 0.00% | 0.02% |
| Northeast Skate Complex | $46.1 | $20.6 | 0.28% | 0.57% |
| Spiny Dogfish | $16.0 | $6.4 | 0.22% | 2.64% |
| Summer Flounder/Scup/Black Sea Bass | $48.0 | $37.5 | 0.09% | 0.34% |
| Other FMPs, non-disclosed species, and non-FMP fisheries‡ | $101.9 | $56.9 | N/A | N/A |
| **Total** | **$519.7** | **$359.7** | **0.04%** | **0.25%** |

Source: Developed using data from NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the Total row.

* See Table 3.9-1 for Mid-Atlantic and New England fisheries data by FMP fishery.

† See Table 3.9-5 for RFA fisheries data by FMP fishery.

‡ The "Other FMPs, non-disclosed species, and non-FMP fisheries" category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. It also includes a) revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions and b) revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

In terms of pounds landed, the top species harvested along the RWEC were Atlantic herring (60% of the total landings in the area) and skates (15% of the total landings in the area (Table 3.9-14). The area along the RWEC accounted for approximately 0.59% of skates total landings and 0.44% of scup total landings in the Mid-Atlantic and New England regions, and approximately 2.3% of spiny dogfish and Atlantic herring total landings in the RFA.

**Table 3.9-14. Commercial Fishing Landings of Federally Permitted Vessels along the Revolution Wind Export Cable by Species (2008–2019)**

| Species | FMP | Peak Annual Landings (pounds) | Average Annual Landings (pounds) | Average Annual Landings as a Percentage of Total Landings in the Mid-Atlantic and New England Regions* | Average Annual Landings as a Percentage of Total Landings in the RFA† |
|---|---|---|---|---|---|
| American lobster | American Lobster | 25,780 | 13,779 | 0.07% | 1.03% |
| Atlantic herring | Atlantic Herring | 1,773,535 | 519,326 | 0.33% | 2.25% |
| Atlantic mackerel | Mackerel/Squid/Butterfish | 151,724 | 20,483 | 0.11% | 0.73% |
| Black sea bass | Summer Flounder/Scup/Black Sea Bass | 2,997 | 2,036 | 0.11% | 0.48% |
| Bluefish | Bluefish | 18,315 | 9,243 | 0.51% | 1.27% |
| Butterfish | Mackerel/Squid/Butterfish | 24,319 | 10,998 | 0.34% | 0.89% |
| Cod | Northeast Multispecies (large-mesh) | 1,240 | 617 | 0.01% | 0.31% |
| Jonah crab | Jonah Crab | 12,348 | 7,438 | 0.06% | 0.12% |
| *Loligo* squid | Mackerel/Squid/Butterfish | 85,935 | 31,217 | 0.13% | 0.31% |
| Monkfish | Monkfish | 5,440 | 2,902 | 0.03% | 0.07% |
| Red hake | Northeast Multispecies (small-mesh) | 10,185 | 4,860 | 0.36% | 0.74% |
| Rock crab | Other FMPs, non-disclosed species and non-FMP fisheries | 3,428 | 2,141 | 0.23% | 0.32% |
| Scup | Summer Flounder/Scup/Black Sea Bass | 94,284 | 47,550 | 0.44% | 0.67% |
| Sea scallop | Atlantic Sea Scallop | 1,712 | 848 | 0.00% | 0.02% |

| Species | FMP | Peak Annual Landings (pounds) | Average Annual Landings (pounds) | Average Annual Landings as a Percentage of Total Landings in the Mid-Atlantic and New England Regions* | Average Annual Landings as a Percentage of Total Landings in the RFA† |
|---|---|---|---|---|---|
| Silver hake | Northeast Multispecies (small-mesh) | 97,186 | 25,993 | 0.18% | 0.73% |
| Skates | Northeast Skate Complex | 239,722 | 125,479 | 0.59% | 0.90% |
| Spiny dogfish | Spiny Dogfish | 62,007 | 24,793 | 0.19% | 2.33% |
| Summer flounder | Summer Flounder/Scup/Black Sea Bass | 14,798 | 10,002 | 0.11% | 0.29% |
| Winter flounder | Northeast Multispecies (large-mesh) | 3,556 | 1,467 | 0.04% | 0.41% |
| Yellowtail flounder | Northeast Multispecies (large-mesh) | 1,898 | 678 | 0.03% | 0.17% |

Source: Developed using data from NMFS (2021a, 2022b).

Notes: The table shows landings of the top 20 species landed (by pounds) in the combined Lease Area and RWEC.

* See Table 3.9-2 for Mid-Atlantic and New England fisheries data by species.

† See Table 3.9-6 for RFA fisheries data by species.

Table 3.9-15 provides the average annual revenue along the RWEC area by gear type from 2008 through 2019. Together, pot gear, bottom trawl, and midwater trawl gear accounted for approximately 86% of the revenue generated by commercial fishing activity along the RWEC area. The area accounted for about 0.29% of midwater trawl gear total revenue in the Mid-Atlantic and New England regions. The area accounted for about 2.32% of midwater trawl total revenue in the RFA.

**Table 3.9-15. Commercial Fishing Revenue of Federally Permitted Vessels along the Revolution Wind Export Cable by Gear Type (2008–2019)**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Dredge-clam* | ND | ND | ND | ND |
| Dredge-scallop | $20.6 | $9.8 | 0.00% | 0.02% |
| Gillnet-sink | $49.3 | $28.1 | 0.09% | 0.29% |
| Handline | $1.7 | $1.1 | 0.02% | 0.08% |
| Pot-other | $141.3 | $86.6 | 0.08% | 0.54% |
| Trawl-bottom | $263.6 | $177.4 | 0.09% | 0.41% |
| *Trawl-midwater* | *$131.8* | *$54.5* | *0.29%* | *2.32%* |
| All other gear‡ | $27.6 | $12.2 | 0.03% | 0.46% |
| **Total** | **$519.7** | **$369.6** | **0.04%** | **0.26%** |

Source: Developed using data from NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Gear types shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

* See Table 3.9-3 for Mid-Atlantic and New England fisheries data by gear type.

† See Table 3.9-7 for RFA fisheries data by gear type.

‡ Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table 3.9-16 shows the ports where fish and shellfish caught along the RWEC from 2008 through 2019 were landed. Together, Point Judith, New Bedford, and Newport accounted for approximately 83% of the revenue generated by commercial fishing activity within the RWEC corridor. In terms of total commercial fishing revenue in the Mid-Atlantic and New England regions, Little Compton was the port most dependent on the RWEC corridor, with 1.4% of its revenue derived from the area. In terms of total commercial fishing revenue in the RFA, Newport was the port most dependent on the RWEC corridor, with 1.7% of its revenue derived from the area.

**Table 3.9-16. Commercial Fishing Revenue of Federally Permitted Vessels along the Revolution Wind Export Cable by Port (2008–2019)**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA[†] |
|---|---|---|---|---|
| *Beaufort, NC* | *$0.8* | *$0.5* | *0.02%* | *0.05%* |
| *Chilmark/Menemsha, MA* | *$0.9* | *$0.4* | *0.09%* | *0.10%* |
| *Fairhaven, MA* | *$1.7* | *$0.9* | *0.01%* | *0.07%* |
| *Fall River, MA* | *$11.0* | *$4.8* | *0.43%* | *1.09%* |
| *Hampton, VA* | *$1.2* | *$0.6* | *0.00%* | *0.04%* |
| Little Compton, RI | $53.0 | $28.2 | 1.42% | 1.45% |
| Montauk, NY | $6.1 | $2.6 | 0.01% | 0.02% |
| New Bedford, MA | $111.0 | $42.9 | 0.01% | 0.09% |
| *New London, CT* | *$4.9* | *$1.8* | *0.03%* | *0.07%* |
| *Newport News, VA* | *$1.5* | *$0.4* | *0.00%* | *0.02%* |
| Newport, RI | $88.4 | $50.2 | 0.56% | 1.74% |
| Point Judith, RI | $260.6 | $195.1 | 0.42% | 0.71% |
| *Point Pleasant Beach, NJ* | *$2.3* | *$0.7* | *0.00%* | *0.01%* |
| Stonington, CT | $3.0 | $1.1 | 0.01% | 0.03% |
| *Tiverton, RI* | *$1.9* | *$1.0* | *0.08%* | *0.15%* |
| Westport, MA | $12.8 | $6.6 | 0.50% | 0.56% |
| **Revenues by Port State[‡]** | | | | |
| All Connecticut Ports | $6.9 | $2.1 | 0.01% | 0.04% |
| All Massachusetts Ports | $116.8 | $52.8 | 0.01% | 0.09% |
| *All New Jersey Ports* | *$12.8* | *$2.5* | *0.00%* | *0.01%* |
| All New York Ports | $6.1 | $2.6 | 0.01% | 0.01% |
| All Rhode Island Ports | $380.6 | $274.8 | 0.40% | 0.81% |
| *Ports in all other states* | *$2.3* | *$1.1* | *0.00%* | *0.02%* |
| Port data withheld for confidentiality[‡] | $46.9 | $25.0 | 0.05% | 0.45% |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| **Total** | **$519.7** | **$360.9** | **0.04%** | **0.25%** |

Source: Developed using data from NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND for average revenues and for percentages of other areas.

MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 for Mid-Atlantic and New England fisheries data by port.

† See Table 3.9-8 for RFA fisheries data by port.

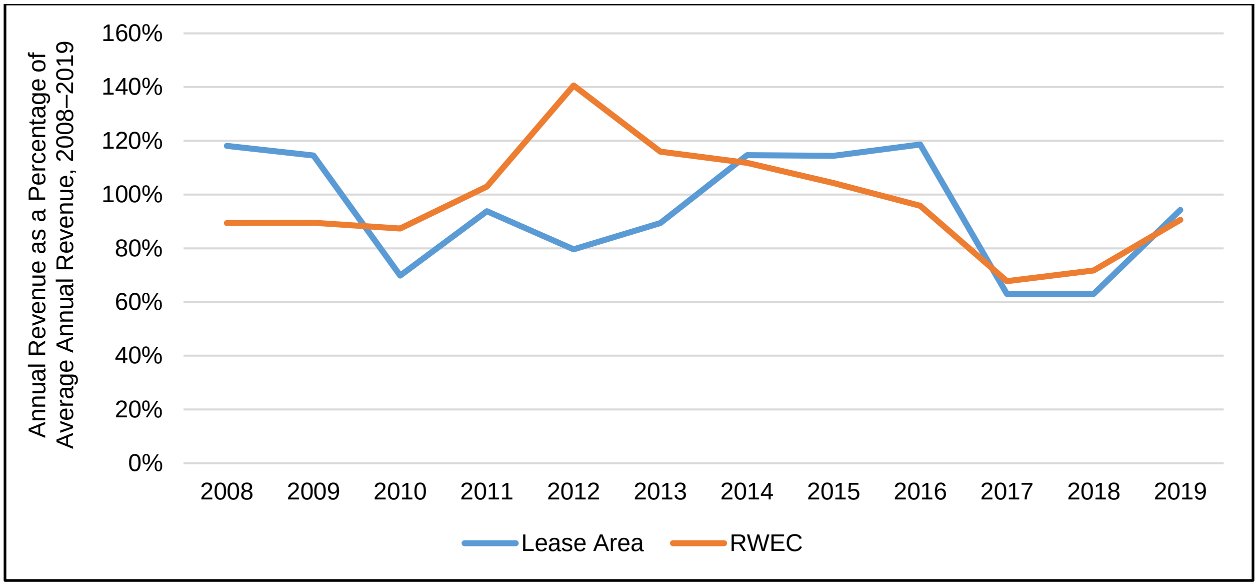
‡ Revenues by Port State include all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

A large portion of the RWEC corridor would be located in Rhode Island state waters. As discussed above, the landings of fishing vessels with only state permits are not included in the federal VTR dataset. In addition, state VTR data are unavailable for fishing activity occurring specifically in the portion of the proposed RWEC corridor located in state waters. However, state VTR data are available for Rhode Island –only permitted vessels that fished in Greater Atlantic Region Statistical Area 539, which is the statistical area most relevant to the RWEC (Figure 3.9-2). Tables summarizing the landings of these vessels from 2009 through 2018 are shown in Appendix G, Tables G-CF3 through G-CF5. Landings are reported by species, gear type, and port of landing.

As shown in Table G-CF3, from 2009 to 2018, commercial fishermen permitted to fish in Rhode Island state waters landed many different species in Statistical Area 539, including in order of highest average annual landings by weight, scup (*Stenotomus chrysops*) (781,887 pounds), channeled whelk (*Busycotypus canaliculatus*) (355,805 pounds), summer flounder (223,629 pounds), menhaden (*Brevoortia tyrannus*) (200,245 pounds), skates (120,571 pounds), and striped bass (*Morone saxatilis*) (119,233 pounds). Top gear type categories by landings were pots and traps (746,812 pounds), other fixed nets (432,516 pounds), hook and line (388,116 pounds), and otter trawls (259,353 pounds) (see Table G-CF4). The top ports where fishermen landed their catch from fishing in Rhode Island state waters in Statistical Area 539 were Point Judith, Little Compton, Newport, Bristol, and North Kingstown (see Table G-CF5). Point Judith was the port with the highest average annual landings (672,982 pounds) in Statistical Area 539 and the largest number of fishing permits making landings in the area (459 permits).

Figure 3.9-7 summarizes the inter-annual variability of revenues within the Lease Area and the RWEC. Annual revenue in the Lease Area varies between 119% and 63% of the average from 2008 to 2019. Annual revenue within the RWEC varies between 141% and 68% of the average.




Source: Developed using data from NMFS (2022b).

**Figure 3.9-7. Interannual variability of commercial fishing revenue of federally permitted vessels in the Lease Area and along the Revolution Wind Export Cable, 2008–2019.**

### 3.9.1.2 For-Hire Recreational Fishing

For-hire recreational fishing boats are operated by licensed captains for businesses that sell recreational fishing trips to anglers. These boats include both party (head) boats, which are defined as boats on which fishing space and privileges are provided for a fee, and charter boats, defined as boats operating under charter for a price, time, etc., and the participants are part of a preformed group of anglers (NMFS 2021e).

The following analysis focuses on for-hire recreational fishing activity in the Lease Area. The primary source of party and charter boat catch and effort data in the area was VTR data provided by NMFS (2023d).[26] To understand the relative importance of the Lease Area to federally permitted party and charter boats the analysis compares the vessel trips, and angler trips reported in the Lease Area to the total for-hire recreational fishing catch and effort across the Mid-Atlantic and New England Regions. In addition, to provide a more localized geographical context, the analysis describes the for-hire recreational fishing activity occurring in and around the RI/MA WEA. This description includes a discussion of the area of high value fisheries that was excluded by BOEM from possible leasing for wind energy development in order to reduce conflict with both commercial and recreational fishing activities.

As with the commercial fisheries analysis, the analysis for for-hire recreational fishing predominantly uses fisheries data for the 2008–2019 period.

#### 3.9.1.2.1 Regional Fisheries Area

A comprehensive list of species that are targeted by for-hire boats within the study area of the *Rhode Island Ocean Special Management Plan* was developed through an iterative process using catch data and correspondence with recreational charter boat captains (RI CRMC 2010). This study area encompasses a

[26] NMFS requires all federally permitted party and charter boats to submit a VTR for every fishing trip (50 CFR 648.7).

broad region in and around the RI/MA WEA, including portions of Block Island Sound, Rhode Island Sound, and the Atlantic Ocean. As shown in Table 3.9-17, for-hire boats target a wide range of pelagic and demersal species.

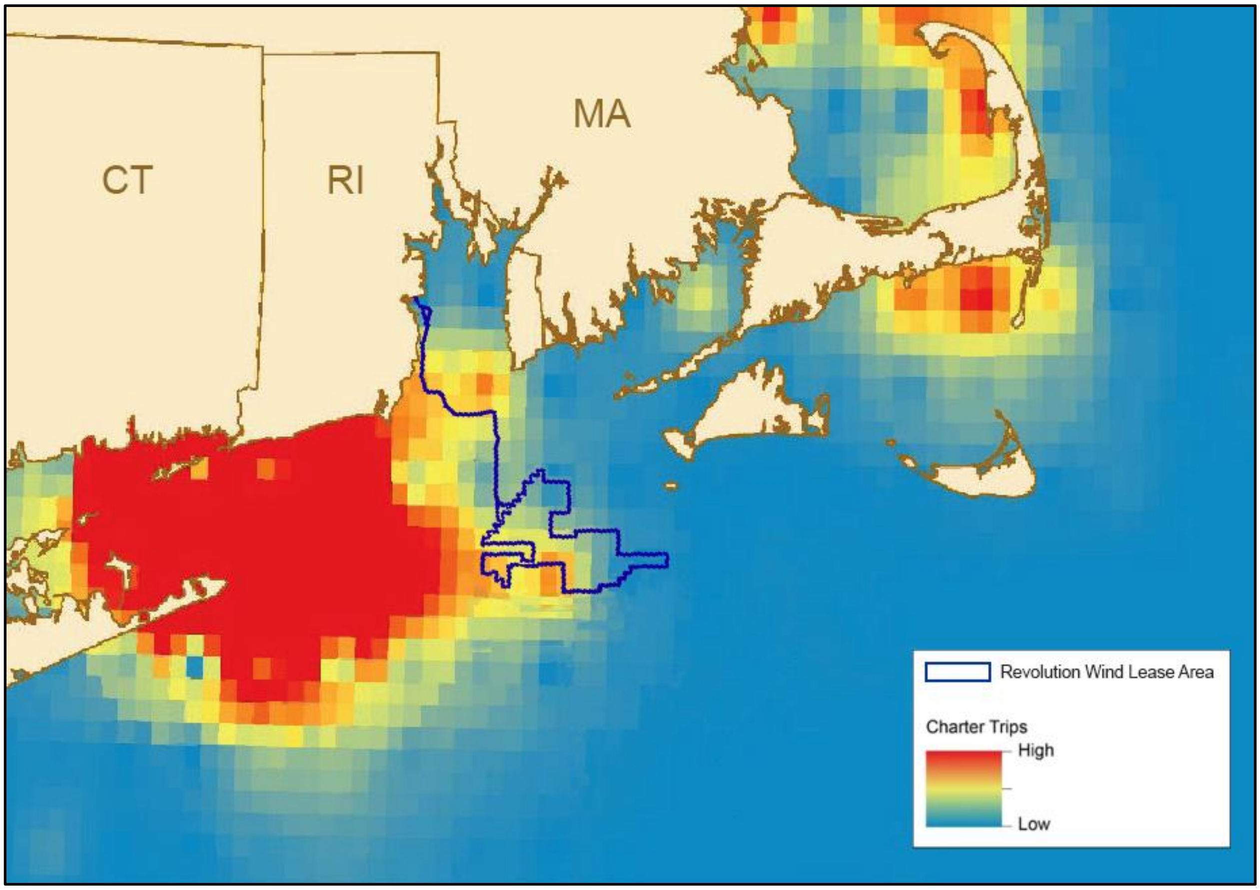
**Table 3.9-17. Species Targeted by For-Hire Recreational Fishing Boats in the Rhode Island Ocean Special Management Plan Area**

| | | | |
|---|---|---|---|
| Atlantic bonito | Bluefin tuna | Scup | Tautog |
| Atlantic cod | Bluefish | Shortfin mako | Thresher shark |
| Black sea bass | False albacore | Striped bass | Winter flounder |
| Blue shark | Pollock | Summer flounder | Yellowfin tuna |

Source: RI CRMC (2010).

Recreational fishing in the region occurs year-round but is most intensive from April through November (Tetra Tech 2016). Early in spring, most of the Rhode Island–based party and charter boats target the migratory stocks of the Mid-Atlantic and New England regions such as striped bass, summer flounder, and black sea bass (*Centropristis striata*). During late spring, party and charter boats almost exclusively target cod, with most of the cod fishing occurring on Cox Ledge and south of Block Island (RI CRMC 2010). Cod fishing on Cox Ledge is also popular in the summer as the water warms and cod start to congregate on the ledge (Plaia 2009). However, most summer recreational fishing is focused on striped bass and bluefish, with some boats targeting summer flounder closer to shore. Later in the summer, some of the boats move farther offshore to target sharks, which are generally caught anywhere from 20 to 50 miles offshore. Sharks targeted include blue, mako, and thresher sharks, with most shark fishing being catch and release. Some tuna fishing also takes place in an area east of Block Island and northwest of Cox Ledge known as the Mud Hole or Deep Hole. Starting in September, much of the fishing switches to sea bass and scup around Block Island or to striped bass closer to shore (RI CRMC 2010). Many recreational fishermen participate in organized sportfishing tournaments during the year. For example, the Rhode Island Saltwater Anglers Association sponsors 15 tournaments per year and a “Yearlong Tournament” targeting the majority of recreational species in the *Rhode Island Ocean Special Management Plan Area* (RI CRMC 2010).

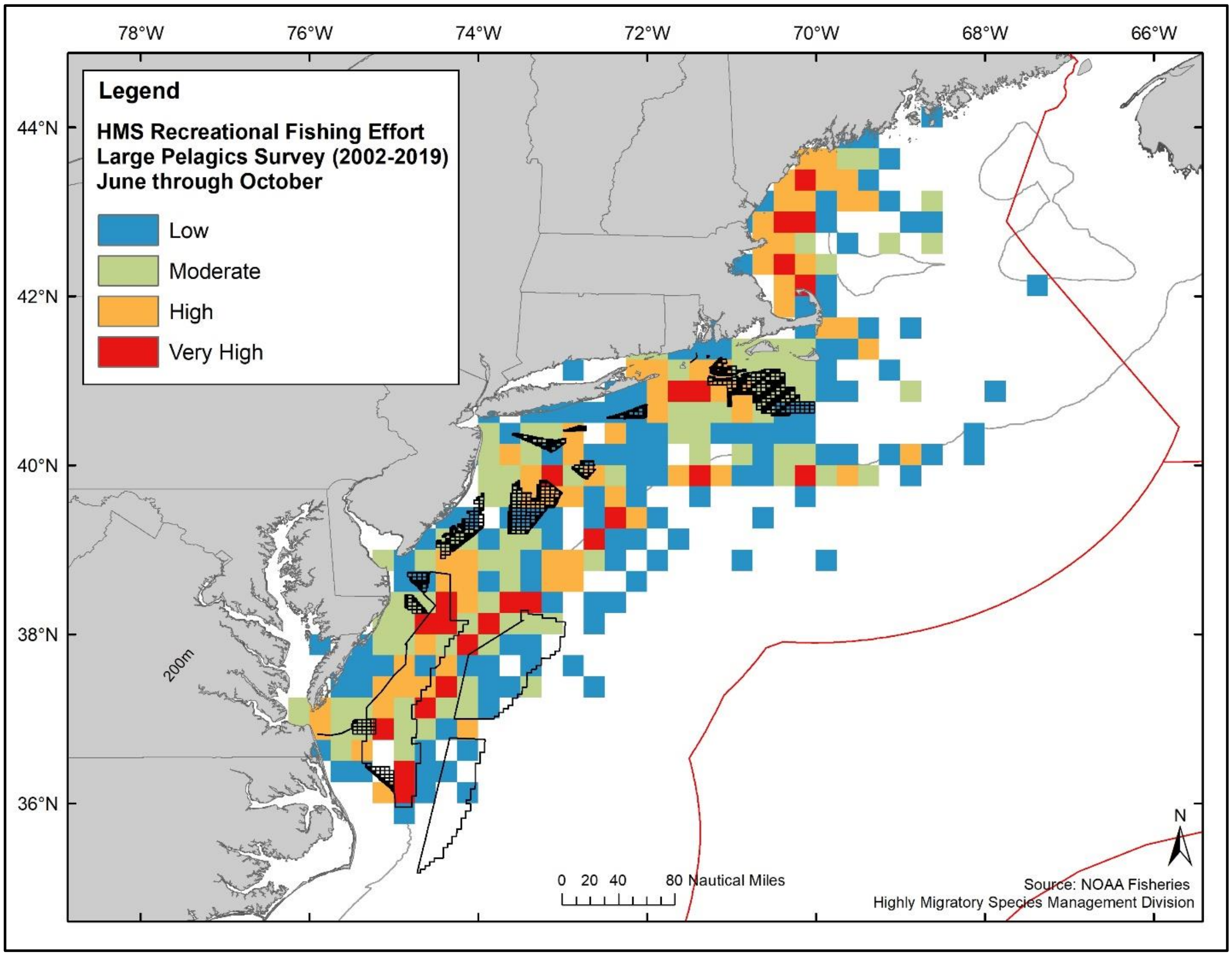
As shown in Figure 3.9-8, which presents spatial data indicating the relative intensity of charter fishing activity, the number of charter fishing trips is fairly low in the RI/MA WEA and along the proposed RWEC corridor.




Source: Adapted from BOEM (2019).

**Figure 3.9-8. Distribution of vessel trip report data for charter vessels (2001–2010).**

However, the for-hire recreational fishing effort for some targeted species is fairly high in and around the RI/MA WEA. For example, Figure 3.9 9 shows a considerable level of effort for highly migratory species, including tuna and sharks, near the area based on for-hire recreational vessel logbook data from 2002 through 2019.




Source: NMFS (2023e)

**Figure 3.9-9. Distribution of highly migratory species recreational fishing effort (2002–2019).**

Most for-hire boats fishing near the RI/MA WEA are based in Rhode Island. However, party and charter boats from New York, Connecticut, and Massachusetts also regularly fish in or near the RI/MA WEA. For-hire recreational fishing is an integral part of each of these states' coastal tourism industries. From 2007 to 2012, annual for-hire boat revenue averaged $15.6 million in Rhode Island, $86.2 million in New York, $14.5 million in Connecticut, and $62.4 million in Massachusetts. However, of the 16,569 average annual for-hire boat trips that left from ports in the four states each year from 2007 to 2012, only 0.9% occurred in or near the RI/MA WEA (Kirkpatrick et al. 2017).

The 70 square miles of Cox Ledge excluded from the RI/MA WEA is important to for-hire recreational fishing and commercial fisheries. Table 3.9-18 presents data on party/charter recreational fishing reported on Cox Ledge during various time periods. The data suggest that a small number of for-hire recreational fishing businesses fish relatively intensively on Cox Ledge, with each individual business generating on the order of $9,400 per year in the area. The revenue reported on Cox Ledge is consistently high across all time periods studied (NEFMC and NMFS 2016).

**Table 3.9-18. For-Hire Recreational Fishing Activity on the Portion of Cox Ledge Excluded from Wind Energy Development by Time Period**

| Time Period | Average Annual Revenue | Average Revenue Per Trip | Average Annual Number of Permit Holders | Average Annual Number of Anglers |
|---|---|---|---|---|
| 2006–2014 | $95,911 | $2,385 | 10 | 887 |
| 2010–2014 | $88,928 | $2,257 | 9 | 816 |
| 2012–2014 | $64,696 | $2,521 | 6 | 587 |

Source: NEFMC and NMFS (2016).

#### 3.9.1.2.2 Lease Area

Table 3.9-19 lists the top nine species most frequently kept on party/charter boat trips in the Lease Area from 2008 through 2019.

**Table 3.9-19. For-Hire Recreational Fishing Landings in the Lease Area by Species (2008–2019 average)**

| Species | Average Annual Number of Fish | Average Annual Number of Fish as a Percentage of Total Fish Landed in the Lease Area |
|---|---|---|
| Black sea bass | 129 | 5.8% |
| Bluefish | 368 | 16.5% |
| Cod | 26 | 1.2% |
| Cunner | 962 | 43.2% |
| Dogfish spiny | 37 | 1.7% |
| Red hake | 8 | 0.3% |
| Scup | 1 | 0.0% |
| Striped bass | 586 | 26.3% |
| Summer flounder | 1 | 0.1% |
| All others | 109 | 4.9% |
| **Total** | **2,226** | **100.0%** |

Source: NMFS (2023d).

Notes: Trips with no VTR are not reflected in this table. Many Atlantic-permitted vessels for highly migratory species do not have a VTR requirement (NMFS 2023d). Therefore, this table may not accurately report highly migratory species landings in the Lease Area.

The category “All Others” refers to species with less than three permits impacted to protect data confidentiality.

From 2009 to 2019, an average of five for-hire recreational fishing operations fished in the Lease Area each year. All of these fishing operations are small businesses. as defined by the Small Business Administration (NMFS 2023d). To understand the relative importance of the Lease Area to for-hire recreational fishing in the Mid-Atlantic and New England Regions as a whole, Table 3.9-20 compares the vessel trips and angler trips reported in the Lease Area to the total for-hire recreational fishing effort in the Mid-Atlantic and New England Regions from 2008 to 2019. The Lease Area annually accounted for 0.19% or less of the total vessel trips and 2.64% or less of the total angler trips. Based on marine angler expenditure survey data, from 2008 through 2019, trips in the Lease Area annually generated an average of $43,083 (in 2019 dollars) in revenue across all for-hire fishing operations, with a low of $3,000 in 2008 and a high of $77,000 in 2014 (NMFS 2023d). This revenue amount is a small fraction of the total earned by regional for-hire fishing operations. As described above, from 2007 through 2012, annual for-hire boat revenue averaged $15.6 million in Rhode Island, $86.2 million in New York, $14.5 million in Connecticut, and $62.4 million in Massachusetts.

**Table 3.9-20. Annual For-Hire Recreational Fishing Vessel Trips and Angler Trips in the Lease Area (2008–2019)**

| Year | Average Annual Number of Vessel Trips | Average Annual Vessel Trips as a Percentage of Total Vessel Trips in the Mid-Atlantic and New England Regions | Average Annual Number of Angler Trips | Average Annual Angler Trips as a Percentage of Total Angler Trips in the Mid-Atlantic and New England Regions |
|---|---|---|---|---|
| 2008 | 5 | 0.02 | 32 | 0.77 |
| 2009 | 7 | 0.03 | 60 | 0.62 |
| 2010 | 33 | 0.10 | 429 | 1.18 |
| 2011 | 35 | 0.11 | 431 | 1.97 |
| 2012 | 33 | 0.11 | 606 | 2.07 |
| 2013 | 24 | 0.08 | 313 | 1.27 |
| 2014 | 22 | 0.08 | 689 | 1.15 |
| 2015 | 27 | 0.10 | 574 | 2.22 |
| 2016 | 33 | 0.13 | 660 | 2.05 |
| 2017 | 44 | 0.19 | 594 | 2.64 |
| 2018 | 11 | 0.05 | 97 | 1.79 |
| 2019 | 31 | 0.16 | 197 | 1.24 |

Source: NMFS (2023d).

Notes: The term "vessel trips" refers to the number of party/charter VTRs submitted to NMFS where landings of any species were recorded; the term "angler trips" refers to the number of reported passengers on party/charter VTRs.

Data provided in NMFS (2023d) were used to analyze differences in the economic importance of fishing grounds in the Lease Area across for-hire recreational fishing operations. These data summarize the percentage of each federally permitted party/charter vessel's total angler trips coming from within Lease area. The vessel-level angler trip percentages were divided into quartiles, which were created by ordering the data from the lowest to highest percentage and then dividing the data into four groups of equal size. The first quartile represents the lowest 25% of ranked percentages, whereas the fourth quartile represents the highest 25%. In addition, the data provided in NMFS (2023d) reported the number of "outlier" vessels in the distribution of percentage of angler trips. In the context of this analysis, an outlier is a vessel that had an exceptionally high proportion of its annual angler tips coming from the Lease Area in comparison to other vessels that fished in the area.

From 2008 through 2021, the vessel ranked as the seventy-fifth percentile vessel (i.e., the vessel in the third quartile with the greatest dependence on the Lease Area over the 14-year period) had 5% of its total angler trips coming from the Lease Area (NMFS 2023d). Of the outliers, the vessel with the greatest dependence on the Lease Area had 42% of its total angler trips coming from the area in 2017. In short, some vessels depended heavily on the Lease Area, but most vessels derived a small percentage of their total annual revenue from the area.

Table 3.9-21 shows the annual vessel trips and angler trips reported in the Lease Area by port of departure. For-hire recreational vessels based in Point Judith and Montauk were the most dependent on the Lease Area. From 2008 through 2019, Point Judith accounted for 49% of the vessel trips in the Lease Area and 62% of the angler trips; Montauk accounted for 31% of the vessel trips in the Lease Area and 31% of the angler trips.

**Table 3.9-21. Annual For-Hire Recreational Fishing Vessel Trips and Angler Trips in the Lease Area by Port (2008–2019)**

| Year | Trip Type | Point Judith, Rhode Island | Other Rhode Island Ports* | Montauk, New York | Other New York Ports* | All Massachusetts Ports | All Connecticut Ports | Total |
|---|---|---|---|---|---|---|---|---|
| 2008 | Vessel trips | 4 | 1 | 0 | 0 | 0 | 0 | **5** |
| | Angler trips | 28 | 4 | 0 | 0 | 0 | 0 | **32** |
| 2009 | Vessel trips | 5 | 2 | 0 | 0 | 0 | 0 | **7** |
| | Angler trips | 52 | 8 | 0 | 0 | 0 | 0 | **60** |
| 2010 | Vessel trips | 14 | 0 | 17 | 1 | 0 | 1 | **33** |
| | Angler trips | 172 | 0 | 242 | 3 | 0 | 12 | **429** |
| 2011 | Vessel trips | 16 | 1 | 18 | 0 | 0 | 0 | **35** |
| | Angler trips | 314 | 11 | 106 | 0 | 0 | 0 | **431** |
| 2012 | Vessel trips | 19 | 1 | 11 | 0 | 1 | 1 | **33** |
| | Angler trips | 378 | 3 | 218 | 0 | 1 | 6 | **606** |
| 2013 | Vessel trips | 15 | 2 | 0 | 6 | 1 | 0 | **24** |
| | Angler trips | 237 | 11 | 0 | 62 | 3 | 0 | **313** |
| 2014 | Vessel trips | 17 | 0 | 5 | 0 | 0 | 0 | **22** |
| | Angler trips | 457 | 0 | 232 | 0 | 0 | 0 | **689** |
| 2015 | Vessel trips | 10 | 3 | 11 | 1 | 2 | 0 | **27** |
| | Angler trips | 265 | 8 | 292 | 4 | 5 | 0 | **574** |
| 2016 | Vessel trips | 25 | 0 | 5 | 0 | 3 | 0 | **33** |
| | Angler trips | 539 | 0 | 103 | 0 | 18 | 0 | **660** |
| 2017 | Vessel trips | 14 | 0 | 29 | 0 | 1 | 0 | **44** |
| | Angler trips | 351 | 0 | 241 | 0 | 2 | 0 | **594** |

| Year | Trip Type | Point Judith, Rhode Island | Other Rhode Island Ports* | Montauk, New York | Other New York Ports* | All Massachusetts Ports | All Connecticut Ports | Total |
|---|---|---|---|---|---|---|---|---|
| 2018 | Vessel trips | 6 | 0 | 0 | 2 | 3 | 0 | **11** |
| | Angler trips | 78 | 0 | 0 | 10 | 9 | 0 | **97** |
| 2019 | Vessel trips | 4 | 0 | 0 | 0 | 27 | 0 | **31** |
| | Angler trips | 38 | 0 | 0 | 0 | 159 | 0 | **197** |
| **Average 2008–2019** | **Vessel trips** | **149** | **10** | **96** | **10** | **38** | **2** | **305** |
| | **Angler trips** | **2,909** | **45** | **1,434** | **79** | **197** | **18** | **4,682** |

Source: NMFS (2023b).

Notes: The term "vessel trips" refers to the number of party/charter VTRs submitted to NMFS where landings of any species were recorded; the term "angler trips" refers to the number of reported passengers on party/charter VTRs.

* "Other Rhode Island Ports" and "Other New York Ports" refer to ports with less than three permits to protect data confidentiality.

## 3.9.2 Environmental Consequences

### 3.9.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The proposed PDE parameters (see Appendix D) in Table 3.9-22 would influence the magnitude of the impacts on commercial fisheries and for-hire recreational fishing.

**Table 3.9-22. Project Design Envelope Parameters That Could Reduce Impacts**

| Parameter | Influence |
|---|---|
| The number, size, and location/orientation of WTGs | Reducing the number and size of the WTGs and changing their location/orientation could increase access to fishing grounds, reduce allisions, and reduce impacts on targeted species. |
| Total length and route of IACs and offshore export cables, including ability to reach target burial depths | Reducing the length and changing the route of IACs and offshore export cables, together with reaching target burial depths, could increase access to fishing grounds, reduce impacts on targeted species, and decrease gear loss/damage. |
| Number of simultaneous vessels, number of trips, size of vessels, and marine traffic routes to and from the Lease Area | Reducing the number of simultaneous vessels, number of trips, and size of vessels, together with changing marine traffic routes, could reduce vessel collisions and decrease use of port facilities. |
| Time of year during which construction occurs | Changing the time of year during which construction occurs could increase access to fishing grounds and reduce impacts on targeted species. |

EPMs implemented during construction, O&M, and decommissioning would decrease the potential for impacts to commercial fisheries and for-hire recreational fishing (see Table F-1 in Appendix F). These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for commercial fisheries and for-hire recreational fishing across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E1, Table E2-12.

Table 3.9-23 provides a summary of IPF findings carried forward for analysis in this section. A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations. Under all of the alternatives, the overall impact to commercial fisheries and for-hire recreational fishing from any alternative would be **moderate** adverse as mitigation would reduce adverse impacts substantially during the life of the proposed Project, including decommissioning; the affected activity or community would have to adjust somewhat to account for disruptions due to notable and measurable adverse impacts of the Project; or once the impacting agent is gone, the affected activity or community, including traditional cultural practices, is expected to return to a condition with no measurable impacts, when remedial or mitigating action is taken.

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**Table 3.9-23. Comparison of Evaluated Impact-Producing Factors under Action Alternatives for Commercial Fisheries and For-Hire Recreational Fishing**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| Accidental releases and discharges | **Offshore**: Construction and O&M activities related to offshore wind energy development that reduce water quality could have a physiological or behavioral impact on some species targeted by commercial and for-hire recreational fisheries in the GAA. For any given offshore wind energy project, the impacts of accidental releases and discharges on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term. The intensity of impacts is anticipated to be **negligible** adverse. | **Offshore**: Project construction activities that reduce water quality could have a physiological or behavioral impact on some species targeted by commercial and for-hire recreational fisheries in the GAA. In turn, these impacts could decrease target species catch rates. The impacts during Project construction, O&M, and decommissioning from Project-related accidental releases and discharges on target species catch in commercial and for-hire recreational fisheries are expected to be localized, and the intensity of impacts is anticipated to be **negligible** adverse. The effects could be short term to long term depending on the type and volume of material released.<br>The impacts of accidental releases and discharges of the Proposed Action on the target species catch of commercial and for-hire recreational fisheries would be undetectable or noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be short term to long term **negligible** to **minor** adverse. | **Offshore**: By omitting certain WTG positions, Alternatives C through F would reduce the impact of accidental releases and discharges on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing. However, the impact of accidental releases and discharges on finfish and invertebrates would be similar to that for the Proposed Action. Therefore, the impact of accidental releases and discharges to commercial fisheries and for-hire recreational fishing in the GAA would be similar to the Proposed Action: short term to long term **negligible** adverse for all design configurations analyzed.<br>For all design configurations analyzed, the accidental releases and discharges impact of Alternatives C through F on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: short term to long term **negligible** to **minor** adverse. | | | | **Offshore**: By omitting certain WTG positions, Alternative G would reduce the impact of accidental releases and discharges on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing. However, the impact of accidental releases and discharges on finfish and invertebrates would be similar to that for the Proposed Action. Therefore, the impact of accidental releases and discharges to commercial fisheries and for-hire recreational fishing in the GAA would be similar to the Proposed Action: short term to long term **negligible** adverse for all design configurations analyzed.<br>The accidental releases and discharges impact of Alternative G on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: short term to long term **negligible** to **minor** adverse. |
| Anchoring | **Offshore**: Anchoring vessels used in the construction of offshore wind energy projects could pose a navigational hazard to commercial and for-hire recreational fishing vessels in the GAA. All impacts would be localized (within a few hundred yards of anchored vessel) and temporary (hours to days). Therefore, the effects of offshore wind energy-related anchoring on commercial fisheries and for-hire recreational fishing are expected to be short term **negligible** to **moderate** adverse. | **Offshore**: Anchoring vessels used in the construction of the Project could pose a navigational hazard to commercial and for-hire recreational fishing vessels in the GAA. All anchoring impacts would be localized (within a few hundred yards of an anchored vessel) and temporary (hours to days). Therefore, the adverse effects of Project-related anchoring on commercial fisheries and for-hire recreational fishing are expected to be short term **negligible** to **minor**.<br>Although anchoring impacts would occur primarily during Project construction, some impacts could occur during O&M. Therefore, the adverse effects of Project-related anchoring on commercial fisheries and for-hire recreational fishing are expected to be short term **negligible** to **minor**. Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction. | **Offshore**: The anchoring impact on navigation and vessel traffic under Alternatives C through F would be similar to the Proposed Action. Therefore, the impact of anchoring to commercial fisheries and for-hire recreational fishing in the GAA would be similar to that of the Proposed Action: short term **negligible** to **minor** adverse for all design configurations analyzed.<br>For all design configurations analyzed, the anchoring impact of Alternatives C through F on navigation and vessel traffic would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: short term **negligible** to **moderate** adverse. | | | | **Offshore**: The anchoring impact on navigation and vessel traffic under Alternative G would be similar to the Proposed Action. Therefore, the impact of anchoring to commercial fisheries and for-hire recreational fishing in the GAA would be similar to that of the Proposed Action: short term **negligible** to **minor** adverse for all design configurations analyzed.<br>The anchoring impact of Alternative G on navigation and vessel traffic would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: short term **negligible** to **moderate** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | | Impacts from anchoring due to present and future military, survey, commercial, and recreational activities, including the Proposed Action, could pose a navigational hazard to commercial and for-hire recreational fishing vessels in the GAA. The anchoring impacts of the Proposed Action on commercial and for-hire recreational fisheries would be undetectable or noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be short term **negligible** to **moderate** adverse. | | | | | |
| Climate change | **Offshore**: Impacts on commercial fisheries and for-hire recreational fishing in the GAA are expected to result from climate change trends such as increased magnitude or frequency of storms, shoreline changes, ocean acidification, and water temperature changes. The intensity of impacts from climate change trends to commercial fisheries and for-hire recreational fishing is anticipated to qualify as **minor** to **major** adverse for those fishing operations targeting species adversely affected by climate change trends, and the beneficial impacts are anticipated to qualify as **minor** to **major** for those fishing operations targeting species beneficially affected by climate change trends.<br>As they become operational, future offshore wind facilities would produce fewer GHG emissions than fossil fuel–powered generating facilities with similar capacities. However, given the global scale of GHG emissions, the benefits would be **negligible**. | **Offshore**: The types of impacts from global climate change trends to commercial fisheries and for-hire recreational fishing described for the No Action Alternative would occur under the Proposed Action. These impacts are expected to be long term **minor** to **major** adverse for those fishing operations targeting species adversely affected by climate change trends, and **minor** to **major** beneficial for those fishing operations targeting species beneficially affected by climate change trends.<br>As they become operational, future offshore wind facilities, including the Proposed Action, would produce fewer GHG emissions than fossil fuel–powered generating facilities with similar capacities. However, given the global scale of GHG emissions, the benefits would be **negligible**. | **Offshore**: The impact of climate change trends under Alternatives C through F due to a change in GHG emissions would be similar to the Proposed Action: for all design configurations analyzed, long term **minor** to **major** adverse for fishing operations targeting species adversely affected by climate change trends, and **minor** to **major** beneficial for fishing operations targeting species beneficially affected by climate change trends.<br>For all design configurations analyzed, the impact of Alternatives C through F on GHG emissions would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **negligible** beneficial. | | | | **Offshore**: The impact of climate change trends under Alternative G due to a change in GHG emissions would be similar to the Proposed Action: for all design configurations analyzed, long term **minor** to **major** adverse for fishing operations targeting species adversely affected by climate change trends, and **minor** to **major** beneficial for fishing operations targeting species beneficially affected by climate change trends.<br>The impact of Alternative G on GHG emissions would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **negligible** beneficial. |
| Light | **Offshore**: Construction and O&M activities related to offshore wind energy development that introduce artificial lighting could result in behavioral responses from some target species. For any given offshore wind energy project, adverse lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be | **Offshore**: Project construction, O&M, and decommissioning activities that introduce artificial lighting could result in behavioral responses from some target species. Project EPMs include construction vessel light shielding and operational restrictions to limit light use to required periods and minimize artificial lighting effects on the environment. Project-related lighting impacts on target species catch in commercial and for-hire | **Offshore**: By omitting certain WTG positions, Alternatives C through F would reduce the impact of lighting on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing. However, the impact of lighting on finfish and invertebrates would be similar to that for the Proposed Action. Therefore, the impact of lighting on commercial fisheries and for-hire recreational fishing in the GAA would be similar to that for the Proposed Action: long term **negligible** to **minor** adverse for all design configurations analyzed.<br>For all design configurations analyzed, the lighting impact of Alternatives C through F on finfish and invertebrate resources important to commercial fisheries and for-hire | | | | **Offshore**: By omitting certain WTG positions, Alternative G would reduce the impact of lighting on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing. However, the impact of lighting on finfish and invertebrates would be similar to that for the Proposed Action. Therefore, the impact of lighting on commercial fisheries and for-hire recreational |

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| | localized and long term. The intensity of impacts is anticipated to be **minor** to **moderate** adverse. | recreational fisheries are expected to be localized and long term. The intensity of impacts resulting from lighting are anticipated to be **negligible** to **minor** adverse.<br>The adverse lighting impacts from ongoing and future offshore activities, including the Proposed Action, on the target species catch of commercial and for-hire recreational fisheries are expected to be localized and short term. The light impacts of the Proposed Action on commercial and for-hire recreational fisheries would be undetectable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be long term **minor** to **moderate** adverse. | recreational fishing would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **negligible** to **minor** adverse. | | | | fishing in the GAA would be similar to that for the Proposed Action: long term **negligible** to **minor** adverse for all design configurations analyzed.<br>The lighting impact of Alternative G on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **negligible** to **minor** adverse. |
| New cable emplacement/maintenance and EMF | **Offshore**: Approximately 11,816 miles of offshore export and IACs could be installed along the U.S. East Coast to support future offshore wind energy projects. To the fullest extent possible, future offshore wind energy projects would reduce the occurrence of accidental snagging of fishing gear by burying all cables beneath the seafloor. Therefore, the impact of buried submarine cables to commercial fisheries and for-hire recreational fishing through entanglement or gear loss or damage is expected to be long term **moderate** adverse. The impacts of EMF generated by submarine cables on commercial fisheries and for-hire recreational fishing are also expected to be long term but **negligible** to **minor** adverse. | **Offshore**: The installation of the offshore export and IACs could temporarily restrict vessel movement and thus transit and harvesting activities in the Lease Area and along the RWEC. To the fullest extent possible, Revolution Wind would reduce the occurrence of accidental snagging of fishing gear by burying all cables beneath the seafloor. The impact of submarine cables to commercial fisheries and for-hire recreational fishing through entanglement or gear loss/damage is expected to be long term **negligible** to **minor** adverse where cable burial can occur and long term **moderate** adverse where cable burial cannot occur.<br>EMF levels, which are calculated using conservative assumptions likely to overestimate results, indicate that the magnetic-field and induced electric field produced by the Project cables would be below the detection thresholds for magnetosensitive and electrosensitive marine organisms. Consequently, EMF from Project cables are expected to have long term **negligible** to **minor** adverse impacts on commercial fisheries and for-hire recreational fishing.<br>The cable emplacement/maintenance and EMF impacts of the Proposed Action on commercial and for-hire recreational fisheries would be undetectable or noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impact of submarine cables to commercial fisheries and for-hire | **Offshore**: If the number of IACs is reduced under Alternatives C through F, the adverse impact of new cable emplacement on commercial and for-hire recreational fisheries would be diminished during Project construction and O&M. In comparison to the Proposed Action, fishing access would be improved and the risk of fishing gear loss/damage would be reduced. However, the impact of new cable emplacement and maintenance on commercial fisheries and for-hire recreational fishing in the GAA would be similar to that for the Proposed Action: long term **negligible** to **minor** adverse where cable burial can occur and long term **moderate** adverse where cable burial cannot occur.<br>Reducing the number of IACs would also decrease the potential adverse impacts of EMF generated by submarine cables on fish and invertebrates targeted by commercial and for-hire recreational fisheries. However, the impact of EMF on commercial fisheries and for-hire recreational fishing would be similar to that for the Proposed Action: long term **negligible** to **minor** adverse for all design configurations analyzed.<br>For all design configurations analyzed, the new cable emplacement and maintenance and EMF impact of Alternatives C through F would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action for all design configurations: long term **negligible** to **minor** adverse for EFH, long term **negligible** to **minor** adverse for cable installation where cable burial can occur; long term **moderate** adverse for cable installation where cable burial cannot occur. | | | | **Offshore**: If the number of IACs is reduced under Alternative G, the adverse impact of new cable emplacement on commercial and for-hire recreational fisheries would be diminished during Project construction and O&M. In comparison to the Proposed Action, fishing access would be improved and the risk of fishing gear loss/damage would be reduced. However, the impact of new cable emplacement and maintenance on commercial fisheries and for-hire recreational fishing in the GAA would be similar to that for the Proposed Action: long term **negligible** to **minor** adverse where cable burial can occur and long term **moderate** adverse where cable burial cannot occur.<br>Reducing the number of IACs would also decrease the potential adverse impacts of EMF generated by submarine cables on fish and invertebrates targeted by commercial and for-hire recreational fisheries. However, the impact of EMF on commercial fisheries and for-hire recreational fishing would be similar to that for the Proposed Action: long term **negligible** to **minor** adverse for all design configurations analyzed.<br>The new cable emplacement and maintenance and EMF impact of Alternative G would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational |

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| | | recreational fishing through entanglement or gear loss/damage is expected to be long term **moderate** adverse and the impacts of EMF on commercial fisheries and for-hire recreational fishing are expected to be long term **negligible** to **minor** adverse. | | | | | fishing in the GAA would be similar to those under the Proposed Action for all design configurations: long term **negligible** to **minor** adverse for EFH, long term **negligible** to **minor** adverse for cable installation where cable burial can occur; long term **moderate** adverse for cable installation where cable burial cannot occur. |
| Noise | **Offshore**: Construction and O&M activities related to offshore wind energy development that increase underwater noise could result in behavioral responses from some target species, such as fish not biting at hooks or fish changing swim height. In turn, these responses could decrease the catch rates of target species, thereby reducing revenue for commercial fishing and for-hire recreational fishing businesses. Some sources of noise, such as vessels and pile driving during project construction, could cause some target species to temporarily move away from the source and disperse to other areas. These species are expected to return to the area after the noise ends. Alteration of the ambient noise environment during construction and O&M activities could also result in reduced reproductive success for some species, which could negatively impact catch levels in the fisheries targeting those species. The effects of operational underwater noise from future offshore wind energy projects would occur for the life of the projects but are not anticipated to have population-level effects on target species. For any given offshore wind energy project, all adverse noise impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term during construction and long term during O&M. The intensity of impacts is anticipated to be **moderate** adverse. | **Offshore**: Project construction and O&M activities that increase underwater noise could cause behavioral responses from some marine target species or could result in reduced reproductive success for some species. These impacts, in turn, could negatively impact catch levels in the fisheries targeting those species. EPMs, together with an acoustic monitoring plan, are expected to reduce impacts to target species. Therefore, Project-related noise is expected to have a short-term **moderate** adverse impact on the target species catch of commercial fisheries and for-hire recreational fishing during construction, and a long-term **moderate** adverse impact during O&M. Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction.<br>For any given activity, all adverse cumulative noise impacts on the target species catch of commercial and for-hire recreational fisheries are expected to be localized. The noise impacts of the Proposed Action on commercial and for-hire recreational fishing would be undetectable or noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be long term **moderate** adverse. | **Offshore**: By omitting certain WTG positions, Alternatives C through F would reduce the impact of noise on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing. However, the impact of noise on finfish and invertebrates would be similar to that for the Proposed Action. Therefore, for all design configurations analyzed, the impact of noise to commercial fisheries and for-hire recreational fishing in the GAA would be similar to that for the Proposed Action: short term **moderate** adverse during construction and decommissioning and long term **moderate** adverse during O&M.<br>For all design configurations analyzed, the noise impact of Alternatives C through F on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **moderate** adverse. | | | | **Offshore**: By omitting certain WTG positions, Alternative G would reduce the impact of noise on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing. However, the impact of noise on finfish and invertebrates would be similar to the Proposed Action. Therefore, for all design configurations analyzed, the impact of noise to commercial fisheries and for-hire recreational fishing in the GAA would be similar to the Proposed Action: short term **moderate** adverse during construction and decommissioning and long term **moderate** adverse during O&M.<br>The noise impact of Alternative G on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing would be similar to the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to the Proposed Action: long term **moderate** adverse. |
| Port utilization | **Onshore**: Offshore wind energy projects would require vessels for staging and | **Onshore**: Several port facilities located in New York, Rhode Island, Massachusetts, and | **Onshore**: Construction and O&M of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts to commercial | | | | **Onshore**: Construction and O&M of onshore facilities under Alternative G would not be |

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| | installation during construction and for routine maintenance during operations. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels and for-hire recreational fishing vessels. The use of multiple ports to support offshore wind energy project development would reduce the related congestion impacts in any one port. Therefore, port utilization impacts to commercial fisheries and for-hire recreational fishing are expected to be localized long term **minor** to **moderate** adverse. | Connecticut are considered for offshore Project construction, staging, and fabrication as well as crew transfer and logistics support. Although final port selection has not been determined at this time, the list of affected commercial ports could include ports used by commercial fishing vessels and for-hire recreational fishing vessels. Vessels for staging and installation during construction would add traffic to port facilities. The additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels and for-hire recreational fishing vessels. As a result, the adverse impact on commercial fisheries and for-hire recreational fishing would be short term **minor** to **moderate**.<br><br>During Project O&M, port facilities would be required for vessels used for routine maintenance of offshore Project components. These vessels would require berthing and would add traffic to port facilities. Given the low number of vessels required for Project O&M, the adverse impacts on the accessibility of port facilities by commercial fishing vessels and for-hire recreational fishing vessels would be long term **minor**. Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction.<br><br>The major ports in the GAA are anticipated to continue to have increasing vessel visits, and vessel size is also expected to increase. Future offshore wind energy projects, including the Project, would contribute to the increase in vessel traffic. The port utilization impacts of the Proposed Action on commercial and for-hire recreational fisheries would be noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be long term **minor** to **moderate** adverse. | fisheries and for-hire recreational fishing in the GAA would be the same as those described for the Proposed Action: short term **minor** to **moderate** adverse during construction, and long term **minor** adverse during operations for all design configurations analyzed.<br><br>For all design configurations analyzed, the port utilization impact of Alternatives C through F to commercial fisheries and for-hire recreational fishing would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **minor** to **moderate** adverse. | | | | markedly different from the Proposed Action; therefore, impacts to commercial fisheries and for-hire recreational fishing in the GAA would be the same as the Proposed Action: short term **minor** to **moderate** adverse during construction, and long term **minor** adverse during operations for all design configurations analyzed.<br><br>The port utilization impact of Alternative G to commercial fisheries and for-hire recreational fishing would be similar to the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to the Proposed Action: long term **minor** to **moderate** adverse. |
| Presence of structures | **Offshore**: The presence of structures can lead to impacts on commercial fisheries and for-hire recreational fishing through reduced catch levels of target species; increased space-use conflicts that may result in navigation hazards, allisions, and | **Offshore**: The installation of offshore Project components, including the WTGs and export cables, could temporarily restrict vessel movement and thus transit and harvesting activities in the Lease Area and along the RWEC. To safeguard mariners from the hazards associated with | **Offshore**: See Section 3.9.2.4 for the detailed analysis. In general, the impacts on commercial fisheries from the presence of structures would be the same or similar to the Proposed Action. However, by omitting certain WTG positions, Alternatives C through E would reduce the estimated annual revenue at risk across all FMP and non-FMP fisheries in the Lease Area and along the RWEC during construction, and the estimated annual exposed revenue for all FMP and non-FMP fisheries as a percentage of total revenue in the | | | | **Offshore**: See Section 3.9.2.5 for the detailed analysis. In general, the presence of structures impacts on commercial fisheries would be the same or similar to the Proposed Action. However, by omitting certain WTG positions, Alternative G would reduce the estimated |

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| | gear loss/damage; and interference with NMFS's ongoing scientific research and protected species surveys.<br>During construction of offshore wind energy projects, temporary or permanent habitat alterations could occur, but the impact of these alterations on invertebrate and fish populations would be **negligible** to **minor** adverse. Therefore, the adverse impacts to fisheries that target affected species would be short term or long term **negligible** to **minor**. Construction activities could overlap with the spawning habitat and/or spawning season of a number of target species, leading to potential short-term **negligible** to **moderate** adverse impacts to the productivity and recruitment success of these species. Therefore, the adverse impact to fisheries that target these species is expected to be short term **negligible** to **moderate** adverse. Once offshore components are installed, the presence of the WTG and OSS foundations and associated scour protection would reduce the habitat for some target species and increase the habitat for others. Overall, localized adverse or beneficial impacts on target species populations from habitat alteration would have a long-term **negligible** to **moderate** effect on the target species catch of commercial and for-hire recreational fisheries.<br>With respect to impacts related to increased space-use conflicts, fishing revenue would be foregone if these conflicts cause fishing vessel operators to no longer fish in affected areas, and they cannot capture that revenue in different locations. The annual commercial fishing revenue exposed at the end of the project development timeline for all planned offshore wind energy lease areas in the New England and Mid-Atlantic regions is estimated to be about $34.0 million. This annual exposed revenue represents 3.6% of the average annual revenue for all FMP | construction of the Project, Revolution Wind would request, and it is expected the USCG would establish, temporary safety zones around each WTG site and each cable laying vessel. Non-construction vessels would be prohibited from entering into, transiting through, mooring in, or anchoring within the safety zones while construction vessels and associated equipment are working on-site.<br>During Project construction, temporary or permanent habitat alterations could occur, but the impact of these alterations on invertebrate and fish populations would be **negligible** to **minor** adverse. Therefore, the adverse impacts to fisheries that target affected species would be short term or long term **negligible** to **minor**. Construction activities could overlap with the spawning habitat and/or spawning season of a number of target species, leading to potential short-term **negligible** to **moderate** adverse impacts to the productivity and recruitment success of these species. Therefore, the adverse impact to fisheries that target these species is expected to be short term **negligible** to **moderate** adverse. Once offshore components are installed, the presence of the WTG and OSS foundations and associated scour protection would reduce the habitat for some target species and increase the habitat for others. Overall, localized adverse or beneficial impacts on target species populations from habitat alteration would have a long-term **negligible** to **moderate** effect on the target species catch of commercial and for-hire recreational fisheries.<br>The annual revenue at risk across all FMP and non-FMP fisheries in the Lease Area and along the RWEC during Project construction and O&M is estimated to be $1.42 million. This annual exposed revenue represents 0.99% of the average annual revenue for all FMP and non-FMP fisheries in the RFA. The largest impacts in terms of exposed revenue as a percentage of total revenue in the RFA would be in the Spiny Dogfish, American Lobster, and Atlantic Herring FMP fisheries. The gear type and port most affected in terms of exposed revenue as a percentage of total revenue in the RFA would be midwater trawl and Little Compton, RI, respectively. | RFA would be lower. The annual revenue at risk across all FMP and non-FMP fisheries in the Lease Area and along the RWEC during Project construction and O&M is estimated to range from $1.06 million under Alternative E1 to $1.37 million under Alternative D2. This range of annual exposed revenue represents 0.74% to 0.95% of the average annual revenue for all FMP and non-FMP fisheries in the RFA. Under all design configurations, the largest impacts in terms of exposed revenue as a percentage of total revenue in the RFA would be in the Spiny Dogfish, American Lobster, and Atlantic Herring FMP fisheries. The gear type and port most affected in terms of exposed revenue as a percentage of total revenue in the RFA would be midwater trawl and Little Compton, RI, respectively.<br>During construction, the impact level from the presence of structures for all design configurations would be similar to the Proposed Action: short term **negligible** to **moderate** adverse for the majority of commercial fishing vessels but short term **major** adverse for a small number of vessels. During O&M, the impact level from the presence of structures for all design configurations would be similar to the Proposed Action: long term **negligible** to **moderate** adverse for the majority of commercial fishing vessels, but long term **major** adverse for a small number of vessels.<br>The Direct Compensation Program, Coastal Community Funds, and fishing gear conflict prevention and claim procedure would reduce adverse economic impacts to commercial or for-hire recreational fishing operations during Project construction and O&M. | | | | annual revenue at risk across all FMP and non-FMP fisheries in the Lease Area and along the RWEC during Project construction and O&M to $1.14 million, and the estimated annual exposed revenue for all FMP and non-FMP fisheries as a percentage of total revenue in the RFA would be 0.79%. The largest impacts in terms of exposed revenue as a percentage of total revenue in the RFA would be in the Spiny Dogfish, American Lobster, and Atlantic Herring FMP fisheries. The gear type and port most affected in terms of exposed revenue as a percentage of total revenue in the RFA would be midwater trawl and Little Compton, RI, respectively.<br>During construction, the impact level from the presence of structures for all design configurations would be similar to the Proposed Action: short term **negligible** to **moderate** adverse for the majority of commercial fishing vessels but short term **major** adverse for a small number of vessels. During O&M, the impact level from the presence of structures for all design configurations would be similar to the Proposed Action: long term **negligible** to **moderate** adverse for the majority of commercial fishing vessels, but long term **major** adverse for a small number of vessels.<br>The Direct Compensation Program, Coastal Community Funds, and fishing gear conflict prevention and claim procedure would reduce adverse economic impacts to commercial or for-hire recreational fishing operations during Project construction and O&M. |

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| | and non-FMP fisheries in the New England and Mid-Atlantic regions.<br>For those fishing vessels that derive a large percentage of their total revenue from areas where offshore wind facilities would be located, that choose to avoid these areas once the facilities become operational, and are unable to find suitable alternative fishing locations, the adverse impacts due to the presence of structures would be long term **major**. However, it is expected that most fishing vessels would only have to adjust somewhat to account for disruptions due to the presence of structures. Most derive a small percentage of their total revenue from any one lease area or would be able to relocate to other fishing locations. In addition, the impacts of offshore wind energy facilities could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect. Therefore, BOEM expects that the impacts to commercial fisheries and for-hire recreational fishing resulting from the presence of structure would be long term **negligible** to **major** adverse, depending on the fishery and fishing operation. If BOEM's and Revolution Wind's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects, adverse impacts on commercial fisheries due to the presence of structures could be reduced.<br>The offshore structures associated with offshore wind energy development could also affect commercial fisheries and for-hire recreational fishing by preventing or hampering NMFS's ongoing scientific surveys on which fishery management measures are based. If NMFS's scientific survey methodologies are not adapted to sample within wind energy facilities, there could be increased uncertainty in scientific | For those fishing vessels that derive a large percentage of their total revenue from those areas closed during Project construction and are unable to find suitable alternative fishing locations, the adverse impacts of safety zones would be temporarily **major**. However, most of the fishing vessels derive only a small percentage of their total revenue from areas where safety zones would be in effect. The impacts of safety zones on these fishing vessels are expected to be temporary **negligible** to **moderate** adverse.<br>Considering the moderate revenue at risk across ports, together with the small number of vessels that depend heavily on the Lease Area, the impacts to other fishing industry sectors during Project construction, including seafood processors and distributors and shoreside support services, are expected to be temporary **minor** to **moderate** adverse.<br>The Direct Compensation Program, Coastal Community Funds, and fishing gear conflict prevention and claim procedure are considered part of the Proposed Action and would reduce adverse economic impacts to commercial or for-hire recreational fishing operations during Project construction.<br>The Proposed Action would result in the installation of 100 WTGs and two OSSs. Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15 mile (1 nm) × 1.15 mile (1 nm) spacing that aligns with other proposed adjacent offshore wind energy projects in the RI/MA WEA. This layout has been confirmed through expert analysis to allow for safe navigation without the need for additional designated transit lanes. However, BOEM is cognizant that maneuverability within the Lease Area could vary depending on factors such as vessel size, fishing gear or method used, and/or environmental conditions.<br>The amount of fishing activity that could be affected during Project O&M is a small fraction of the amount of fishing activity in the Mid-Atlantic and New England regions as a whole. Nonetheless, for those fishing vessels that derive a large percentage of their total revenue from the Lease | | | | | |

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| | survey results, which would increase uncertainty in stock assessments and quota setting processes. This increased uncertainty, in turn, could result in more conservative catch quotas and/or more restrictive effort management measures for commercial and recreational fisheries. | Area, choose to avoid the Lease Area during Project O&M, and are unable to find suitable alternative fishing locations, the adverse impacts would be long term **major**. However, three-quarters of the vessels fishing in the Lease Area from 2008 through 2019 derived 0.88% or less of their total revenue from the area. Moreover, some fishing vessels that choose to avoid the Lease Area would likely be able to relocate to other fishing locations and continue to earn revenue. Therefore, the adverse impact of the presence of structures on the majority of vessels would be long term **negligible** to **moderate.** The impacts to other fishing industry sectors, including seafood processors and distributors and shoreside support services, would be long term **minor** to **moderate** adverse.<br>The Direct Compensation Program, Coastal Community Funds, and fishing gear conflict prevention and claim procedure are considered part of the Proposed Action and would reduce adverse economic impacts to commercial or for-hire recreational fishing operations during Project O&M.<br>Given the small footprint of the Lease Area and RWEC, any localized adverse impacts on target species populations from habitat alteration would have a **negligible** to **moderate** effect on the catch of for-hire recreational and commercial fisheries depending on the species targeted.<br>The WTG and OSS foundations and associated scour protection could also produce an artificial reef effect and attract finfish and invertebrates. Although the effects of artificial reefs on species abundance are uncertain, with respect to the Project, it is expected that the reef effect of the WTG foundations would have long-term **negligible** to **minor** beneficial impacts to for-hire recreational fishing, depending on the extent to which the foundations attract targeted species. The potential for disruption of inshore to offshore migratory patterns of important species has been identified as a topic of concern. This potential effect would have long-term **negligible** to **minor** adverse impacts to commercial fisheries and for-hire recreational fishing, depending on the extent to | | | | | |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | | which the foundations alter the migratory behaviors of targeted species.<br>Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction.<br>Under the No Action Alternative, offshore wind energy development could result in the installation of 3,088 WTG and OSS foundations through 2030. The impact of the Project would be noticeable because it would add as many as 102 foundations, which is a 3% increase. The addition of these new structures and cables in the GAA could adversely impact commercial fisheries and for-hire recreational fishing due to potential increased space-use conflicts. In the event that these fishing operations are unable to find suitable alternative fishing locations, they could experience long-term **major** adverse impacts. However, it is expected that most fishing vessels would only have to adjust somewhat to account for disruptions due to the presence of structures. In addition, the impacts of offshore wind energy facilities could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect.<br>Project construction and O&M are expected to impact NMFS's ongoing scientific research surveys or protected species surveys. Refer to Section 3.17 for this analysis.<br>Overall, BOEM expects that the cumulative impacts of the presence of structures resulting from the Project and other past, present, and reasonably foreseeable activities would be long term **moderate** to **major** adverse depending on the fishery and fishing operation. If BOEM's and Revolution Wind's recommendations related to Project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects, adverse impacts on commercial fisheries due to the presence of structures could be reduced. | | | | | |
| Vessel traffic | **Offshore**: Construction of offshore wind energy projects would require staging and installation vessels, including crew transfer, dredging, cable lay, pile driving, | **Offshore**: Construction of the Project would require port facilities for staging and installation vessels, including crew transfer, dredging, cable lay, pile driving, survey vessels, and, potentially, | **Offshore**: Under Alternatives C through F, vessel traffic would be similar to the Proposed Action. Therefore, the impact to commercial fisheries and for-hire recreational fishing in the GAA would be similar to the Proposed Action: term **moderate** adverse for construction | | | | **Offshore**: Under Alternative G, vessel traffic would be similar to the Proposed Action. Therefore, the impact to commercial fisheries and for-hire recreational fishing in the GAA |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | survey vessels, and potentially feeder lift barges and heavy lift barges. A more limited number of vessels would also be required for routine maintenance during the O&M phase. The additional vessel volume could cause vessel traffic congestion, difficulties with navigating, and an increased risk for collisions. These potential adverse impacts could cause some fishing vessel operators to change. In addition, once offshore wind energy projects are completed, some commercial fishermen could avoid the lease areas if large numbers of recreational fishermen are drawn to the areas by the prospect of higher catches. Overall, the vessel traffic effects on commercial fisheries and for-hire recreational fishing are expected to be short term **moderate** adverse during construction and long term **minor** to **moderate** adverse during O&M. | feeder lift barges and heavy lift barges. However, the Project-related increase in vessel traffic would be nominal when compared to existing vessel operations within the GAA. In addition, Revolution Wind would implement a comprehensive communication plan during offshore construction. As a result, the adverse impact on commercial fisheries and for-hire recreational fishing would be temporary and **moderate**.<br>In comparison to the construction phase, Project O&M would require a more limited number of vessels, and most of the vessels would be smaller in size, although the number of vessel transits would increase during O&M. As a result of a less compressed time period, the increased vessel transits during O&M are not expected to result in a significant increase in the overall traffic volume or patterns. In addition, once the Project is completed, some commercial fishermen could avoid the lease areas if large numbers of recreational fishermen are drawn to the area by the prospect of higher catches. Overall, the vessel traffic effects on commercial fisheries and for-hire recreational fishing during Project O&M are expected to be long term **minor** to **moderate** adverse.<br>Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction.<br>Future offshore wind energy projects, including the Project, would contribute to the increase in vessel traffic, but the risk of vessel collisions is expected to remain low. The vessel traffic impacts of the Proposed Action on commercial and for-hire recreational fishing would be noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be long term **minor** to **moderate** adverse. | and decommissioning and long term **minor** to **moderate** adverse for O&M under all design configurations analyzed.<br>For all design configurations analyzed, the vessel traffic impact of Alternatives C through F would be similar to the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to the Proposed Action: long term **minor** to **moderate** adverse. | | | | would be similar to the Proposed Action: term **moderate** adverse for construction and decommissioning and long term **minor** to **moderate** adverse for O&M under all design configurations analyzed.<br>The vessel traffic impact of Alternative G would be similar to the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to the Proposed Action: long term **minor** to **moderate** adverse. |

### 3.9.2.2 Alternative A: Impacts of the No Action Alternative on Commercial Fisheries and For-Hire Recreational Fishing

#### 3.9.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for commercial fisheries and for-hire recreational fishing (see Section 3.9.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

Other ongoing activities within the GAA, including non–offshore wind activities that affect commercial and for-hire recreational fisheries, are generally associated with climate change trends and fisheries management activities. Ongoing impacts of climate change trends include increased magnitude or frequency of storms, shoreline changes, ocean acidification, and water temperature changes. Risks to fisheries associated with these events include the ability to safely conduct fishing operations (e.g., because of storms) and climate-related habitat or distribution shifts in targeted species. Fish and shellfish species are expected to exhibit variation in their responses to climate change trends, with some species benefiting from climate change trends and others being adversely affected (Hare et al. 2016). To the extent that impacts of climate change trends on targeted species result in a decrease in catch or increase in fishing costs, the profitability of businesses engaged in commercial fisheries and for-hire recreational fishing would be adversely affected.

Ongoing fisheries management activities of NMFS, federal regional fishery management councils, and coastal states affect commercial and for-hire recreational fisheries through stock assessments and management measures to ensure the continued existence of species at levels that will allow commercial and for-hire recreational fisheries to occur. For example, ongoing fishing restrictions designed to rebuild depleted stocks in the Northeast Multispecies (large-mesh) FMP fishery would continue to reduce landings in that fishery. If successful, however, these measures would ensure the sustainability of fishery resources, which would have a beneficial impact on fishery operations by maximizing sustainable yield of fishery resources over the long term.

Ongoing offshore wind activities within the GAA that contribute to impacts on commercial fisheries and for-hire recreational fishing include the following:

- Continued O&M of the BIWF project (five WTGs) installed in state waters
- Continued O&M of the Coastal Virginia Offshore Wind project (two WTGs) installed in OCS-A 0497
- Ongoing construction of two offshore wind projects: the Vineyard Wind 1 project (62 WTGs and 1 OSS) in OCS-A 0501 and the SFWF project (12 WTGs and 1 OSS) in OCS-A 0517

The construction effects of the Vineyard Wind 1 and SFWF projects have been evaluated through previous NEPA reviews (BOEM 2021b, 2021c). Ongoing O&M of the BIWF and Coastal Virginia Offshore Wind projects and ongoing construction of the Vineyard Wind 1 and SFWF projects would affect commercial fisheries and for-hire recreational fishing through the primary IPFs of anchoring, noise, port utilization, vessel traffic, presence of structures, and cable emplacement and maintenance. Ongoing offshore wind activities would have the same type of impacts from anchoring, noise, port utilization, vessel traffic, presence of structures, and cable emplacement and maintenance that are described in detail in Section 3.9.3.2.2 for planned offshore wind activities, but the impacts would be of lower intensity.

#### 3.9.2.2.2 Cumulative Impacts

This section discloses potential impacts to commercial fisheries and for-hire recreational fishing associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

### Offshore Activities and Facilities

Accidental releases and discharges: Construction and O&M activities related to offshore wind energy development that reduce water quality could have a physiological or behavioral impact on some species targeted by commercial and for-hire recreational fisheries in the GAA. In turn, these impacts could decrease target species catch rates. BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operations of offshore energy facilities (30 CFR 585.105(a)). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). Compliance with these requirements would effectively minimize releases of water quality contaminants and trash or debris. For any given offshore wind energy project, the impacts of accidental releases and discharges on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term. The intensity of impacts is anticipated to be **negligible** adverse. Details regarding the potential impacts of accidental releases and discharges to finfish and EFH are described in Section 3.13.

Anchoring: Anchoring vessels used in the construction of offshore wind energy projects could pose a navigational hazard to commercial and for-hire recreational fishing vessels in the GAA. Although anchoring impacts would occur primarily during construction, some impacts could also occur during O&M and decommissioning. All impacts would be localized (within a few hundred yards of anchored vessel) and temporary (hours to days). Therefore, the adverse effects of offshore wind energy-related anchoring on commercial fisheries and for-hire recreational fishing are expected to be short term **negligible** to **moderate**.

Climate change: Impacts on commercial fisheries and for-hire recreational fishing in the GAA are expected to result from climate change trends such as increased magnitude or frequency of storms, shoreline changes, ocean acidification, and water temperature changes. Risks to fisheries associated with these events include habitat/distribution shifts, disease incidence, and risk of invasive species. If these risk factors result in a decrease in catch and/or increase in fishing costs (e.g., transiting time), the profitability of businesses engaged in commercial fisheries and for-hire recreational fishing would be adversely affected. The catch potential for the temperate Northeast Atlantic is projected to decrease between now and the 2050s (Barange et al. 2018). Hare et al. (2016) predicted that climate change would affect northeast fishery species differently. For approximately half of the 82 species assessed, the authors report that overall climate vulnerability is high to very high; diadromous fish and benthic invertebrate species exhibit the greatest vulnerability. In addition, most species included in the assessment have a high potential for a change in distribution in response to projected changes in climate. Adverse effects of climate change trends are expected for approximately half of the species assessed; however, some species are expected to increase in stock distribution and/or productivity (Hare et al. 2016). The intensity of the impacts of climate change trends to commercial fisheries and for-hire recreational fishing is anticipated to qualify as **minor** to **major** adverse for those fishing operations targeting species adversely affected by climate change trends, and the beneficial impacts are anticipated to qualify as **minor** to **major** for those fishing operations targeting species expected to increase in stock distribution and/or productivity as a result of climate change trends.

The economies of communities reliant on marine species vulnerable to climate change trends could be adversely affected. If the distribution of important fish stocks changes, it could affect where commercial and for-hire recreational fisheries are located. Furthermore, coastal communities with fishing businesses that have infrastructure near the shore could be adversely affected by sea level rise (Colburn et al. 2016; Rogers at al. 2019).

As they become operational, future offshore wind facilities would produce fewer GHG emissions than fossil fuel–powered generating facilities with similar capacities. This reduction in GHG emissions (or avoidance of increased GHG emissions from equivalent fossil fuel–powered energy production) would result in long-term beneficial impacts to fishing operations that target species adversely affected by climate change trends. However, given the global scale of GHG emissions, the benefits would be **negligible**. Section 3.4 describes the expected contribution of offshore wind to air emissions and climate change trends.

Light: Construction and O&M activities related to offshore wind energy development that introduce artificial lighting could result in behavioral responses from some target species, such as fish not biting at hooks or changing swim height. In turn, these responses could decrease the catch rates of target species. For any given offshore wind energy project, adverse lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized **minor** to **moderate** adverse and long term. Details regarding potential lighting impacts to finfish and EFH are described in Section 3.13

New cable emplacement/maintenance and EMF: Under the No Action Alternative, approximately 13,469 miles of offshore export and IACs could be installed along the U.S. East Coast to support future offshore wind energy projects (see Appendix E3). To the fullest extent possible, future offshore wind energy projects would reduce the occurrence of accidental snagging of fishing gear by burying all cables beneath the seafloor. BOEM (2018) notes that the standard commercial practice is to bury submarine cables 4 to 6 feet deep in waters shallower than 6,562 feet to protect them from external aggression hazards, such as fishing gear and anchors. Therefore, the impact of buried submarine cables to commercial fisheries and for-hire recreational fishing through entanglement or gear loss or damage is expected to be long term **moderate** adverse.

In areas where seafloor conditions or other factors might not allow for cable burial, other methods of cable protection would be employed, such as articulated concrete mattresses or rock placement. Impacts of this transmission cable infrastructure to commercial fisheries and for-hire recreational fishing through entanglement or gear loss/damage and navigation hazards are discussed below under the presence of structures IPF.

Fishermen have raised concerns regarding the suspected behavioral impacts of EMF generated by submarine cables on target fish and invertebrates (BOEM 2018). In particular, there is concern that EMF could slow or deviate migratory species from their intended routes, with subsequent potential problems for populations if they do not reach essential feeding, spawning, or nursery grounds (Kirkpatrick et al. 2017). To date, however, effects on representative sensitive species indicate that although some marine species are observed to respond to EMF, the responses have not risen to the level at which critical impacts on marine organism behavior are reported (BOEM 2018) (see Sections 3.6 and 3.13). There is no evidence to indicate that EMF from undersea AC power cables adversely affects commercially and recreationally important fish species within the southern New England area (CSA Ocean Sciences Inc. and Exponent 2019). Therefore, the impacts of EMF on commercial fisheries and for-hire recreational fishing are expected to be long term but **negligible** to **minor** adverse.

<u>Noise</u>: Construction and O&M activities related to offshore wind energy development that increase underwater noise could result in behavioral responses from some target species, such as fish not biting at hooks or changing swim height. In turn, these responses could decrease the catch rates of target species, thereby reducing revenue for commercial fishing and for-hire recreational fishing businesses. Some sources of noise, such as vessels and pile driving during project construction, could cause some target species to temporarily move away from the source and disperse to other areas. These species are expected to return to the area after the noise ends. Alteration of the ambient noise environment during construction and O&M activities could also result in reduced reproductive success for some species, which could negatively impact catch levels in the fisheries targeting those species. Details regarding potential noise impacts to finfish and EFH are described in Section 3.13; impacts to invertebrate resources are described in Section 3.6. For any given offshore wind energy project, all adverse noise impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term during construction and long term during O&M. The intensity of impacts is anticipated to be **moderate** adverse.

<u>Presence of structures</u>: The presence of structures can lead to impacts on commercial fisheries and for-hire recreational fishing through reduced catch levels of target species and increased space-use conflicts that may result in navigation hazards, allisions, and gear loss/damage. With respect to offshore wind energy development, these impacts could arise from buoys, met towers, foundations, scour/cable protection, and transmission cable infrastructure. Under the assumptions in Appendix E3, future offshore wind energy projects under the No Action Alternative would include the installation of 3,088 WTG and OSS foundations. In addition, projects could install buoys and meteorological evaluation towers. BOEM anticipates that structures would be added intermittently over an assumed 10-year period and that they would remain until decommissioning of each facility is complete.

The installation of offshore components for offshore wind energy projects could temporarily restrict fishing vessel movement and thus transit and harvesting activities within lease areas and along offshore export cable corridors. To safeguard mariners from the hazards associated with installation of these offshore components, it is expected that the USCG would create safety zones around offshore wind energy project construction areas (BOEM 2018). Fishing vessels would be prohibited from entering these safety zones. When the safety zones are in effect, fishing vessels could either forfeit fishing revenue or relocate to other fishing locations and continue to earn revenue. However, vessels that chose to relocate could incur increased operating costs (e.g., additional fuel to arrive at more distant locations; additional crew compensation due to more days at sea, assuming pay is not based on a percentage of harvest earnings) and/or lower revenue (e.g., less-productive area or less-valuable species).

During construction of offshore wind energy projects, temporary or permanent habitat alterations could occur, but the impact of these alterations on invertebrate and fish populations would be **negligible** to **minor** adverse (see Sections 3.6 and 3.13). Construction activities that disturb the seafloor could result in the injury or mortality of sedentary species such as sea scallop and surfclam. Given that the area affected by seafloor disturbance would be a fraction of the available habitat, the impact to sedentary species habitat would not be measurably altered compared to the environmental baseline. Therefore, the number of individual organisms affected would also be limited. Moreover, the populations of these species are expected to recover quickly through migration and recolonization from adjacent undisturbed habitat. Therefore, the adverse impacts to fisheries that target these species would be short term or long term **negligible** to **minor**, depending on the species.

In addition, construction activities related to offshore wind energy development could overlap with the spawning habitat and/or spawning season of a number of species targeted by commercial and for-hire recreational fisheries, leading to potential short-term **negligible** to **moderate** adverse impacts to the productivity and recruitment success of these species (see Sections 3.6 and 3.13). Therefore, the adverse impact on the catch of commercial and for-hire recreational fisheries targeting affected species would be short term **negligible** to **moderate**, depending on the species. See also noise and light impacts to commercial fisheries and for-hire recreational fishing.

Once offshore components are installed, the presence of the WTG and OSS foundations and associated scour protection would convert existing sand or sand with mobile gravel habitat to hard bottom, which in turn would reduce the habitat for target species that prefer soft-bottom habitat (e.g., squid, summer flounder, and surfclam) and increase the habitat for target species that prefer hard-bottom habitat (e.g., lobster, striped bass, black sea bass, and cod) (see Sections 3.6 and 3.13). However, given the small footprint of the lease areas and offshore cable corridors, any localized adverse impacts on target species populations from habitat alteration would have a **negligible** to **moderate** effect on the catch of for-hire recreational and commercial fisheries depending on the species targeted.

Where WTG and OSS foundations and associated scour protection produce an artificial reef effect and attract finfish and invertebrates, the aggregation of species could increase the catch rates of some target species (Kirkpatrick et al. 2017). Smythe et al. (2021) found that the enhanced fishing experience created by the BIWF led to the establishment of new for-hire recreational fishing businesses and benefited existing ones. It is expected that the reef effect of the WTG foundations would have long-term **negligible** to **minor** beneficial impacts to for-hire recreational fishing, depending on the extent to which the foundations attract targeted species. Additionally, the presence of food or shelter associated with the structures could alter the migratory behaviors of some species. In particular, the potential for disruption of onshore to offshore migratory patterns of important species such as lobster and black sea bass has been identified as a topic of concern (see Sections 3.6 and 3.13). Overall, localized adverse or beneficial impacts on target species populations from habitat alteration would have a long-term **negligible** to **moderate** effect on the target species catch of for-hire recreational and commercial fisheries.

As discussed above, the USCG does not plan to create exclusionary zones around offshore wind facilities during their operations (BOEM 2018). However, WTGs and OSSs would be visually detectable at a considerable distance during the day and easily detected by vessels equipped with radar regardless of the time of day. As described in Chapter 2 under the Proposed Action, all structures would have appropriate markings and lighting in accordance with USCG and International Association of Marine Aids to

Navigation and Lighthouse Authorities guidelines, and NOAA would chart WTG locations and could include a physical or virtual AIS at each turbine. Some fishing vessels operating in or near offshore wind facilities could experience radar clutter and shadowing. As discussed in Section 3.16, the USCG has reviewed all available studies on radar interference and found that although these studies show that structures could have some effect upon radar, they do not render radar inoperable.

Notwithstanding these safety measures, some fishermen have commented that because of safety considerations, they would not enter an offshore wind array during inclement weather, especially during low-visibility events (Kirkpatrick et al. 2017). In addition, trawl and dredge vessel operators have expressed specific concerns about being unable to safely deploy gear and operate in a WEA given the size of the gear, the spacing between the WTGs, and the space required to safely navigate (BOEM 2021b). Navigating through the WEAs would not be as problematic for for-hire recreational fishing vessels, which tend to be smaller than commercial vessels and do not use large external fishing gear (other than hook and line) that makes maneuverability difficult. However, trolling for highly migratory species (e.g., bluefin tuna [*Thunnus thynnus*], or swordfish [*Xiphias gladius*]) could involve deploying many feet of lines and hooks behind the vessel and then following large pelagic fish once they are hooked, which pose additional navigational and maneuverability challenges around WTGs (BOEM 2021b).

A potential effect of the presence of the offshore cables associated with offshore wind energy development is the entanglement and damage or loss of commercial and recreational fishing gear. Specifically, cable protection in the form of rock berms, concrete mattresses, fronded mattresses, and/or rock bags could cause a potential safety hazard should gear snag or hook on these seafloor structures. In addition, seafloor preparation prior to cable installation may relocate boulders and other obstructions that could cause gear damage or loss. Economic impacts to fishing operations associated with gear damage or loss include the costs of gear repair or replacement, together with the fishing revenue lost while gear is being repaired or replaced. Given that mobile fishing gear is actively pulled by a vessel over the seafloor, the chance of snagging this gear type on transmission cable infrastructure is greater than if—as in the case of fixed gear—the gear was set on the infrastructure or waves or currents pushed the gear into the infrastructure (BOEM 2021b).

Fishing vessel operators unwilling or unable to travel through areas where offshore wind facilities are located or to deploy fishing gear in those areas could find suitable alternative fishing locations and continue to earn revenue. This could result in increased operating costs (e.g., additional fuel to arrive at more distant locations; additional crew compensation due to more days at sea, assuming pay is not based on a percentage of harvest earnings) and/or lower revenue (e.g., fishing in a less-productive area or for a less-valuable species). However, if at times a fishery resource is only available within an offshore wind facility area, some fishermen, primarily those using mobile gear, could lose the revenue from that resource for the time the resource is inaccessible. These impacts could remain until decommissioning of each facility is complete, although the magnitude of the impacts would diminish over time if fishing practices adapt to the presence of structures.

An accurate assessment of the effects of planned offshore wind energy projects on the economic performance of commercial fisheries and for-hire recreational fishing in the GAA would depend on project-specific information that is unknown at this time, such as the actual location of offshore activities within lease areas and the arrangement of WTGs. However, it is possible to estimate the amount of commercial fishing revenue that would be "exposed" (i.e., potentially foregone) as a result of offshore wind energy development. Estimates of revenue exposure quantify the value of fishing that occurs in the footprint areas of individual offshore wind farms based on historical spatial catch data. Therefore, these estimates represent the fishing revenue that would be foregone if fishing vessel operators opt to no longer fish in these areas and cannot capture that revenue in a different location. Revenue exposure estimates should not be interpreted as measures of actual economic impact. Actual economic impact would depend on many factors—foremost, the potential for continued fishing to occur within the footprint of the wind farm, together with the ecological impact on target species residing within these lease areas. Economic impacts also depend on a vessel's ability to adapt to changing where it fishes. For example, if alternative fishing grounds are available nearby and could be fished at no additional cost, the economic impact would be lower. In addition, it is important to note that there could be cultural and traditional values to fishermen from fishing in certain areas that go beyond expected profit. For example, some fishermen could gain utility from being able to fish in locations that are known to them and also fished by their peers; the presence of other boats in the area could contribute to the fishermen's sense of safety. Given this, changes in where fishermen fish may affect social relationships and cultural identity and therefore the wellbeing of individuals and communities. Impacts on these social and cultural values are not quantifiable but are qualitatively considered when assessing the impacts of the No Action Alternative.

Also of note when calculating revenue exposure are the species with limited existing datasets (BOEM 2022). As described in Section 3.9.1, these data-limited species include American lobster, Jonah crab, and highly migratory species. In addition, the landings of fishing vessels with only state permits are not included in the federal VTR dataset. Consequently, this analysis may not fully represent the actual revenue exposure for some fisheries.

Table 3.9-24 shows the estimated annual commercial fishing revenue exposed to offshore wind energy development in the Mid-Atlantic and New England regions under the No Action Alternative by FMP fishery. The table includes the revenue at risk from the 1) Coastal Virginia Offshore Wind, which has been completed; 2) Vineyard Wind 1 and SFWF, which are being constructed; and 3) proposed offshore wind farms on the Atlantic Coast for which leases have been granted, with the exception of RWF. Fisheries data for BIWF were unavailable. Annual revenue-at-risk estimates are based on 2008–2019 data from NMFS (2021b). The average annual revenue by FMP for each offshore wind energy project is assigned to the construction year based on the timeline and project phasing set forth in Table E-1 of Appendix E. A detailed explanation of the methodology used to develop Table 3.9-24 is found in the Commercial Fisheries section of Appendix G.

The largest impacts in terms of exposed revenue are expected to be in the Northeast Skate Complex, Atlantic Sea Scallop, and Surfclam/Ocean Quahog FMP fisheries. The total average annual exposed revenue from 2022 to 2030 represents approximately 2% of the average annual revenue of all FMP and non-FMP fisheries in the Mid-Atlantic and New England regions from 2008 to 2019 (see Table 3.9-1). The maximum exposed revenue—which is projected to occur as early as 2029 when construction on the last of the foreseeable projects could begin—represents about 3.6% of the average annual revenue of all FMP and non-FMP fisheries in the regions. In general, fisheries do not have high relative revenue intensity within the lease areas compared with nearby waters because lease areas were chosen to reduce potential use conflicts between the wind energy industry and fishermen (Ecology and Environment, Inc. 2013).

**Table 3.9-24. Estimated Annual Commercial Fishing Revenue Exposed to Offshore Wind Energy Development in the Mid-Atlantic and New England Regions under the No Action Alternative by FMP Fishery (2022–2030)**

| FMP Fishery ($1,000s) | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|
| American Lobster | $0.0 | $152.2 | $197.8 | $270.7 | $427.1 | $526.7 | $581.4 | $636.0 | $636.0 |
| Atlantic Herring | – | $29.5 | $61.6 | $81.0 | $133.3 | $174.8 | $207.2 | $239.5 | $239.5 |
| Bluefish | $0.0 | $4.1 | $6.8 | $11.0 | $14.5 | $16.5 | $18.0 | $19.5 | $19.5 |
| Highly Migratory Species | $0.0 | $0.1 | $0.2 | $0.7 | $0.9 | $1.2 | $1.4 | $1.6 | $1.6 |
| Jonah Crab | $0.0 | $41.1 | $78.6 | $224.4 | $311.0 | $335.3 | $355.8 | $376.4 | $376.4 |
| Mackerel/Squid/ Butterfish | $0.1 | $310.8 | $553.8 | $756.5 | $1,122.6 | $1,275.9 | $1,409.7 | $1,543.6 | $1,543.6 |
| Monkfish | $0.0 | $355.1 | $428.3 | $535.4 | $699.8 | $803.6 | $886.1 | $968.6 | $968.6 |
| Northeast Multispecies (large-mesh) | – | $150.3 | $164.9 | $182.6 | $231.8 | $254.2 | $268.4 | $282.7 | $282.7 |
| Northeast Multispecies (small-mesh) | $0.0 | $97.5 | $139.4 | $229.5 | $320.4 | $348.8 | $365.6 | $382.5 | $382.5 |
| Atlantic Sea Scallop | $0.0 | $357.6 | $2,601.8 | $2,876.4 | $7,819.6 | $12,686.9 | $17,527.1 | $22,367.4 | $22,367.4 |
| Northeast Skate Complex | – | $184.5 | $223.6 | $284.3 | $379.4 | $430.7 | $462.9 | $495.1 | $495.1 |
| Spiny Dogfish | – | $13.5 | $20.7 | $25.5 | $31.5 | $35.6 | $37.7 | $39.8 | $39.8 |
| Summer Flounder/Scup/ Black Sea Bass | $0.1 | $222.5 | $392.3 | $592.1 | $863.4 | $1,049.3 | $1,214.2 | $1,379.2 | $1,379.2 |
| Other FMPs, non-disclosed species, and non-FMP fisheries* | $0.4 | $656.3 | $819.2 | $1,015.9 | $1,616.2 | $2,029.8 | $2,411.6 | $2,793.4 | $2,793.4 |
| All revenues of federally permitted vessels | $0.7 | $2,711.1 | $5,867.5 | $7,933.8 | $15,239.3 | $21,641.1 | $27,823.5 | $34,005.9 | $34,005.9 |

Source: Developed using construction schedule data from Table E-1 in Appendix E and fishing revenue data from NMFS (2022a).

Notes: Exposed revenue estimates are based on commercial fishery revenues in Atlantic offshore wind energy lease areas exclusive of the Revolution Wind Lease Area. Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator and is estimated based on the average annual revenue by FMP from 2008 through 2019.

The federal VTR data used to estimate revenue exposure provide a broad census of fishing activity that encompasses most of the commercial fisheries in the Mid-Atlantic and New England regions. However, there are species with limited existing datasets for calculating revenue exposure, including American lobster, Jonah crab, and highly migratory species. In addition, the landings of fishing vessels with only state permits are not included in the federal VTR dataset. Consequently, this analysis may not fully represent the actual revenue exposure for some fisheries.

"–" indicates the value is zero; "$0" indicates the value is positive but less than $500.

* Includes all species not assigned to an FMP, as listed in the table.

With respect to impacts to individual fishing operations, NMFS (2022a) determined for each federally permitted commercial fishing vessel that fished in New England/Mid-Atlantic offshore wind energy development lease areas the percentage of the vessel's total fishing revenue from 2008 through 2019. It is estimated that over that period, only 0.9% of the vessels that fished in one or more of the lease areas generated more than 50% of their total fishing revenue for the year from one or more of the areas. According to the data presented, in each lease area, there were one or more vessels that earned a substantial (> 5%) portion of their revenue from fishing in the area. Some vessels derived more than half of their revenue from fishing in a particular lease area. However, 75% of the vessels fishing in any given lease area derived less than 0.9% of their total revenue from the area.

For those fishing vessels that derive a large percentage of their total revenue from areas where offshore wind facilities would be located, that choose to avoid these areas once the facilities become operational, and that are unable to find suitable alternative fishing locations, the adverse impacts of the presence of structures would be long term **major**. As discussed above, the displacement of fishermen from their customary fishing grounds can adversely affect the social wellbeing of individuals and communities as well as the profitability of fishing operations. However, it is expected that most fishing vessels would only have to adjust somewhat to account for disruptions due to the presence of structures. A majority derive a small percentage of their total revenue from any one lease area or would be able to relocate to other fishing locations. In addition, the impacts of offshore wind energy facilities could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect. Therefore, BOEM expects that the impacts to commercial fisheries and for-hire recreational fishing resulting from the presence of structure would be long term **negligible** to **major** adverse, depending on the fishery and fishing operation. If BOEM's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects (see BOEM 2022), adverse impacts on commercial fisheries due to the presence of structures could be reduced.

The offshore structures associated with offshore wind energy development could also affect commercial fisheries and for-hire recreational fishing by preventing or hampering NMFS's ongoing scientific surveys on which fishery management measures are based. If NMFS's scientific survey methodologies are not adapted to sample within wind energy facilities, there could be increased uncertainty in scientific survey results, which would increase uncertainty in stock assessments and quota setting processes. This increased uncertainty, in turn, could result in more conservative catch quotas and/or more restrictive effort management measures for commercial and recreational fisheries (BOEM 2021b). Additional information on impacts to NMFS scientific research and protected species surveys is provided in Section 3.17.

Vessel traffic: Construction of offshore wind energy projects would require staging and installation vessels, including crew transfer, dredging, cable lay, pile driving, survey vessels, and potentially feeder lift barges and heavy lift barges. A more limited number of vessels would also be required for routine maintenance during the O&M phase. The additional vessel volume could cause vessel traffic congestion, difficulties with navigating, and an increased risk for collisions. These potential adverse impacts could cause some fishing vessel operators to change routes (see Section 3.16).

Once offshore wind energy projects are completed, some commercial fishermen could avoid the lease areas if large numbers of recreational fishermen are drawn to the areas by the prospect of higher catches. As discussed above, WTG and OSS foundations and associated scour protection could produce an artificial reef effect, potentially increasing fish and invertebrate abundance within a facility's footprint. According to ten Brink and Dalton (2018), the influx of recreational fishermen into the BIWF caused some commercial fishermen to cease fishing in the area because of vessel congestion and gear conflict concerns. If these concerns cause commercial fishermen to shift their fishing effort to areas not routinely fished, conflict with existing users could increase as other areas are encroached. In general, the potential for conflict among commercial fishermen due to fishing displacement could be higher in a fixed gear fishery with regulations that restrict where individual permit holders in the fishery can fish, such as the lobster fishery. However, the potential for vessel congestion and gear conflict could also increase if mobile species targeted by commercial fishermen, such as Atlantic herring, Atlantic mackerel (*Scomber scombrus*), squid species, tuna species, and groundfish species, are attracted to offshore wind energy facilities by the artificial reef effect, and fishermen targeting these species concentrate their fishing effort in offshore wind farm lease areas as a result.

Overall, the vessel traffic effects on commercial fisheries and for-hire recreational fishing are expected to be short term **moderate** adverse during construction and long term **minor** to moderate adverse during O&M.

### Onshore Activities and Facilities

Port utilization: Offshore wind energy projects would require vessels for staging and installation during construction and for routine maintenance during operations. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to, and higher costs for, high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels and for-hire recreational fishing vessels. These potential adverse impacts could cause some fishing vessel operators to use an alternative port (see Section 3.16 and Section 3.11). As fishing vessels shift the location of their landings and shoreside service activities, the could result in economic losses and a decline in fisheries-related onshore infrastructure in some ports but could result in economic gains and enhanced infrastructure in others.

However, regardless of whether offshore wind energy development occurs, most ports are going through continual upgrades and maintenance to ensure that they can receive projected future volumes of vessels. Moreover, state and local agencies would be responsible for minimizing the potential adverse impacts of additional port utilization by managing traffic to ensure continued access to port facilities (see Section 3.16). In addition, the use of multiple ports to support offshore wind energy project development would reduce the related congestion impacts in any one port. Therefore, port utilization impacts to commercial fisheries and for-hire recreational fishing are expected to be localized long term **minor** to **moderate** adverse.

## 3.9.2.2.3 Conclusions

BOEM anticipates that reasonably foreseeable offshore wind activities would have long-term **moderate** to **major** adverse impacts on commercial fisheries and **minor** to **moderate** adverse impacts on for-hire recreational fishing in the GAA. These impacts would be primarily due to the increased presence of offshore structures (foundations and cable protection measures) that could reduce fishing access and increase the risk of fishing gear damage or loss, and prevent or hamper continued research surveys. The extent of adverse impacts would vary by fishery and fishing operation due to differences in target species, gear type, and the predominant location of fishing activity. The impacts could also include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect.

### 3.9.2.3 Alternative B: Impacts of the Proposed Action on Commercial Fisheries and For-Hire Recreational Fishing

#### 3.9.2.3.1 Construction and Installation

#### Offshore Activities and Facilities

Accidental releases and discharges: As discussed in the No Action Alternative (see Section 3.9.2.2), compliance with regulatory requirements would minimize releases of water quality contaminants and trash or debris. Additionally, training and awareness of EPMs proposed for waste management and reduction of marine debris would be required of Project personnel (see Table F-1 in Appendix F). Accidental spill or release of oils or other hazardous materials offshore would be managed through the oil spill response plan (OSRP). Therefore, during Project construction, the impacts of accidental releases and discharges on target species catch in commercial and for-hire recreational fishing are expected to be localized **negligible** adverse and short term or long term depending on the type and volume of material released. Details regarding potential water quality impacts to finfish and invertebrates are described in Section 3.6 and Section 3.13.

Anchoring: Potential impacts from anchoring vessels used during Project construction would be the same as the No Action Alternative (see Section 3.9.2.2): short term **negligible** to **minor** adverse. Details regarding potential navigation impacts to commercial and for-hire recreational fishing vessels are described in Section 3.16.

Light: Project construction activities that introduce artificial lighting could result in behavioral responses from some target species (see Sections 3.6 and 3.13). In turn, these responses could decrease the catch rates of target species, thereby reducing revenue for commercial fishing and for-hire recreational fishing businesses. Project EPMs include construction vessel light shielding to minimize artificial lighting effects on the environment (see Table F-1 in Appendix F). Project-related lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized, **negligible** to **minor** adverse, and short term.

New cable emplacement/maintenance: The installation of the offshore export and IACs could temporarily restrict vessel movement and thus transit and harvesting activities in the Lease Area and along the RWEC. These impacts of new cable emplacement to commercial fisheries and for-hire recreational fishing are discussed below under the presence of structures IPF.

Noise: As discussed in the No Action Alternative, Project construction activities that increase underwater noise could cause behavioral responses from some marine species or could result in reduced reproductive success for some species. These impacts, in turn, could negatively impact catch levels in the fisheries targeting those species. According to Revolution Wind, a ramp-up or soft start would be used at the beginning of each pile segment during impact pile driving and/or vibratory pile driving to provide additional protection to mobile species in the vicinity by allowing them to vacate the area before pile-driving activities begin (see Table F-1 in Appendix F). In addition, BOEM would require an adaptive management approach that would require the applicant to prepare an acoustic monitoring plan and, based on the monitoring, require the applicant to avoid activities that would disrupt spawning aggregations of Atlantic cod (*Gadus morhua*). If implemented, a restriction on pile-driving activity to times outside the Atlantic cod spawning season would minimize adverse impacts on cod spawning and likely avoid broader population-level effects (see Section 3.13). Therefore, Project-related construction noise is expected to have a localized **minor** to **moderate** adverse impact on the target species catch of commercial fisheries and for-hire recreational fishing.

<u>Presence of structures</u>: As discussed in the No Action Alternative, the installation of offshore Project components, including the WTGs and export cables, could temporarily restrict vessel movement and thus transit and harvesting activities in the Lease Area and along the RWEC. Construction safety zones implementation dates are pending and would depend on the Project schedule and duration of the expected construction phase. To allow fishing vessels to alter their plans to avoid impacted areas, Revolution Wind would publicize safety zones in advance via a local notice to mariners and would communicate in advance where and when construction activities are scheduled (see Table F-1 in Appendix F).

In addition, if the fishing effort is shifted to areas not routinely fished, conflict with existing users could increase as other areas are encroached. The competition would be higher for fishermen engaged in fisheries with regulations that constrain where fishermen can fish, such as the lobster fishery. The potential for conflict due to fishing displacement is lower among fishermen targeting mobile species such as Atlantic herring, Atlantic mackerel, squid species, tuna species, and groundfish species. In a given year, however, it is possible that the center of the exploitable biomass, or the portion of a fish population available to fishing gear, of one or more of these species would occur within the Lease Area or along the RWEC during construction. During these occurrences, fishermen could be adversely impacted because of restricted access to the available fish population within the Project construction area. Given the small size of the offshore areas affected during construction, the likelihood of this co-occurrence in time and space would be low, as would be the likelihood of increased conflict and competition from a temporary displacement of fishing activities.

It is difficult to predict the ability of fishing operations displaced by Project construction activities to locate alternative fishing grounds that would allow them to maintain revenue targets while continuing to minimize costs. However, the available data suggest the presence of alternative productive fishing grounds near the Lease Area and RWEC. As shown in the revenue intensity figures in Appendix G (Figures G-CF1 through G-CF13), the revenue intensity levels for many of the FMP fisheries in large expanses of ocean within 20 nm of the Lease Area and RWEC corridor are comparable to or higher than those within the two areas.

Based on 2008–2019 NMFS data, Table G-CF6 through Table G-CF9 in Appendix G show the estimated number of vessels and vessel trips that would be affected by Project construction in the Lease Area and along the RWEC under the Proposed Action (NMFS 2021a, 2022b). The largest impacts in terms of the number of vessels active in the Lease Area and along the RWEC as a percentage of total fishing effort in the RFA would be in the Jonah Crab (52%), Northeast Multispecies (small-mesh) (47%), and Mackerel/Squid/Butterfish (43%) FMP fisheries. The species most affected in terms of number of vessels as a percentage of total effort in the RFA would be rock crab (56%), butterfish (53%), Jonah crab (52%), and red hake (52%). Midwater trawl (68%) and lobster pot gear (53%) would be the gear types most affected. With respect to ports, the largest impacts would be in Little Compton (93%), Fall River (92%), and Chilmark/Menemsha (88%).

It is possible to estimate the amount of commercial fishing revenue that would be exposed under the Proposed Action as a result of construction activities in the Lease Area and along the offshore RWEC. As discussed in Section 3.9.2.2, estimates of revenue exposure represent the fishing revenue that would be foregone if fishing vessel operators cannot capture that revenue in a different location. Based on commercial fishing revenue data averaged over the 2008–2019 period, Table 3.9-25 and Table 3.9-26 show the annual revenue at risk in the Lease Area and along the RWEC during each year of the 2-year (2023–2024) Project construction phase by FMP fishery and gear type, respectively. Most of the WTG and RWEC installation is expected in year 2 (2024). The largest impacts in terms of exposed revenue as a percentage of total revenue in the RFA would be in the Spiny Dogfish, American Lobster, Atlantic Herring, and  Northeast Skate Complex FMP fisheries. The amount of commercial fishing revenue that would be exposed across all FMP and non-FMP fisheries is estimated to be $1.42 million. The annual exposed revenue represents 0.15% of the average annual revenue for all FMP and non-FMP fisheries in the Mid-Atlantic and New England regions and 0.99% of the average annual revenue for all FMP and non-FMP fisheries in the RFA. Midwater trawl, all other, and pot gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA.

**Table 3.9-25. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the Revolution Wind Export Cable by FMP Fishery under the Proposed Action**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $507.7 | $283.8 | 0.30% | 3.64% |
| Atlantic Herring | $273.5 | $102.9 | 0.40% | 3.44% |
| Bluefish | $17.2 | $8.7 | 0.68% | 1.50% |
| Highly Migratory Species | $6.9 | $2.2 | 0.10% | 1.00% |
| Jonah Crab | $40.7 | $23.2 | 0.24% | 0.39% |
| Mackerel/Squid/Butterfish | $324.4 | $145.3 | 0.28% | 0.94% |
| Monkfish | $210.0 | $109.9 | 0.53% | 1.46% |
| Northeast Multispecies (large-mesh) | $117.0 | $52.6 | 0.07% | 2.20% |
| Northeast Multispecies (small-mesh) | $193.3 | $74.3 | 0.66% | 2.63% |
| Atlantic Sea Scallop | $409.9 | $157.1 | 0.03% | 0.32% |
| Northeast Skate Complex | $175.9 | $110.7 | 1.49% | 3.09% |
| Spiny Dogfish | $35.7 | $15.7 | 0.53% | 6.45% |

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| Summer Flounder/Scup/Black Sea Bass | $133.5 | $84.3 | 0.21% | 0.77% |
| Other FMPs, non-disclosed species, and non-FMP fisheries | $574.6 | $248.0 | N/A | N/A |
| Total | $1,707.8 | $1,418.8 | 0.15% | 0.99% |

Source: Developed using 2008-2019 data from NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the Total row.

The “Other FMPs, non-disclosed species, and non-FMP fisheries” category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. It also includes a) revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions and b) revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

The federal VTR data used to estimate revenue exposure provide a broad census of fishing activity that encompasses most of the commercial fisheries in the Mid-Atlantic and New England regions. However, there are species with limited existing datasets for calculating revenue exposure, including American lobster, Jonah crab, and highly migratory species. In addition, the landings of fishing vessels with only state permits are not included in the federal VTR dataset. Consequently, this analysis may not fully represent the actual revenue exposure for some fisheries.

**Table 3.9-26. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the Revolution Wind Export Cable by Gear under the Proposed Action**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| *Dredge-clam* | *$399.9* | *$121.1* | *0.20%* | *0.58%* |
| Dredge-scallop | $417.6 | $157.7 | 0.03% | 0.33% |
| Gillnet-sink | $291.6 | $197.4 | 0.66% | 2.05% |
| Handline | $15.7 | $3.7 | 0.08% | 0.27% |
| Pot-other | $531.2 | $345.3 | 0.30% | 2.15% |
| Trawl-bottom | $658.9 | $492.1 | 0.26% | 1.14% |
| *Trawl-midwater* | *$191.8* | *$98.1* | *0.52%* | *4.18%* |

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| All other gear* | $288.3 | $70.1 | 0.15% | 2.63% |
| Total | $1,707.8 | $1,485.6 | 0.16% | 1.03% |

Source: Developed using 2008-2019 data from NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the Total row.

Gear types shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

The federal VTR data used to estimate revenue exposure provide a broad census of fishing activity that encompasses most of the commercial fisheries in the Mid-Atlantic and New England regions. However, there are species with limited existing datasets for calculating revenue exposure, including American lobster, Jonah crab, and highly migratory species. In addition, the landings of fishing vessels with only state permits are not included in the federal VTR dataset. Consequently, this analysis may not fully represent the actual revenue exposure for some fisheries.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table 3.9-27 shows the annual revenue at risk in the Lease Area and along the RWEC during the Project construction phase by port. The average annual revenue at risk as a percentage of total revenue was calculated by taking the revenue in a particular port from vessels fishing within the Lease Area and export cable corridor and dividing it by the total landings from the Mid-Atlantic and New England regions or RFA for that same port. The largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would be in the ports of Little Compton (7.4%), Westport (5.7%), and Chilmark/Menemsha (4.1%). As shown in Table 3.9-4, the communities in which these ports are located have a low to medium presence of commercial fishing activities.

**Table 3.9-27. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under the Proposed Action**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| *Beaufort, NC* | *$5.4* | *$2.6* | *0.10%* | *0.31%* |
| Chilmark/Menemsha, MA | $29.1 | $17.1 | 3.62% | 4.06% |
| *Fairhaven, MA* | *$29.8* | *$15.5* | *0.14%* | *1.07%* |
| *Fall River, MA* | *$18.2* | *$9.2* | *0.81%* | *2.07%* |
| *Hampton, VA* | *$8.2* | *$3.9* | *0.03%* | *0.25%* |
| Little Compton, RI | $219.9 | $143.2 | 7.19% | 7.38% |
| Montauk, NY | $42.8 | $18.8 | 0.10% | 0.16% |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| New Bedford, MA | $596.2 | $369.4 | 0.10% | 0.76% |
| New London, CT | *$22.8* | *$10.4* | *0.16%* | *0.39%* |
| *Newport News, VA* | *$16.2* | *$4.1* | *0.01%* | *0.24%* |
| Newport, RI | $194.1 | $109.0 | 1.22% | 3.78% |
| Point Judith, RI | $746.5 | $574.2 | 1.25% | 2.08% |
| *Point Pleasant Beach, NJ* | *$16.8* | *$4.8* | *0.02%* | *0.06%* |
| Stonington, CT | $21.5 | $7.5 | 0.07% | 0.24% |
| *Tiverton, RI* | *$17.7* | *$7.2* | *0.63%* | *1.11%* |
| Westport, MA | $121.0 | $67.1 | 5.14% | 5.74% |
| **Revenues by Port State‡** | | | | |
| All Connecticut ports | $44.3 | $13.6 | 0.08% | 0.23% |
| All Massachusetts ports | $695.6 | $474.4 | 0.10% | 0.84% |
| *All New Jersey* ports | *$16.8* | *$6.8* | *0.00%* | *0.04%* |
| All New York ports | $42.8 | $18.8 | 0.06% | 0.10% |
| All Rhode Island ports | *$997.9* | *$833.9* | *1.21%* | *2.47%* |
| *Ports in all other states* | *$24.3* | *$8.4* | *0.01%* | *0.19%* |
| Port data withheld for confidentiality‡ | $145.3 | $68.6 | 0.15% | 1.23% |
| **Total** | **$1,707.8** | **$1,424.6** | **0.15%** | **0.99%** |

Source: Developed using 2008-2019 data from NMFS (2021a, 2022b).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the Total row.

MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

The federal VTR data used to estimate revenue exposure provide a broad census of fishing activity that encompasses most of the commercial fisheries in the Mid-Atlantic and New England regions. However, there are species with limited existing datasets for calculating revenue exposure, including American lobster, Jonah crab, and highly migratory species. In addition, the landings of fishing vessels with only state permits are not included in the federal VTR dataset. Consequently, this analysis may not fully represent the actual revenue exposure for some fisheries.

‡ Revenues by Port State include all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

Revenue exposure estimates should not be interpreted as measures of actual economic impact. Actual economic impact would depend on many factors—foremost, the ability of vessels to adapt to changing where they fish, together with the ecological impact on target species residing within these lease areas (see discussion of potential impacts to target species catch below). Fishing vessel operators could find suitable alternative fishing locations and continue to earn revenue. However, as noted above, this shift in fishing effort could result in increased operating costs and/or lower revenue. In addition, economic impacts would also depend on the timing of construction activities. Specifically, the time of year during which construction occurs could affect access to fishing areas and availability of targeted fish in the area, which, in turn, could affect catch volumes and fishing revenue.

As described under the No Action Alternative, there could be cultural and traditional values to fishermen from fishing in certain areas that go beyond expected profit. For instance, some fishermen could gain utility from being able to fish in locations that are known to them and also fished by their peers, and the presence of other boats in the area can contribute to the fishermen's sense of safety. Given this, changes in where fishermen fish may affect social relationships and cultural identity and therefore the wellbeing of individuals and communities. Impacts on these social and cultural values are not quantifiable but are qualitatively considered when assessing the impacts of the Proposed Action.

The amount of fishing activity that could be affected during Project construction as a result of reduced fishing access is a small fraction of the amount of fishing activity in the Mid-Atlantic and New England regions as a whole. As described above, the annual exposed revenue represents approximately 0.15% of the average annual revenue for all FMP and non-FMP fisheries in the Mid-Atlantic and New England regions from 2008 through 2019, and approximately 0.99% of the average annual revenue for all FMP and non-FMP fisheries in the RFA. Nevertheless, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts as a result of reduced fishing access.

As discussed in Section 3.9.1, an average of 289 vessels per year fished in the Lease Area from 2008 through 2019. A small number of fishing vessels historically derived a large percentage of their total fishing revenue from the area. For example, the vessel with the greatest dependence on the Lease Area derived 38% of its total revenue over the 2008–2019 period from the area. If these fishing vessels are unable to find suitable alternative fishing locations when safety zones are in effect during Project construction, the adverse impacts would be temporarily **major**. The displacement of fishermen from their customary fishing grounds can adversely affect the social wellbeing of individuals and communities as well as the profitability of fishing operations. However, three-quarters of the vessels that fished in the Lease Area derived 0.88% or less of their total annual revenue from the area. Moreover, some fishing vessels would likely be able to relocate to other fishing locations when safety zones are in effect and would continue to earn revenue. Therefore, most of the fishing vessels are expected to experience temporary **negligible** to **moderate** adverse impacts as a result of the establishment of safety zones during Project construction.

It is estimated that during Project construction, the revenue exposure for any given port would not exceed 8% of its total revenue from the Mid-Atlantic and New England regions or from the RFA (see Table 3.9-27). Considering this moderate revenue at risk across ports, together with the small number of vessels that depend heavily on the Lease Area and the ability of vessels to adjust transit and fishing locations to avoid conflicts with construction activities, the impacts to other fishing industry sectors, including seafood processors and distributors and shoreside support services, are expected to be temporary **minor** to **moderate** adverse.

In addition, as described in Table F-1 in Appendix F, Revolution Wind is committed to establishing a Direct Compensation Program for impacted fishermen. Revolution Wind would base the direct compensation program on findings from two separate Coastal Zone Management Act (CZMA) consistency reviews conducted by the states of Rhode Island and Massachusetts and resulting mitigation agreements. The direct compensation programs, which are part of the mitigation agreements for the states of Rhode Island and Massachusetts, would address impacts to commercial fishing operations and for-hire recreational fishing operations. Understanding there may be impacts outside of Rhode Island and Massachusetts, Revolution Wind is committed to advancing and adhering to principles set forth by the nine-state initiative as well as ideals laid out in the BOEM guidance. In addition to the direct compensation programs created during the CZMA process, Revolution Wind would create or contribute to Coastal Community Funds in Rhode Island and Massachusetts. The contribution amounts would be determined during the CZMA process. The Coastal Community Funds would be grant-making entities, unrelated to Revolution Wind, and open to all fishing interests, including private recreational angling and onshore support businesses. Also described in Table F-1 in Appendix F is a fishing gear conflict prevention and claim procedure to be used when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear. The use of this procedure for qualifying gear interactions that could occur during Project construction or O&M is considered part of the Proposed Action and would reduce any adverse impacts to commercial or for-hire recreational fishing operations due to fishing gear loss or damage.

During Project construction, temporary or permanent habitat alterations could occur, but the impact of these alterations on invertebrate and fish populations would be **negligible** to **minor** adverse (see Sections 3.6 and 3.13). Construction activities that disturb the seafloor could result in the injury or mortality of sedentary species such as sea scallop and surfclam. Given that the area affected by seafloor disturbance would be a fraction of the available habitat, the impact to sedentary species habitat would not be measurably altered compared to the environmental baseline. Therefore, the number of individual organisms affected would also be limited. Moreover, the populations of these species are expected to recover quickly through migration and recolonization from adjacent, undisturbed habitat. Therefore, the adverse impacts to fisheries that target these species would be short term or long term **negligible** to **minor**, depending on the species.

Construction activities could overlap with the spawning habitat and/or spawning season of a number of target species, leading to potential short-term **negligible** to **moderate** adverse impacts to the productivity and recruitment success of these species (see Sections 3.6 and 3.13). Therefore, the adverse impact on the catch of commercial and for-hire recreational fisheries targeting these affected species would be short term **negligible** to **moderate**, depending on the species. See also noise and light impacts to commercial fisheries and for-hire recreational fishing.

As discussed in the No Action Alternative (see Section 3.9.1.1), the offshore structures associated with offshore wind energy development could also affect commercial fisheries and for-hire recreational fishing by preventing or hampering NMFS's ongoing scientific surveys on which fishery management measures are based. Additional information on impacts to NMFS's scientific research and protected species surveys is provided in Section 3.17.

<u>Vessel traffic</u>: Construction of the Project would involve the same types of vessels and vessel traffic as described in the No Action Alternative (see Section 3.9.2.2). The additional vessel volume in construction

ports could cause vessel traffic congestion, difficulties with navigating, and an increased risk for collisions (see Section 3.16 and Section 3.11). However, the Project-related increase in vessel traffic would be nominal when compared to existing vessel operations within the GAA (VHB 2023). In addition, Revolution Wind would implement a comprehensive communication plan during offshore construction to inform all mariners, including commercial and recreational fishermen, of construction activities and vessel movements. Communication would be facilitated through a fisheries liaison, Project website, and public notices to mariners and vessel float plans (in coordination with USCG) (see Table F-1 in Appendix F). As a result, the adverse impact on commercial fisheries and for-hire recreational fishing would be temporary and **moderate**.

### Onshore Activities and Facilities

<u>Port utilization</u>: Several port facilities located in New York, Rhode Island, Massachusetts, and Connecticut are considered for offshore Project construction, staging, and fabrication, as well as crew transfer and logistics support. Although final port selection has not been determined at this time, the list of affected commercial ports could include ports used by commercial fishing vessels and for-hire recreational fishing vessels. For example, fishing ports that could be used during construction and installation, O&M, or decommissioning of the Lease Area or RWEC include Montauk, New London, Point Judith, and New Bedford (VHB 2023). During the facility design report phase, Revolution Wind would finalize commercial ports to be used to support offshore installation activities for the Lease Area and RWEC.

Vessels for staging and installation during construction would add traffic to port facilities. The additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels and for-hire recreational fishing vessels. These potential adverse impacts could cause some fishing vessel operators to use an alternative port (see Section 3.16 and Section 3.11). As fishing vessels shift the location of their landings and shoreside service activities, the result could be economic losses and a decline in fisheries-related onshore infrastructure in some ports but could be economic gains and enhanced infrastructure in others.

As noted above, Revolution Wind would implement a comprehensive communication plan during offshore construction that would reduce the adverse impacts on other users of ports supporting Project construction. As a result, the adverse impact on commercial fisheries and for-hire recreational fishing would be short term **minor** to **moderate**.

## 3.9.2.3.2 Operations and Maintenance and Conceptual Decommissioning

This section focuses on the impacts to commercial fisheries and for-hire recreational fishing during Project O&M. Decommissioning of the Lease Area and RWEC would have similar impacts on commercial fisheries and for-hire recreational fishing as construction. Within 2 years of cancellation, expiration, or other termination of the lease, Revolution Wind would remove or decommission all facilities, projects, cables, pipelines, and obstructions and clear the seafloor of all obstructions created by activities on the Lease Area (VHB 2023). Any cut and cleared cables would typically have the exposed ends weighted with clump anchors so that the cables cannot be snagged by fishing gear. Removal of structures that produce an artificial reef effect would result in loss of any beneficial fishing impacts that could have occurred during O&M.

### Offshore Activities and Facilities

Accidental releases and discharges: As discussed in the No Action Alternative (see Section 3.9.2.2), compliance with regulatory requirements would minimize releases of water quality contaminants and trash and debris. Additionally, training and awareness of EPMs proposed for waste management and reduction of marine debris would be required of Project personnel (see Table F-1 in Appendix F). Accidental spill or release of oils or other hazardous materials offshore would be managed through the OSRP. Therefore, during Project O&M, the impacts of accidental releases and discharges on target species catch in commercial and for-hire recreational fisheries are expected to be localized **negligible** adverse and short term or long term depending on the type and volume of material released. Details regarding potential water quality impacts to finfish and EFH are described in Section 3.13.

Anchoring: Potential impacts from anchoring vessels used during Project O&M would be the same as under the No Action Alternative (see Section 3.9.2.2) and are expected to be short term **negligible** to **minor** adverse. Details regarding potential navigation impacts to commercial and for-hire recreational fishing vessels are described in Section 3.16.

Climate change: As discussed in the No Action Alternative, impacts on commercial fisheries and for-hire recreational fishing in the GAA are expected to result from climate change trends. Risks to fisheries associated with these events include habitat and distribution shifts, disease incidence, and risk of invasive species. If the distribution of important fish stocks changes, it could affect where commercial and for-hire recreational fisheries are located. As under the No Action Alternative, impacts from climate change trends to commercial fisheries and for-hire recreational fishing during Project O&M are expected to be long term **minor** to **major** adverse for those fishing operations targeting species adversely affected by climate change trends and **minor** to **major** beneficial for those fishing operations targeting species beneficially affected by climate change trends.

As the Project becomes operational, the reduction in GHG emissions (or avoidance of increased GHG emissions from equivalent fossil fuel–powered energy production) would result in long-term beneficial impacts to fishing operations that target species adversely affected by climate change trends. However, given the global scale of GHG emissions, the benefits would be **negligible**. Section 3.4 describes the expected contribution of the Project to air emissions and climate change trends.

Light: Project O&M activities would have the same potential impact as Project construction but at a lower frequency over a longer period. Project EPMs include operational restrictions to limit light use to required periods and minimize artificial lighting effects on the environment (see Table F-1 in Appendix F). Project-related lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized **negligible** to **minor** adverse and long term.

New cable emplacement/maintenance and EMF: Assuming two 42-mile-long export cables co-located within a single corridor and 155 miles of IACs (see Section 2.1.2), an estimated 239 miles of offshore export and IACs would be installed to support the maximum-case scenario under the Proposed Action. To the extent feasible, installation of the IAC, OSS-link cable, and RWEC would occur using equipment such as a mechanical cutter, mechanical plow, or jet plow. The feasibility of cable burial equipment would be determined based on an assessment of seafloor conditions and the cable burial risk assessment. In addition, to the extent feasible, the RWEC, IAC, and OSS-link cable would achieve a target burial depth of 4 to 6 feet (1.2 to 1.8 m) below the seafloor to reduce the occurrence of accidental snagging of fishing gear by burying all cables beneath the seafloor (see Table F-1 in Appendix F). Revolution Wind estimates that 19.5% of the route for each cable comprising the RWEC would require secondary cable protection for the following reasons: 1) because burial cannot occur, 2) because sufficient burial depth cannot be achieved due to seafloor conditions, or 3) to avoid risk of interaction with external hazards (VHB 2023). The impacts of this transmission cable infrastructure to commercial fisheries and for-hire recreational fishing through entanglement or gear loss/damage are discussed below under the presence of structures IPF.

As discussed in the No Action Alternative, fishermen have raised concerns regarding the behavioral impacts of EMF generated by submarine cables on target fish and invertebrates (BOEM 2018). The Project would employ HVAC transmission (VHB 2023), which generally produces lower intensity EMF than HVDC and may not be as detectable by electrosensitive fish and invertebrate species (see Sections 3.6 and 3.13). According to Revolution Wind, EMF levels, which are calculated using conservative assumptions likely to overestimate results, indicate that the magnetic field and induced electric field produced by the Project cables would be below the detection thresholds for magnetosensitive and electrosensitive marine organisms (VHB 2023). Consequently, EMF from Project cables are expected to have the same potential impact as the No Action Alternative; long-term **negligible** to **minor** adverse impacts on commercial and for-hire recreational fisheries.

Noise: As discussed in the No Action Alternative, Project construction activities that increase underwater noise could cause behavioral responses from some marine species or could result in reduced reproductive success for some species. In particular, operational noise could reduce the ability of hearing specialist species, like Atlantic cod, haddock (*Melanogrammus aeglefinus*), Atlantic pollock (*Pollachius virens*), and hake, to communicate effectively within a few hundred feet of each turbine. These impacts, in turn, could negatively impact catch levels in the fisheries targeting those species. Given the small area in which noise impacts would occur, Project-related O&M noise is expected to have a localized **minor** to **moderate** adverse impact on the catch of commercial fisheries and for-hire recreational fishing targeting these species.

Presence of structures: The presence of WTGs could result in de facto exclusion if fishing vessel operators are not—or perceive that they are not—able to safely navigate the area around WTGs. As described in Table F-1 in Appendix F, as part of the Project, Revolution Wind has committed to self-implement measures to facilitate safe navigation within the Lease Area. Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15 mile (1 nm) × 1.15 mile (1 nm) spacing that aligns with other proposed adjacent offshore wind energy projects in the RI/MA WEA. This layout has been confirmed through expert analysis to allow for safe navigation without the need for additional designated transit lanes. Each WTG would be marked and lit with both USCG navigation lighting and FAA aviation lighting. AISs would be installed at the RWF marking the corners of the wind farm to assist in safe navigation. In addition, Revolution Wind would create The Navigational Safety Fund, which would provide training and experiential learning opportunities to those navigating within the Lease Area off the coast of Rhode Island and Massachusetts. Fishermen eligible for the Direct Compensation Program and who do not already possess AIS transceivers and/or pulse compression radar systems may receive one-time grants for up to $10,000 in order to upgrade or purchase pulse compression radar or AIS. Commercial fishing vessels and inspected for-hire/party vessels would be eligible for $10,000 in upgrades, and uninspected for-hire vessels would be eligible for $5,000 in upgrades. Notwithstanding these measures, BOEM is cognizant that maneuverability within the Lease Area could vary depending on factors such as vessel size, fishing gear or method used, and/or environmental conditions.

The amount of commercial fishing revenue that would be annually exposed as a result of O&M activities in the Lease Area and along the RWEC would be the same as the amount exposed during construction. As described above, the largest impacts in terms of exposed revenue as a percentage of total revenue in the Mid-Atlantic and New England regions or as a percentage of total revenue in the RFA would be in the American Lobster, Atlantic Sea Scallop, and Mackerel/Squid/Butterfish FMP fisheries. The amount of commercial fishing revenue that would be exposed across all FMP and non-FMP fisheries is estimated to be $1.42 million. The annual exposed revenue represents 0.15% of the average annual revenue for all FMP and non-FMP fisheries in the Mid-Atlantic and New England regions, and 0.99% of the average annual revenue for all FMP and non-FMP fisheries in the RFA. Midwater trawl, all other, and pot gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would be in the ports of Little Compton (7.4%) and Westport (5.7%).

As discussed above, revenue exposure estimates should not be interpreted as measures of actual economic impact. The actual economic impact to commercial fisheries during Project O&M would depend on many factors—foremost, the potential for continued fishing to occur in the Lease Area. It is also important to note that fishermen gain utility from being able to fish in locations that are known to them and are also fished by their peers; the presence of other boats in the area can contribute to the fishermen's sense of safety.

As described above, the amount of fishing activity that could be affected during Project O&M is a small fraction of the amount of fishing activity in the entire Mid-Atlantic and New England regions. However, a small number of fishing vessels historically derived a large percentage of their total fishing revenue from the area (see description of the Lease Area and RWEC in Section 3.9.1). For example, the vessel with the greatest dependence on the Lease Area derived 38% of its total revenue over the 2008–2021 period from the area. If these vessels choose to avoid the Lease Area during Project O&M and are unable to find suitable alternative fishing locations and continue to earn revenue, the adverse impacts would be long term **major** adverse. However, three-quarters of the vessels that fished in the Lease Area derived 0.88% or less of their total annual revenue from the area. Moreover, some fishing vessels that choose to avoid the Lease Area would likely be able to relocate to other fishing locations and continue to earn revenue. As a result, the adverse impacts of the presence of structures on most of the vessels are expected to be long term **negligible** to **moderate**.

In addition, as described in Table F-1 in Appendix F, Revolution Wind is committed to establishing a Direct Compensation Program for impacted fishermen. Revolution Wind would base the direct compensation program on findings from two separate CZMA consistency reviews conducted by the states of Rhode Island and Massachusetts and resulting mitigation agreements. The direct compensation programs, which are part of the mitigation agreements for the states of Rhode Island and Massachusetts, would address impacts to commercial fishing operations and for-hire recreational fishing operations. Understanding there may be impacts outside of Rhode Island and Massachusetts, Revolution Wind is committed to advancing and adhering to principles set forth by the nine-state initiative as well as ideals laid out in the BOEM guidance. In addition to the direct compensation programs created during the CZMA process, Revolution Wind would create or contribute to Coastal Community Funds in Rhode Island and Massachusetts. The contribution amounts would be determined during the CZMA process. The Coastal Community Funds would be grant-making entities, unrelated to Revolution Wind, and open to all fishing interests, including private recreational angling and onshore support businesses. Also described in Table F-1 in Appendix F is a fishing gear conflict prevention and claim procedure to be used when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear. The use of this procedure for qualifying gear interactions that could occur during Project construction or O&M is considered part of the Proposed Action and would reduce any adverse impacts to commercial or for-hire recreational fishing operations due to fishing gear loss or damage.

Is estimated that during Project O&M, the revenue exposure for any given port would not exceed 8% of its total commercial fishing revenue from the Mid-Atlantic and New England regions or the RFA (see Table 3.9-27). Considering revenue risks across ports with the small number of vessels and fishing activity that would be affected during Project O&M, the impacts to other fishing industry sectors, including seafood processors and distributors and shoreside support services, would be long term **minor** to **moderate** adverse.

Transmission cable infrastructure could cause a potential safety hazard should gear snag or hook on secondary cable protection. Cables could become uncovered during extreme storm events or other natural occurrences. Transmission cable infrastructure, together with the scour protection around the monopile foundations, would result in permanent gear impacts if not removed at decommissioning. In addition, seafloor preparation prior to cable installation may relocate boulders and other obstructions that could cause gear damage or loss.

As discussed in the No Action Alternative, economic impacts to fishing operations associated with gear damage or loss include the costs of gear repair or replacement, together with the fishing revenue lost while gear is being repaired or replaced. Revolution Wind would implement a number of measures to reduce entanglement and damage or loss of fishing gear during Project operations. Revolution Wind would conduct bathymetry surveys of cable placements to confirm that cables remain buried and that rock placement and concrete mattresses remain secured and undamaged. Surveys would be performed 1 year after commissioning, 2 to 3 years after commissioning, and 5 to 8 years after commissioning. Survey frequency thereafter would depend on the findings of the initial surveys (i.e., site seafloor dynamics and soil conditions). A survey could also be conducted after a major storm event (VHB 2023). Decommissioning would involve removing all components in the RWF to a depth of 15 feet (4.6 m) below the mudline (VHB 2023). In addition, as described above, presents a fishing gear conflict prevention and claim procedure that would reduce any adverse impacts to commercial or for-hire recreational fishing operations due to fishing gear damage or loss. As a result of these measures, the impact of buried submarine cables to commercial fisheries and for-hire recreational fishing through entanglement or gear loss/damage is expected to be long term **negligible** to **minor** adverse where cable burial can occur and long term **moderate** adverse where cable burial cannot occur.

The presence of the WTG and OSS foundations and associated scour protection would convert existing sand or sand with mobile gravel habitat to hard bottom, which in turn would reduce the habitat for target species that prefer soft-bottom habitat (e.g., squid, summer flounder, and surfclam) and increase the habitat for target species that prefer hard-bottom habitat (e.g., lobster, striped bass, black sea bass, and cod) (see Sections 3.6 and 3.13). However, given the small footprint of the Lease Area and RWEC, any localized adverse impacts to target species populations from habitat alteration would have a **negligible** to

**moderate** effect on the catch of for-hire recreational and commercial fisheries depending on the species targeted. As discussed in the No Action Alternative, where WTG and OSS foundations and associated scour protection produce an artificial reef effect and attract finfish and invertebrates, the aggregation of species could increase the catch rates of some target species. With respect to the Project, it is expected that the reef effect of the WTG foundations would have long-term **negligible** to **minor** beneficial impacts to for-hire recreational fishing, depending on the extent to which the foundations attract targeted species. Additionally, the presence of food or shelter associated with the structures could alter the migratory behaviors of some species. In particular, the potential for disruption of inshore to offshore migratory patterns of important species such as lobster and black sea bass has been identified as a topic of concern (see Sections 3.6 and 3.13). Overall, localized adverse or beneficial impacts to target species populations from habitat alteration would have a long-term **negligible** to **moderate** effect on the target species catch of for-hire recreational and commercial fisheries.

As discussed in the No Action Alternative, the offshore structures associated with offshore wind energy development could also affect commercial fisheries and for-hire recreational fishing by preventing or hampering NMFS's ongoing scientific surveys on which fishery management measures are based. Additional information on impacts to NMFS's scientific research and protected species surveys is provided in Section 3.17.

<u>Vessel traffic</u>: In comparison to the construction phase, Project O&M would require a more limited number of vessels, and most of the vessels would be smaller in size (VHB 2023). Although the total number of vessel transits would increase during O&M relative to construction, O&M vessel traffic would not have the same influx of vessels during a compressed time period as expected during construction. As a result, the increased vessel transits during O&M are not expected to result in a significant increase in the overall traffic volume or patterns (VHB 2023) (see Section 3.16).

During Project O&M, some commercial fishermen could avoid the Lease Area if large numbers of recreational fishermen are drawn to the area by the prospect of higher catches due to the artificial reef effect. Overall, the adverse effects of Project O&M to commercial fisheries and for-hire recreational fishing are expected to be long term **minor** to **moderate**.

### Onshore Activities and Facilities

<u>Port utilization</u>: During Project O&M, port facilities would be required for vessels used for routine maintenance of offshore Project components. These vessels would require berthing and would add traffic to port facilities. The additional vessel volume in ports could cause reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels and for-hire recreational fishing vessels. However, in comparison to the construction phase, Project O&M would require a more limited number of vessels (VHB 2023) (see Section 3.16). Given the low level of Project-related vessel traffic during O&M, the normal or routine functions of commercial and for-hire recreational fishing vessels within ports are not expected to be disrupted. Therefore, the adverse impacts on the accessibility of port facilities by commercial fishing vessels and for-hire recreational fishing vessels would be long term **minor**.

#### 3.9.2.3.3 Cumulative Impacts

### Offshore Activities and Facilities

Accidental releases and discharges: As discussed in the No Action Alternative (see Section 3.9.2.2), ongoing and future activities that reduce water quality could in turn decrease target species catch rates over the short term or long term depending on the type and volume of material released.

Compliance with regulatory requirements would effectively minimize releases of water quality contaminants and trash or debris. For this reason, the impacts of accidental releases and discharges of the Proposed Action on the target species catch of commercial and for-hire recreational fisheries would be undetectable. The impacts of the Proposed Action when combined with the impacts of present and other reasonably foreseeable activities are expected to be localized **negligible** to **minor** adverse and short term to long term.

Anchoring: Impacts from anchoring due to present and future military, survey, commercial, and recreational activities, including the Proposed Action, could pose a navigational hazard to commercial and for-hire recreational fishing vessels in the GAA. All impacts would be localized (within a few hundred yards of anchored vessel) and temporary (hours to days). The anchoring impacts of the Proposed Action on commercial and for-hire recreational fisheries would be the same as the No Action Alternative (see Section 3.9.2.2) and undetectable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be short term **negligible** to **moderate** adverse.

Climate change: The types of impacts from global climate change trends to commercial fisheries and for-hire recreational fishing described for the No Action Alternative would occur under the Proposed Action (see Table E2-12 in Appendix E1). These impacts are expected to be long term **minor** to **major** adverse for those fishing operations targeting species adversely affected by climate change trends and **minor** to **major** beneficial for those fishing operations targeting species beneficially affected by climate change trends.

As they become operational, future offshore wind facilities, including the Proposed Action, would produce fewer GHG emissions than fossil fuel–powered generating facilities with similar capacities. This reduction in GHG emissions (or avoidance of increased GHG emissions from equivalent fossil fuel–powered energy production) would result in long-term benefits to fishing operations that target species adversely affected by climate change trends. However, given the global scale of GHG emissions, the benefits would be **negligible**.

Light: Ongoing and future offshore activities, including the Proposed Action, that introduce artificial lighting could result in behavioral responses from some target species. In turn, these responses could decrease target species catch rates, thereby reducing revenue for commercial fishing and for-hire recreational fishing businesses. The light impacts of the Proposed Action on commercial and for-hire recreational fisheries would be undetectable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be long term **minor** to **moderate** adverse.

New cable emplacement/maintenance and EMF: As indicated in the discussed under the cumulative impacts discussion for the No Action Alternative, offshore wind energy development could result in the emplacement of up to 13,469 miles of offshore export and IACs. The Project would add an additional 239 miles of cable to this total, which is a 2% increase. To the fullest extent possible, future offshore wind energy projects would reduce the occurrence of accidental snagging of fishing gear by burying all cables beneath the seafloor. Therefore, the impact of buried submarine cables to commercial fisheries and for-hire recreational fishing from the Proposed Action would be the same as the impacts from the No Action Alternative: long term **moderate** adverse. In areas where cable burial cannot occur, other methods of cable protection would be employed, such as articulated concrete mattresses or rock placement. Impacts of this transmission cable infrastructure to commercial fisheries and for-hire recreational fishing through entanglement or gear loss/damage and navigation hazards are discussed below under the presence of structures IPF.

Although fishermen have raised concerns regarding the suspected behavioral impacts of EMF generated by submarine cables on target fish and invertebrates, there is no evidence to indicate that EMF from undersea AC power cables adversely affects commercially and recreationally important fish species within the southern New England area (CSA Ocean Sciences Inc. and Exponent 2019). Therefore, the impacts of EMF on commercial fisheries and for-hire recreational fishing are expected to be long term **negligible** to **minor** adverse.

Noise: Ongoing and future offshore activities, including the Proposed Action, that increase underwater noise could decrease the catch rates for some target species, thereby reducing the revenue for commercial fishing and for-hire recreational fishing businesses. These noise impacts are expected to be long term **moderate** adverse.

Presence of structures: Most offshore structures in the GAA would be attributable to the offshore wind industry. As provided in Table E3-1 in Appendix E3 and discussed under the No Action Alternative, offshore wind energy development could result in the installation of 3,088 WTG and OSS foundations through 2030. The impact of the Project would be noticeable because it would add as many as 102 foundations, which is a 3% increase.

The addition of these new structures and cables in the GAA could adversely impact commercial fisheries and for-hire recreational fishing due to potential increased space-use conflicts that may result in navigational hazards, allisions, and gear loss/damage. Vessels would have an increasingly difficult time finding new places to fish if displaced by other regional offshore wind energy projects. Therefore, cumulative impacts on fishing operations would increase as more of these projects are developed. Fishing revenue would be foregone if these impacts cause fishing vessel operators to no longer fish in affected areas, and they cannot capture that revenue in different locations. If the Project is not included, the annual commercial fishing revenue exposed at the end of the project development timeline for all planned offshore wind energy lease areas in the Mid-Atlantic and New England regions is estimated to be approximately $34.0 million (see Table 3.9-24). Based on the data in Table 3.9-25, the Proposed Action would increase the commercial fishing revenue at risk by $1.42 million, which is an increase of approximately 4.2%.

With respect to impacts to individual fishing operations, some of the small number of fishing operations that derive a large percentage of their total revenue from areas where offshore wind energy facilities would be located could choose to avoid these areas once the facilities become operational. In the event that these fishing operations are unable to find suitable alternative fishing locations, they could experience long-term **major** adverse impacts. However, most fishing vessels would only have to adjust somewhat to account for disruptions due to the presence of structures. A majority derive a small percentage of their total revenue from any one lease area or would be able to relocate to other fishing locations. In addition, the impacts of offshore wind energy facilities could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect, which would increase the catch rates for some target species.

Overall, BOEM expects that the cumulative adverse impacts of the presence of structures resulting from the Project and other past, present, and reasonably foreseeable activities would be long term and **moderate** to **major,** depending on the fishery and fishing operation. If BOEM's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects (see BOEM 2022), adverse impacts on commercial fisheries due to the presence of structures could be reduced.

<u>Vessel traffic</u>: The GAA is expected to continue to have extensive marine traffic related to shipping, fishing, and other activities, and the risk for vessel collisions would be ongoing but infrequent due to the implementation of the *Fisheries Communication and Outreach Plan* prepared by Orsted U.S. Offshore Wind (2020). The vessel traffic impacts of the Proposed Action on commercial and for-hire recreational fisheries would be noticeable, but the risk of vessel collisions is expected to remain low. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be long term **minor** to **moderate** adverse.

### Onshore Activities and Facilities

<u>Port utilization</u>: The major ports in the GAA are anticipated to continue to have increasing vessel visits, and vessel size is also expected to increase. The increased vessel traffic in ports could result in delays or restrictions in access to ports and increased competition for dockside services. Future offshore wind energy projects, including the Project, would contribute to the increase in vessel traffic. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to, and higher costs for, high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels and for-hire recreational fishing vessels. These potential adverse impacts could cause some fishing vessel operators to use an alternative port (see Sections 3.16 and 3.11). As fishing vessels shift the location of their landings and shoreside service activities, the result could be economic losses and a decline in fisheries-related onshore infrastructure in some ports but could be economic gains and enhanced infrastructure in others.

However, regardless of whether or not offshore wind energy development, including the Project, occurs, most ports are going through continual upgrades and maintenance to ensure that they can receive projected future volumes of vessels. State and local agencies would be responsible for minimizing the potential adverse impacts of additional port utilization by managing traffic to ensure continued access to port facilities (see Section 3.16). In addition, the use of multiple ports to support offshore wind energy project development would reduce the related congestion impacts in any one port. Therefore, the port utilization impacts of present and other reasonably foreseeable activities to commercial fisheries and for-hire recreational fishing are expected to be localized and long term **minor** to **moderate** adverse.

### Conclusions

Construction and installation, O&M, and decommissioning of the Proposed Action could impact commercial fisheries and for-hire recreational through restricted port access, increased space-use conflicts, and reduced catch levels of target species. The impacts under the Proposed Action resulting from individual IPFs would range from short term to long term and **negligible** to **major** adverse, with the duration and intensity of impacts varying by Project phase and by fishery and fishing operation due to differences in target species, gear type, and predominant location of fishing activity. With EPMs, it is estimated that the majority of vessels would only have to adjust somewhat to account for disruptions due to impacts. In addition, the impacts of the Proposed Action could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in an overall long-term **major** adverse impact because some commercial and for-hire recreational fisheries and fishing operations would experience substantial disruptions indefinitely even if remedial action is taken. This impact level is primarily driven by climate change trends, fisheries management activities, and the presence of offshore structures. The majority of offshore structures in the GAA would be attributable to the offshore wind industry.

### 3.9.2.4 Alternatives C, D, E, and F

#### 3.9.2.4.1 Construction and Installation

##### Offshore Activities and Facilities

<u>Presence of structures</u>: In general, impacts on commercial fisheries from the presence of structures would be the same or similar to the Proposed Action. However, by omitting certain WTG positions, Alternatives C through F would reduce the adverse impact of the presence of structures on commercial fisheries and for-hire recreational fishing during Project construction. In comparison to the Proposed Action, fishing access would be improved and the risk of fishing gear loss/damage would be reduced.

Based on NMFS 2008–2019 data, Tables G-CF10 through G-CF21 in Appendix G show the estimated number of vessels and vessel trips that would be affected as a result of construction activities in the Lease Area and along the RWEC under Alternatives C1, C2, and E2 (NMFS 2021a, 2022b). Under all these alternatives, the impacts in terms of the number of vessels active in the Lease Area and along the RWEC as a percentage of total fishing effort in the RFA across FMP fisheries, species, gear types, and ports would be the same or similar to the Proposed Action. Vessel and trip data for all design configurations of Alternative D and for Alternate E1 could not be provided because the data were provided separately for the Lease Area and RWEC. Combining the data for the two areas could result in double counting. Vessel and trip data for Alternative F could not be provided because it is uncertain what WTG positions would be omitted under this alternative.

Based on NMFS 2008–2019 data, Tables G-CF26 through G-CF58 in Appendix G show the estimated amount of commercial fishing revenue that would be exposed as a result of construction activities in the Lease Area and along the RWEC under each configuration for Alternatives C through E (NMFS 2021a, 2022b). The estimates are shown by FMP fishery, gear type, and port.

As under the Proposed Action, under all the design configurations of Alternatives C, D, and E, the largest impacts in terms of exposed revenue as a percentage of total revenue in the RFA would be in the Spiny Dogfish, American Lobster, Atlantic Herring, and Northeast Skate Complex FMP fisheries. Table 3.9-28 summarizes the estimated amount of commercial fishing revenue that would be exposed across all FMP and non-FMP fisheries under the design configurations of Alternatives C, D, and E.

**Table 3.9-28. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the Revolution Wind Export Cable Across all FMP and Non-FMP fisheries under Alternatives C, D, and E**

| Alternative | Annual Revenue at Risk (millions) | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|
| C1 | $1.33 | 0.92 |
| C2 | $1.27 | 0.88 |
| D1 | $1.34 | 0.93 |
| D2 | $1.37 | 0.95 |
| D3 | $1.35 | 0.94 |
| D1+D2 | $1.30 | 0.90 |
| D1+D3 | $1.27 | 0.88 |
| D2+D3 | $1.30 | 0.90 |
| D1+D2+D3 | $1.23 | 0.85 |
| E1 | $1.06 | 0.74 |
| E2 | $1.17 | 0.81 |

Source: Developed using 2008-2019 data from NMFS (2021a, 2022b).

The amount of commercial fishing revenue that would be exposed across all FMP and non-FMP fisheries is estimated to be $1.33 million under Alternative C1 and $1.27 million under Alternative C2. The annual exposed revenue as a percentage of average annual revenue for all FMP and non-FMP fisheries in the RFA would be 0.92% under Alternative C1 and 0.88% under Alternative C2. Midwater trawl, all other, and pot gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would be in Little Compton (6.8%), Westport (5.0%), and Newport (3.6%) under Alternative C1 and Little Compton (6.5%), Westport (4.2%), and Newport (3.5%) under Alternative C2.

The amount of commercial fishing revenue that would be exposed across all FMP and non-FMP fisheries is estimated to be $1.34 million under Alternative D1, $1.37 million under Alternative D2, $1.35 million under Alternative D3, $1.30 million under D1+D2, $1.27 million under D1+D3, $1.30 million under D2+D3, and $1.23 million under D1+D2+D3. The annual exposed revenue as a percentage of average annual revenue for all FMP and non-FMP fisheries in the RFA would be 0.93% under Alternative D1, 0.95% under Alternative D2, 0.94% under Alternative D3, 0.90% under D1+D2, 0.88% under D1+D3, 0.90% under D2+D3, and 0.85% under D1+D2+D3. Midwater trawl, all other, and pot gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would be in Little Compton (7.0%), Westport (5.3%), and Chilmark/Menemsha (3.8%) under Alternative D1; Little Compton (7.3%), Westport (5.6%), and Newport (3.7%) under

Alternative D2; Little Compton (12.5%), Westport (10.5%), and Chilmark/Menemsha (7.9%) under Alternative D3; Little Compton (6.9%), Westport (5.2%), and Newport (3.6%) under Alternative D1+D2; Little Compton (6.6%), Westport (5.2%), and Chilmark/Menemsha (3.7%) under Alternative D1+D3; Little Compton (7.0%), Westport (5.5%), and Newport (3.6%) under Alternative D2+D3; and Little Compton (6.5%), Westport (5.1%), and Newport (3.5%) under Alternative D1+D2+D3.

The amount of commercial fishing revenue that would be exposed across all FMP and non-FMP fisheries is estimated to be $1.06 million under Alternative E1 and $1.17 million under Alternative E2. The annual exposed revenue as a percentage of average annual revenue for all FMP and non-FMP fisheries in the RFA would be 0.74% under Alternative E1 and 0.81% under Alternative E2. Midwater trawl, all other, and sink gillnet gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would as follows: Little Compton (5.5%), Westport (3.6%), and Newport (3.1%) under Alternative E1 and Little Compton (6.2%), Westport (5.0%), and Chilmark/Menemsha (3.7%) under Alternative E2.

The estimated amount of commercial fishing revenue that would be exposed as a result of construction activities in the Lease Area and along the RWEC would be lower for all design configurations under Alternatives C through E than under the Proposed Action ($1.42 million). However, the amount of exposed revenue as a percentage of average annual revenue for all FMP and non-FMP fisheries in the RFA under all design configurations would be similar to that for the Proposed Action (0.99%). Therefore, the impact level from the presence of structures for all design configurations would be similar to that for the Proposed Action: short term **negligible** to **moderate** adverse for the majority of commercial fishing vessels but short term **major** adverse for a small number of vessels.

It is uncertain what WTG positions would be omitted under Alternative F. Consequently, it is not possible to estimate the amount of commercial fishing revenue that would be exposed as a result of construction activities in the Lease Area and along the RWEC under this alternative. However, the impact level from the presence of structures for Alternative F is expected to be similar to that for the Proposed Action: short term **minor** to **moderate** adverse.

#### 3.9.2.4.2 Operations and Maintenance and Conceptual Decommissioning

#### Offshore Activities and Facilities

Presence of structures: In general, impacts on commercial fisheries from the presence of structures would be the same or similar to the Proposed Action. However, by omitting certain WTG positions, Alternatives C through F would reduce the adverse impact of the presence of structures on commercial fisheries and for-hire recreational fishing during Project O&M. In comparison to the Proposed Action, fishing access would be improved, and the risk of fishing gear loss/damage would be reduced.

The amount of commercial fishing revenue that would be exposed as a result of O&M activities in the Lease Area and along the RWEC would be the same as the amount exposed during construction. As described above, under all design configurations, the largest impacts in terms of exposed revenue as a percentage of total revenue in the Mid-Atlantic and New England regions or as a percentage of total revenue in the RFA would be in the Spiny Dogfish, Atlantic Herring, and American Lobster FMP fisheries.

#### 3.9.2.4.3 Cumulative Impacts

**Offshore Activities and Facilities**

Presence of structures: The addition of both new structures and new cables in the GAA could adversely impact commercial fisheries and for-hire recreational fishing due to potential increased space-use conflicts that may result in navigational hazards, allisions, and gear loss/damage. Fishing revenue would be foregone if these impacts cause fishing vessel operators to no longer fish in affected areas, and they cannot capture that revenue in different locations. If the Project is not included, the amount of commercial fishing revenue exposed by planned offshore wind energy development in the Mid-Atlantic and New England regions is estimated to be approximately $34.0 million per year by 2029 (see Table 3.9-24). As described in Section 3.9.2.2.3, the Proposed Action would increase the commercial fishing revenue at risk by $1.42 million, which is an increase of approximately 4.2%.

Alternative C would increase the commercial fishing revenue at risk by $1.33 million under Alternative C1 and $1.27 million under Alternative C2. These impacts add 3.9% and 3.7%, respectively, to the revenue exposed by planned offshore wind energy development in the Mid-Atlantic and New England regions.

Alternative D would increase the commercial fishing revenue at risk by $1.34 million under Alternative D1, $1.37 million under Alternative D2, $1.35 million under Alternative D3, $1.30 million under D1+D2, $1.27 million under D1+D3, $1.30 million under D2+D3, and $1.23 million under D1+D2+D3. These impacts add from 3.6% (under D1+D2+D3) to 4.0% (under D2) to the revenue exposed by planned offshore wind energy development in the Mid-Atlantic and New England regions.

Alternative E would increase the commercial fishing revenue at risk by $1.06 million under Alternative E1 and $1.17 million under Alternative E2. These impacts add 3.1% and 3.4%, respectively, to the revenue exposed by planned offshore wind energy development in the Mid-Atlantic and New England regions.

As described above, for Alternative F, it is not possible to estimate the amount of commercial fishing revenue that would be exposed as a result of Project activities in the Lease Area and along the RWEC because it is uncertain what WTG positions would be omitted under this alternative.

Overall, BOEM expects that the cumulative impacts of the presence of structures resulting from all design configurations under Alternatives C through F and other past, present, and reasonably foreseeable activities would be similar to the cumulative impacts under the Proposed Action: long term **moderate** to **major** adverse depending on the fishery and fishing operation. If BOEM's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects, adverse impacts on commercial fisheries due to the presence of structures could be reduced.

#### 3.9.2.4.4 Conclusions

Alternatives C through F under all layout options could result in fewer WTGs compared to the maximum scenarios under the Proposed Action, which would decrease the potential for space-use conflicts that may result in navigational hazards, allisions, and fishing gear loss/damage in commercial and for-hire recreational fisheries. However, BOEM expects that for all design configurations analyzed, the impacts resulting from individual IPFs would be similar to the Proposed Action: short term to long term and **negligible** to **major** adverse, with the duration and intensity of impacts varying by Project phase and fishery and fishing operations due to differences in target species, gear type, and predominant location of fishing activity. With EPMs, it is estimated that the majority of vessels would only have to adjust somewhat to account for disruptions due to impacts. In addition, the impacts of Alternatives C through F could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect.

The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be the same as under the Proposed Action: long term **major** adverse, primarily as a result of climate change trends, fisheries management activities, and the presence of offshore structures. The majority of offshore structures in the GAA would be attributable to the offshore wind industry.

### 3.9.2.5 Alternative G: Impacts of the Preferred Alternative on Commercial Fisheries and For-Hire Recreational Fishing

#### 3.9.2.5.1 Construction and Installation

#### Offshore Activities and Facilities

Presence of structures: By omitting certain WTG positions, Alternative G would reduce the adverse impact of the presence of structures on commercial fisheries and for-hire recreational fishing during Project construction. In comparison to the Proposed Action, fishing access would be improved, and the risk of fishing gear loss/damage would be reduced.

Tables G-CF22 through G-CF25 in Appendix G show the estimated number of vessels and vessel trips anticipated to be affected as a result of construction activities in the Lease Area and along the RWEC under Alternative G based on NMFS 2008–2019 data NMFS (2021a, 2023a). The impacts in terms of the number of vessels active in the Lease Area and along the RWEC as a percentage of total fishing effort in the RFA across FMP fisheries, species, gear types, and ports would be the same or similar to the Proposed Action.

Tables G-CF59 through G-CF61 in Appendix G show the estimated amount of commercial fishing revenue that would be exposed as a result of construction activities in the Lease Area and along the RWEC under Alternative G. The estimates are shown by FMP fishery, gear type, and port. As under the Proposed Action, the largest impacts under Alternative G in terms of exposed revenue as a percentage of total revenue in the RFA would be in the Spiny Dogfish, American Lobster, Atlantic Herring, and Northeast Skate Complex FMP fisheries. The amount of commercial fishing revenue that would be exposed across all FMP and non-FMP fisheries is estimated to be $1.14 million under Alternative G. The annual exposed revenue as a percentage of average annual revenue for all FMP and non-FMP fisheries in the RFA would be 0.79%. Midwater trawl, all other, and sink gillnet gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would be in Little Compton (6.4%), Westport (5.1%), and Chilmark/Menemsha (3.6%).

More information on the annual commercial fishing revenue at risk under Alternative G is provided in Appendix G. Appendix G Table G-CF66 shows the commercial fishing revenue in the entire Lease Area

(Figure 1.1-2) and the Lease Area under Alternative G (Figure 2.1-22) by state of landing for each year from 2008 to 2021. Table G-CF67 compares the average annual commercial fishing revenue in the entire Lease Area and the Lease Area under Alternative G by state of landing based on the data for two different time periods: 2008–2019 and 2008–2021.

The estimated amount of commercial fishing revenue that would be exposed as a result of construction activities in the Lease Area and along the RWEC would be lower under Alternative G than under the Proposed Action ($1.42 million). However, the amount of exposed revenue as a percentage of average annual revenue for all FMP and non-FMP fisheries in the RFA would be similar to that for the Proposed Action (0.99%). Therefore, the impact level from the presence of structures would be similar to that for the Proposed Action: short term **negligible** to **moderate** adverse for the majority of commercial fishing vessels but short term **major** adverse for a small number of vessels.

### 3.9.2.5.2 Operations and Maintenance and Conceptual Decommissioning

#### Offshore Activities and Facilities

<u>Presence of structures</u>: By omitting certain WTG positions, Alternative G would reduce the adverse impact of the presence of structures on commercial fisheries and for-hire recreational fishing during Project O&M. In comparison to the Proposed Action, fishing access would be improved, and the risk of fishing gear loss/damage would be reduced.

The amount of commercial fishing revenue that would be exposed as a result of O&M activities in the Lease Area and along the RWEC would be the same as the amount exposed during construction. As described above, under all design configurations, the largest impacts in terms of exposed revenue as a percentage of total revenue in the Mid-Atlantic and New England regions or as a percentage of total revenue in the RFA would be in the Spiny Dogfish, Atlantic Herring, and American Lobster FMP fisheries.

### 3.9.2.5.3 Cumulative Impacts

#### Offshore Activities and Facilities

<u>Presence of structures</u>: The addition of both new structures and new cables in the GAA could adversely impact commercial fisheries and for-hire recreational fishing due to potential increased space-use conflicts that may result in navigational hazards, allisions, and gear loss/damage. Fishing revenue would be foregone if these impacts cause fishing vessel operators to no longer fish in affected areas, and they cannot capture that revenue in different locations. If the Project is not implemented, the amount of commercial fishing revenue exposed by planned offshore wind energy development in the Mid-Atlantic and New England regions is estimated to be approximately $34.0 million per year by 2029 (see Table 3.9-24). As described in Section 3.9.2.2.3, the Proposed Action would increase the commercial fishing revenue at risk by $1.42 million, which is an increase of approximately 4.2%.

Alternative G would increase the commercial fishing revenue at risk by $1.14 million. This impact adds 3.3% to the revenue exposed by planned offshore wind energy development in the Mid-Atlantic and New England regions.

Overall, BOEM anticipates that the cumulative impacts of the presence of structures resulting from Alternative G and other past, present, and reasonably foreseeable activities would be similar to the cumulative impacts under the Proposed Action: long term **moderate** to **major** adverse depending on the fishery and fishing operation. If BOEM's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects, adverse impacts on commercial fisheries due to the presence of structures could be reduced.

### Conclusions

Alternative G would result in fewer WTGs installed compared to the maximum scenario under the Proposed Action, which would decrease the potential for space-use conflicts that may result in navigational hazards, allisions, and fishing gear loss/damage in commercial and for-hire recreational fisheries. However, BOEM expects the impacts resulting from individual IPFs would be similar to the Proposed Action: short term to long term and **negligible** to **major** adverse, with the duration and intensity of impacts varying by Project phase and fishery and fishing operations due to differences in target species, gear type, and predominant location of fishing activity. With EPMs, it is estimated that most vessels would only have to adjust somewhat to account for disruptions due to impacts. In addition, the impacts of Alternative G could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect.

The overall impacts of Alternative G when combined with past, present, and reasonably foreseeable activities would be the same as the Proposed Action: long term **major** adverse, primarily as a result of climate change trends, fisheries management activities, and the presence of offshore structures. Most of the offshore structures in the GAA would be attributable to the offshore wind industry.

### 3.9.2.6 Mitigation

Mitigation measures resulting from agency consultations for benthic habitat and invertebrates are identified in Appendix F, Table F-2, and addressed in Table 3.9-29. Additional mitigation and monitoring measures identified by BOEM are provided in Table F-3 in Appendix F and addressed in Table 3.9-30.

**Table 3.9-29. Mitigation and Monitoring Measures Resulting from Consultations for Commercial Fisheries and For-Hire Recreational Fishing (Appendix F, Table F-2)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Locations of boulders, berms, and protection measures | Locations of relocated boulders, created berms, and scour protection, including cable protection measures (i.e., concrete mattresses) should be provided to NMFS and the public as soon as possible to help inform marine users, including the fishing industry and entities conducting scientific surveys of potential gear obstructions. | This measure, if adopted, would assist agency, public, and industry to avoid potential seafloor obstructions. |

**Table 3.9-30. Additional Mitigation and Monitoring Measures for Commercial Fisheries and For-Hire Recreational Fishing (Appendix F, Table F-3)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Boulder relocation plan | Revolution Wind must submit to BOEM a boulder relocation plan that will include the following:<br>1) Identification of areas of active (within last 5 years) bottom trawl fishing, areas where boulders greater than 2 m in diameter are anticipated to occur, and areas where boulders are expected to be relocated for Project purposes.<br>2) Methods to minimize the quantity of seafloor obstructions from relocated boulders in areas of active bottom trawl fishing, as identified in #1.<br>The plan must be submitted to BOEM at least 90 days prior to IAC corridor preparation and cable installation (e.g., boulder relocation, pre-cut trenching, cable crossing installation, cable lay and burial) and foundation site preparation (e.g., scour protection installation). | This measure, if adopted, would minimize the number of potential seafloor obstructions that may interact with bottom trawl fisheries. |
| Mobile gear–friendly cable | Cable protection measures should reflect the preexisting conditions at the site. This mitigation measure chiefly ensures that seafloor cable protection does not introduce new hangs for | This measure, if adopted, would ensure that seafloor cable protection does not introduce new hangs for mobile fishing gear (reducing impacts from the Presence of Structures IPF). |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| protection measures | mobile fishing gear. Thus, the cable protection measures should be trawl-friendly with tapered/sloped edges. If cable protection is necessary in "non-trawlable" habitat, such as rocky habitat, then the lessee should consider using materials that mirror the benthic environment. | |
| Post-installation cable monitoring | Revolution Wind must provide BOEM with a cable monitoring report within 45 calendar days following each IAC and export cable inspection to determine cable location, burial depths, state of the cable, and site conditions. An inspection of the inter-array cable and export cable is expected to include high-resolution geophysical (HRG) methods, such as a multi-beam bathymetric survey equipment, and is expected to identify seabed features, natural and human-made hazards, and site conditions along federal sections of the cable routing.<br>In federal waters, the initial IAC and export cable inspection would be carried out within 6 months of commissioning, and subsequent inspections would be carried out at years 1 and 2, then every 3 years thereafter, and after a major storm event. Major storm events are defined as when metocean conditions at the facility meet or exceed the 1 in 50-year return period calculated in the metocean design basis, to be submitted to BOEM with the facility design report (FDR). If conditions warrant adjustment to the frequency of inspections following the Year 2 survey, a revised monitoring plan may be provided to BOEM for review.<br>In addition to inspection, the export cable would be monitored continuously with the as-built distributed temperature sensing system. If distributed temperature sensing data indicate that burial conditions have deteriorated or changed significantly and remedial actions are warranted, the distributed temperature sensing data, a seabed stability analysis, and report of remedial actions taken or scheduled must be provided to BOEM within 45 calendar days of the observations. | This measure, if adopted, would ensure that seafloor cables remain buried, reducing impacts from potential gear entanglement and damage. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | The Distributed Temperature Sensing data, cable monitoring survey data, and cable conditions analysis for each year must be provided to BOEM as part of the annual compliance reports, required by 30 CFR 285.633(b). | |
| Federal survey mitigation guidance | There are 14 NMFS scientific surveys that overlap wind energy development in the northeast region, and eight of these surveys overlap the Project. Per NMFS and BOEM survey mitigation strategy actions 1.3.1, 1.3.2, 2.1.1, and 2.1.2 (Hare et al. 2022), within 120 calendar days of COP approval, Revolution Wind must submit to BOEM a draft survey mitigation agreement between NMFS and Revolution Wind. The survey mitigation agreement will describe how Revolution Wind will mitigate the Project impacts on the eight NMFS surveys. If after consultation with NMFS NEFSC, BOEM deems the survey mitigation agreement acceptable, the mitigation will be considered required as a term and condition of the Project's COP approval.<br>As soon as reasonably practicable, but no later than 30 days after the issuance of the Project's COP approval, Revolution Wind will initiate coordination with NMFS NEFSC to develop the survey mitigation agreement described above. Mitigation activities specified under the agreement will be designed to mitigate the Project impacts on the following NMFS NEFSC surveys: 1) spring bottom trawl survey, 2) autumn multi-species bottom trawl survey, 3) ecosystem monitoring survey, 4) NARW aerial survey, 5) aerial marine mammal and sea turtle survey, 6) shipboard marine mammal and sea turtle survey, 7) Atlantic surfclam and ocean quahog survey, and 8) Atlantic sea scallop survey. At a minimum, the survey mitigation agreement will describe actions needed and the means to address impacts on the affected surveys due to the preclusion of sampling platforms and impacts on statistical designs. In terms of statistical design, the Project will be viewed as a discrete stratum in surveys that use a random stratified design. Other anticipated Project impacts on NMFS surveys such as | This measure, if adopted, would reduce uncertainty in scientific survey results, which would reduce uncertainty in stock assessments and quota setting processes. This reduced uncertainty, in turn, would help avoid more conservative catch quotas and/or more restrictive effort management measures for commercial and recreational fisheries. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | changes in habitat and increased operational costs due to loss of sampling efficiencies may also be addressed in the agreement.<br>The survey mitigation agreement will identify activities that will result in the generation of data equivalent to data generated by NMFS's affected surveys for the duration of the Project. The survey mitigation agreement will describe the implementation procedures by which Revolution Wind will work with NEFSC to generate, share, and manage the data required by NEFSC for each of the surveys impacted by the Project, as mutually agreed upon between Revolution Wind and NMFS/NEFSC. The survey mitigation agreement must also describe Revolution Wind's participation in the NMFS NEFSC Northeast Survey Mitigation Program to support activities that address regional-level impacts for the surveys listed above. | |
| Shoreside seafood business analysis | In addition to the Direct Compensation Fund proposed by Revolution Wind, BOEM would require Revolution Wind to ensure that the Direct Compensation Fund includes losses to shoreside seafood support services. Revolution Wind shall analyze the impacts to shoreside seafood support services within the communities nearby ports listed in Table 3.9-12. The shoreside seafood business analysis would be used to further supplement funds available for settling claims of lost (unrecovered) economic activity as a result of the Project.<br>Revolution Wind must submit to BOEM a report that includes 1) a description of the structure of the fund and its consistency with BOEM's draft guidance and 2) an analysis of the impacts of the Project on shoreside businesses for review and comment. Revolution Wind must then submit to BOEM evidence of the implementation of the Fund, including the following:<br>A description of any implementation details not covered in the report to BOEM regarding the mechanism established to compensate for losses to commercial and for-hire recreational fishermen and related shoreside businesses resulting from all | This measure, if adopted, would reduce economic impacts to shoreside businesses engaged in commercial and for-hire recreational fisheries. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | phases of the project development on the Lease Area (preconstruction, construction, operation, and decommissioning)<br>The Direct Compensation Fund charter, including the governance structure, audit and public reporting procedures, and standards for paying compensatory mitigation for impacts to fishers and related shoreside businesses from lease area development<br>Documentation regarding the funding account, including the dollar amount, establishment date, financial institution, and owner of the account | |

#### 3.9.2.6.1 Measures Incorporated into the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits listed in Table 3.9-29 and in Appendix F, Table F-2, are incorporated into Alternative G (Preferred Alternative). These measures, if adopted, would further define how the effectiveness and enforcement of EPMs would be ensured and improve accountability for compliance with EPMs by requiring the submittal of analyses and plans for approval by the enforcing agency(ies) and by defining reporting requirements. Because these measures ensure the effectiveness of and compliance with EPMs that are already analyzed as part of the Preferred Alternative, implementation of these measures would not further reduce the impact level of the Preferred Alternative from what is described in Section 3.9.2.5.

## 3.10 Cultural Resources

The Cultural Resources section addresses marine and terrestrial archaeological resources and visually sensitive cultural resources located within the viewshed of Project elements, also referred to as viewshed resources. All other visual (non-historic) resources are addressed in Section 3.20. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties on identified cultural resources, adverse effects, and the resolution of adverse effects.[27] The Project constitutes an undertaking under NHPA Section 106. BOEM is using the NEPA process to substitute for the NHPA Section 106 process on this undertaking, in accordance with the Section 106 implementing regulations, 36 CFR 800, and pursuant to 36 CFR 800.8(c) (see also CEQ and ACHP 2013 and ACHP 2020). The Cultural Resources section discusses potential impacts on cultural resources from the Project, alternatives, and ongoing and planned activities in the cultural resources GAA.

Geographic Analysis Area: The combined GAA for cultural resources (marine, terrestrial, and viewshed), as shown in Figures 3.10-1 through 3.10-4, is equivalent to the Project's area of potential effects (APE), as defined in the Section 106 regulations. In 36 CFR 800.16(d), the APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alteration in the character or use of historic properties," or cultural resources that are eligible for the National Register of Historic Places (NRHP), "if any such properties exist." BOEM (2020a) and in Appendix J defines the Project APE as

- the depth and breadth of the seafloor potentially affected by any bottom-disturbing activities, constituting the marine cultural resources portion of the APE;
- the depth and breadth of terrestrial areas potentially affected by any ground-disturbing activities, constituting the terrestrial cultural resources portion of the APE;
- the viewshed from which renewable energy structures, whether located offshore or onshore, would be visible, constituting the APE for visual impacts analysis; and
- any temporary or permanent construction or staging areas, both onshore and offshore.

Table E2-9 in Appendix E1 summarizes baseline conditions and impacts to cultural resources, based on IPFs assessed and that would arise from ongoing activities, future non-offshore wind activities, and offshore wind activities.

The phrase *cultural resources* refers to archaeological sites, buildings, structures, objects, and districts, which may include cultural landscapes and traditional cultural places (TCPs). These resources may be historic properties as defined in 36 CFR 800.16(l) and may be listed on national, state, or local historic registers or be identified as being important to a particular group during consultation. Federal, state, and local regulations recognize the public's interest in cultural resources. Many of these regulations, including NEPA and the NHPA, require a project to consider how it might significantly affect cultural resources.

[27] The term "adverse" has a specific meaning under NHPA Section 106 regulations (in 36 CFR 800.5) and, therefore, to remove confusion in the Cultural Resources section, the terms "negative" and "beneficial" are used in the identification of impacts under NEPA.

### 3.10.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Cultural Resources

This section discusses baseline conditions in the GAA for cultural resources as described in the COP, COP Appendices M, N, and U2, and supplemental cultural resources studies (i.e., EDR 2021a, 2022, 2023a; Forrest and Waller 2023; Revolution Wind 2022; SEARCH 2023). Specifically, this includes terrestrial and offshore areas potentially affected by the proposed Project's land- or seafloor-disturbing activities, areas where structures from the Project would be visible, and the area of intervisibility where structures from both the Project and future offshore wind projects would be visible simultaneously.

Revolution Wind has conducted onshore and offshore cultural resources investigations to identify known and previously unidentified cultural resources within the marine cultural resources, terrestrial cultural resources, and viewshed resources portions of the APE. Table 3.10-1 presents an archaeological summary of the pre-Contact period and post-Contact period cultural context of Rhode Island, Massachusetts, and surrounding areas (Forrest and Waller 2023).

**Table 3.10-1. Cultural Resources Context for Rhode Island, Massachusetts, and Surrounding Areas**

| Period | | Years Before Present (B.P.) |
|---|---|---|
| Pre-Contact | Ancient (Paleoindian) | 13,500–11,000 |
| | Archaic | 11,000–3000 |
| | Early Archaic | 11,000–9000 |
| | Middle Archaic | 9000–6000 |
| | Late Archaic | 6000–3000 |
| | Transitional Archaic | 3900–2500 |
| | Woodland | 3000–450 |
| | Early Woodland | 3000–1600 |
| | Middle Woodland | 1600–1000 |
| | Late Woodland | 1000–450 |
| Post-Contact | Native American, colonial, and U.S. cultural history | 450–0 |

<u>Marine cultural resources review</u>: A marine archaeological resources assessment (MARA) is in COP Appendix M.[28] The MARA identified 32 submerged marine cultural resources (SEARCH 2023). Nineteen of these are post-Contact historic shipwrecks or possible shipwrecks. Thirteen are geomorphic features of ancient submerged landforms. These features consist of discrete and discontinuous locations that may contain preserved evidence of formerly terrestrial landscape features that have survived erosion during the Ancient to Archaic periods of seashore submersion, known as marine transgression, that proceeded over a time frame of several thousand years after the recession of glaciers at the end of the Pleistocene epoch or last Ice Age. Geomorphic features derive their significance from their archaeological

[28] The content of COP Appendix M contains sensitive information and is not available for public review, but a redacted version and non-technical summary are available on BOEM's website: https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan.

potential and potential connections to Native American lifeways, such as their potential for pre-Contact cultural resources and their contribution to a broader culturally significant landscape.

Terrestrial cultural resources review: A terrestrial archaeological resources assessment (TARA) is in COP Appendix N.[29] The TARA identified four terrestrial cultural resources through Phase I archaeological surveys (Forrest and Waller 2023), which is the initial investigation phase of archaeological survey. These terrestrial cultural resources include a Native American encampment dating to the Archaic and Woodland periods, a Native American encampment with stone tool manufacturing waste materials dating to the Late Archaic or perhaps Early Woodland period, a pre-Contact low density locus of chipped stone manufacture, and a pre-Contact isolated quartz flake produced by stone working.

Viewshed resources review: Two historic resources visual effects assessments (HRVEA) are included in COP Appendix U,[30] one for the viewshed of the onshore Project components and another for the viewshed of the offshore Project components. For the onshore HRVEA, viewshed analyses determined that two viewshed resources—both of which contain historic buildings and structures—are within the viewshed APE (EDR 2021a). From 451 viewshed resources identified in the viewshed APE within the offshore HRVEA (including 12 National Historic Landmarks [NHLs]), viewshed analyses found 101 aboveground viewshed resources with the potential to be negatively affected from a moderate to major degree in the viewshed APE (EDR 2023a). These moderate to major impacts would rise to a level of adverse effects under the NHPA Section 106 criteria at 36 CFR 800. These 101 viewshed resources consist of two TCPs and 99 historic buildings, structures, or districts (including five NHLs[31]).

#### 3.10.1.1 Marine Cultural Resources

Geographic analysis area: BOEM (2020a) defines the APE for the marine cultural resources GAA (hereafter marine APE) as the depth and breadth of the seafloor potentially impacted by bottom-disturbing activities by the Project (see Figure 3.10-1).

[29] The content of COP Appendix N contains sensitive information and is not available for public review, but a redacted version and non-technical summary are available on BOEM's website: https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan.

[30] The content of COP Appendix U contains sensitive information and is not available for public review, but a redacted version and non-technical summary are available on BOEM's website: https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan.

[31] The National Park Service (NPS), which administers the NHL program for the Secretary of the Interior (Secretary), describes NHLs and the requirements for NHLs as follows: "National Historic Landmarks (NHL) are designated by the Secretary under the authority of the Historic Sites Act of 1935, which authorizes the Secretary to identify historic and archaeological sites, buildings, and objects which 'possess exceptional value as commemorating or illustrating the history of the United States.' Section 110(f) of the NHPA requires that Federal agencies exercise a higher standard of care when considering undertakings that may directly and adversely affect NHLs. The law requires that agencies, 'to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to such landmark.' In those cases when an agency's undertaking directly and adversely affects an NHL, or when Federal permits, licenses, grants, and other programs and projects under its jurisdiction or carried out by a state or local government pursuant to a Federal delegation or approval so affect an NHL, the agency should consider all prudent and feasible alternatives to avoid an adverse effect on the NHL. (NPS 2021)

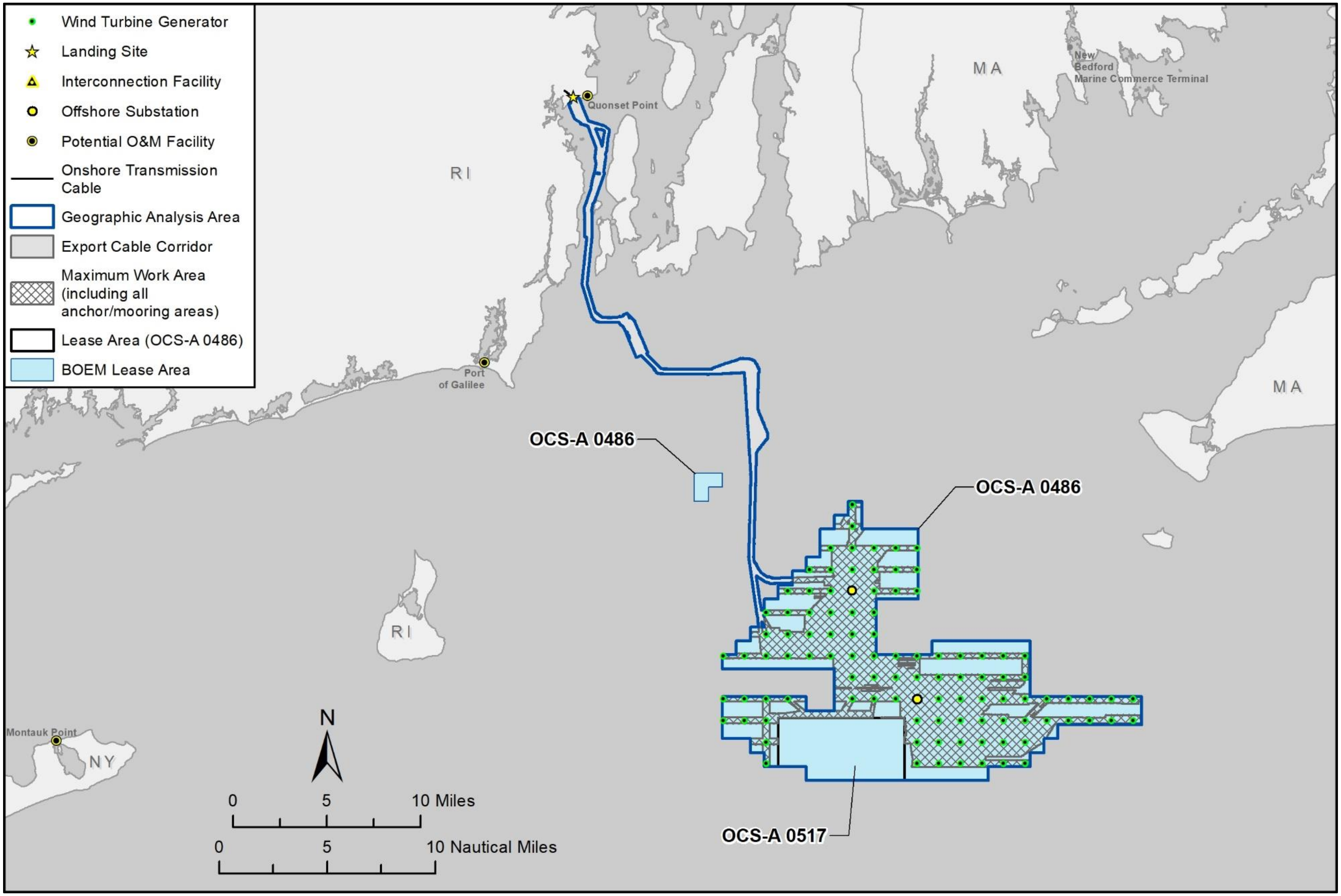


**Figure 3.10-1. Marine cultural resources geographic analysis area.**

Affected environment: The MARA was conducted on the marine APE between 2017 and 2020 (SEARCH 2023). The high-resolution geotechnical data collected during the marine archaeological survey was used for the geoarchaeological analysis (SEARCH 2023). The survey resulted in the identification of 32 targets of interest within the RWF and RWEC, 19 of which are potential submerged archaeological marine resources and 13 of which are geomorphic features of archaeological interest, associated with ancient submerged landforms (SEARCH 2023). Sixteen of the potential submerged marine cultural resources are located in the RWF and three are located in the RWEC. Five of the geomorphic features of archaeological interest are located in the RWF and eight are located in the RWEC.

The 19 potential submerged archaeological marine cultural resources are shipwrecks or possible historic shipwrecks or sunken craft (Table 3.10-2). These shipwrecks may be NRHP-eligible cultural resources, pursuant to 36 CFR 800.16(l), eligible for their potential to contribute important information to archaeological research under NRHP Criterion D at minimum. Any of these resources that are sunken military craft also remain the sovereign property of the U.S. government, subject to the protections of Public Law 108–375 Title XIV—Sunken Military Craft, administered by the Department of the Navy under an overall policy of leaving these crafts and associated remains in place and undisturbed.

The geomorphic features are discrete and discontinuous locations of ancient submerged landforms that may contain preserved evidence of formerly terrestrial landscapes that have survived erosion during marine transgression (Table 3.10-3). Although these features exhibit archaeological potential; no cultural materials associated with the ancient submerged landform features were identified in core samples taken during the submerged cultural resources investigation (SEARCH 2023). These features may derive their significance from reasons other than their archaeological potential, however, such as their potential contribution to a broader culturally significant landscape. Ancient submerged landforms are marine cultural resources of importance to Native American tribes, NRHP eligible at minimum for their connection to broad events within tribal history under NRHP Criterion A and for their ability to contribute further information to the understanding of that history under NRHP Criterion D pursuant to 36 CFR 800.16(l) (SWCA 2021).

**Table 3.10-2. Shipwreck Archaeological Sites Identified within the Marine Cultural Resources Geographic Analysis Area**

| Remote Sensing Target | Location | Target Dimensions (m) | Description |
|---|---|---|---|
| Target 01 | RWF | 24 × 3.9 × 1.4 | Shipwreck |
| Target 02 | RWF | 27 × 20 × 0.7 | Possible historic shipwreck |
| Target 03 | RWF | 7.2 × 0.8 × 0.4 | Possible historic shipwreck |
| Target 04 | RWF | 3.8 × 2.3 × 0.5 | Possible historic shipwreck |
| Target 05 | RWF | Not available (magnetic anomaly) | Possible historic shipwreck |
| Target 06 | RWF IAC | 30 × 15 × 1.4 | Shipwreck |
| Target 07 | RWF IAC | Not available (magnetic anomaly) | Possible historic shipwreck |
| Target 08 | RWF IAC | 28 × 15 × 0.8 | Shipwreck |
| Target 09 | RWF IAC | 41 × 37 × 1.4 | Shipwreck |

| Remote Sensing Target | Location | Target Dimensions (m) | Description |
|---|---|---|---|
| Target 10 | RWF IAC | Not available (magnetic anomaly) | Possible historic shipwreck |
| Target 11 | RWEC | 24 × 8.8 × 0.3 | Shipwreck |
| Target 13 | RWEC | 39 × 15 × 0.6 | Possible historic shipwreck |
| Target 14 | RWEC | Not available (magnetic anomaly) | Possible historic shipwreck |
| Target 15 | RWF | Not available (magnetic anomaly) | Possible historic shipwreck |
| Target 16 | RWF IAC | Not available (magnetic anomaly) | Possible historic shipwreck |
| Target 17 | RWF | Not available (magnetic anomaly) | Possible historic shipwreck |
| Target 18 | RWF | Not available (magnetic anomaly) | Possible historic shipwreck |
| Target 19 | RWF IAC | 34 × 12 × 1.0 | Possible historic shipwreck |
| Target 20 | RWF | 16 × 5.5 × 4.5 | Possible historic shipwreck |

Source: SEARCH (2023:Table 4-1).

Note: No dimensions are available for targets identified on the basis of a magnetic signature. “Target-12” was a probable bridge and not included on that basis. Also, mapped marine resource locations (SEARCH 2023) contain sensitive information and are not publicly distributed.

### Table 3.10-3. Geomorphic Features Identified within the Marine Cultural Resources Geographic Analysis Area

| Geomorphic Feature ID | Location | Description |
|---|---|---|
| Target 21 | RWEC-RI | Paleochannel with preserved flanks |
| Target 22 | RWEC-RI | Paleochannel with preserved flanks |
| Target 23 | RWEC OCS | Paleochannel with preserved flanks |
| Target 24 | RWF | Paleochannel with preserved flanks |
| Target 25 | RWF | Paleochannel with preserved flanks |
| Target 26 | RWF | Paleochannel with preserved flanks |
| Target 27 | RWF | Paleochannel with preserved flanks |
| Target 28 | RWF | Paleochannel with preserved flanks |
| Target 29 | RWEC-RI | Paleochannel with preserved flanks |
| Target 30 | RWEC-RI | Paleochannel with preserved flanks |
| Target 31 | RWEC-RI | Paleochannel with preserved flanks |
| Target 32 | RWEC-RI | Paleochannel with preserved flanks |
| Target 33 | RWEC-RI | Paleochannel with preserved flanks |

Source: SEARCH (2023:Table 4-2).

Note: Mapped ancient submerged landform extents and locations (SEARCH 2023) contain sensitive information and are not publicly distributed.

The Project and other ongoing and reasonably foreseeable activities would result in an adverse effect when it alters, directly or indirectly, any of the characteristics of a marine cultural resource that qualify the resource for the NRHP in a manner that would diminish the integrity of the NRHP-eligible marine cultural resource's location, design, setting, materials, workmanship, feeling, or association per 36 CFR 800.5(a)(1). Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5(a)(1)). NRHP-eligible shipwrecks and ancient submerged landforms would be susceptible to adverse effects from physical destruction of or damage to the historic property by the Project or other ongoing and reasonably foreseeable activities (36 CFR 800.5(a)(2)(i)). Impacts to NRHP-eligible cultural resources that are determined to be **moderate** or **major** as defined in this EIS would rise to the level of adverse effect per the criteria of adverse effect under NHPA Section 106. Impacts to cultural resources that are determined to be **negligible** or **minor** as defined in this EIS would not rise to the level of adverse effects under the criteria of adverse effect under NHPA Section 106.

#### 3.10.1.2 Terrestrial Cultural Resources

<u>Geographic analysis area:</u> BOEM (2020a) defines the APE for the terrestrial cultural resources GAA (or terrestrial APE) as the depth and breadth of terrestrial areas potentially impacted by any ground-disturbing activities by the Project. This includes the areas of the OnSS, ICF, onshore transmission cable corridor, and landfall envelope depicted in Figure 3.10-2.

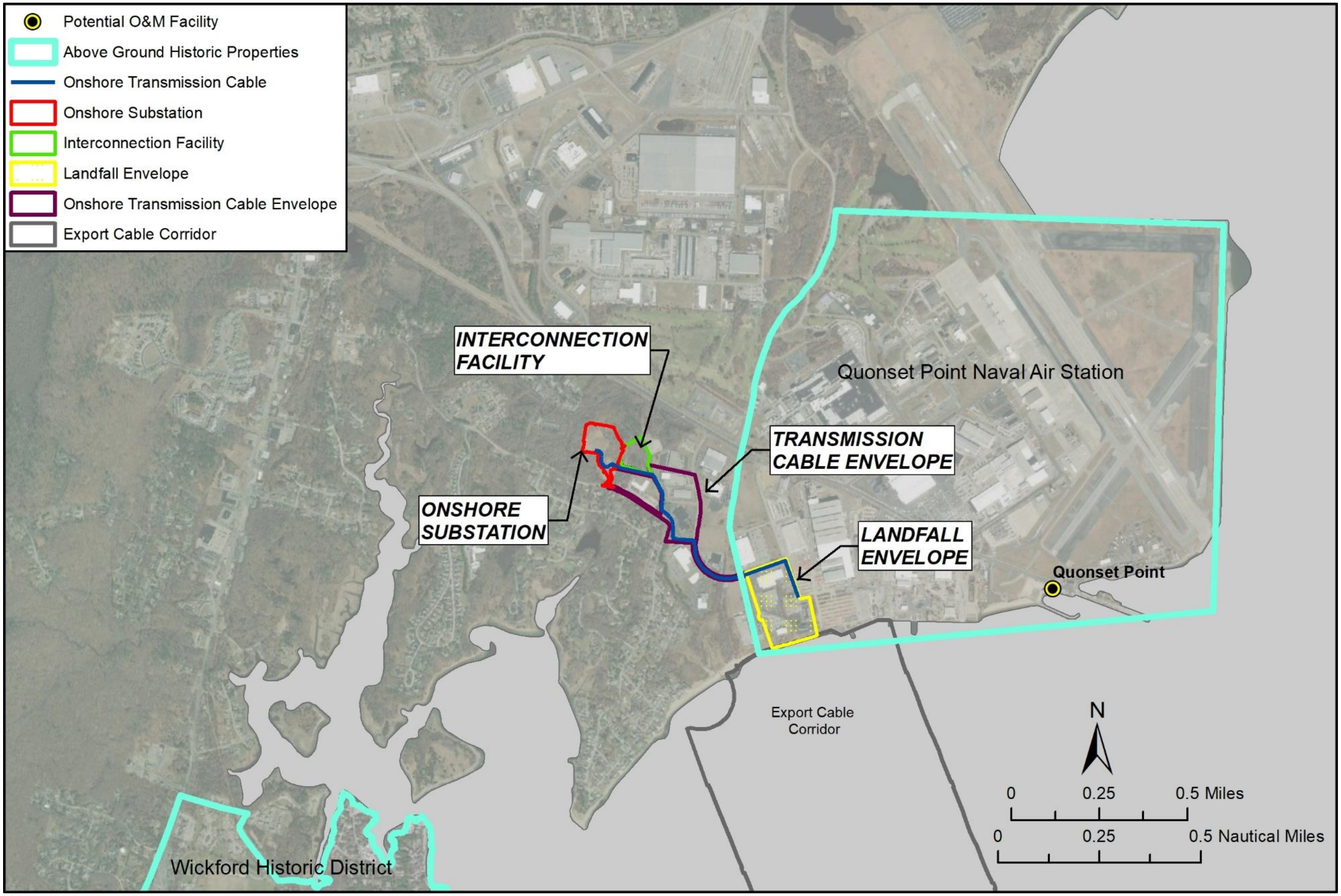


**Figure 3.10-2. Terrestrial cultural resources geographic analysis area.**

Affected environment: The TARA was conducted within the onshore Project components of the onshore transmission cable, landfall work area, and the OnSS and ICF in 2021 (Forrest and Waller 2023) (see Figure 3.10-2). Construction of onshore Project components could affect terrestrial cultural resources through physical disturbance.

Construction of the OnSS and ICF would collectively require temporary disturbance of approximately 10.9 acres. The maximum depth of disturbance within the OnSS and ICF work area limits is 60 feet. The width of potential ground disturbance for the onshore transmission cable is assumed to be at the extent of the Project easement, which is 25 feet wide centered along the cable route. The preferred onshore transmission cable route is an approximately 1-mile route that will predominantly follow along paved roads or previously disturbed areas such as parking lots. There are alternative onshore transmission cable routes under consideration within the onshore transmission cable envelope as depicted on Figure 3.10-2. Some of the routes under consideration have segments that would be installed in undeveloped vegetated areas, although they would mostly be installed within paved roads and parking lots (as with the preferred onshore transmission cable route) and would be approximately the same length. Project-related ground disturbance may extend to a maximum depth of 13 feet anywhere within the width of this corridor. Revolution Wind is considering a range of siting options for the RWEC landfall, all of which are encompassed by a 20-acre landfall work area. Within this landfall area, 3.1-acres would be sited, within which ground disturbance associated with the onshore transmission cable construction would occur. As noted above, a preferred route for the onshore transmission cable has been proposed; however, Revolution Wind is considering alternative routing of the onshore transmission cable within the onshore transmission cable envelope, which totals 16.7 acres. Installation of the onshore transmission cable will impact approximately 3.1 acres; therefore, only a portion of the 16.7-acre onshore transmission cable envelope will actually be impacted by installation of the onshore transmission cable. The deepest disturbances within the landfall work area would be associated with the HDD construction method for cable emplacement, which may entail the installation of temporary sheet pile anchor walls driven to a depth of approximately 20 feet. The HDD drill itself may reach a depth of up to 66 feet between the onshore TJBs and the offshore exit pits, but the sediment displacement would be largely confined to the two 3-foot-diameter bore holes. Quonset Point is in an area of concentrated Narragansett Indian settlement specifically associated with the Contact period and extending to the west and southwest of the terrestrial APE (Forrest and Waller 2023). Construction, operation, decommissioning, and large-scale redevelopment of former military facilities at Quonset Point substantially altered the local landscape. Most of the terrestrial APE has been substantially altered by development, demolition, remediation, and associated grading activities postdating 1941. Intact pockets of natural soils represent a small percentage of all surficial earth. The proposed OnSS site was used as a general dump site during naval operations (1940s through 1960s); several hundred tons of debris and soil were removed during remediation activities in the late 1990s. The pockets of relatively intact natural soils within the terrestrial APE are located within the OnSS and ICF work area limits and along the southern margins of the landfall area (Forrest and Waller 2023).

The Public Archaeology Laboratory, Inc. (PAL) contacted the Rhode Island Historic Preservation and Heritage Commission (RIHPHC) and the Narragansett Indian Tribe, Wampanoag Tribe of Gay Head (Aquinnah), Mashpee Wampanoag, Mashantucket (Western) Pequot Tribal Nation, and Mohegan Tribal Historic Preservation Offices (THPOs) to consider and address tribal concerns within their Phase I survey investigation. Results of the Phase I survey of potentially undisturbed, buried portions of the OnSS and ICF

APE by PAL (Forrest and Waller 2023) resulted in the identification of four archaeological resources. PAL did not conduct remote sensing (ground penetrating radar, soil resistivity, magnetometry, or similar techniques). Dense surface vegetation made remote sensing impractical, and twentieth-century dumping, filling, and other ground disturbances and landscape modifications would have produced inconclusive results. The RIHPHC also does not recognize remote sensing as a reliable method for archaeological site identification, preferring ground-truthing instead to include the excavation of test pits or other excavation units.

The Phase I survey resulted in the identification of two archaeological sites within the OnSS work area limits and one archaeological site and one isolated artifact within the ICF work area limits, named the Quonset Substation archaeological site, the Mill Creek Swamp #1 archaeological site, the Mill Creek Swamp #2 archaeological site, and the QDC Find Spot artifact, respectively (Forrest and Waller 2023). In the OnSS work area limits, the Mill Creek Swamp #1 archaeological site and the Mill Creek Swamp #2 archaeological site are eligible for the NRHP under Criterion D and are archaeologically important (Table 3.10-4). Revolution Wind is committed to avoiding or minimizing impacts to these sites to the best extent feasible. If final OnSS and ICF construction design plans result in impacts to these sites, Revolution Wind will consult with BOEM, other federal and state agencies, and Native American tribes to develop and implement an archaeological mitigation/treatment plan to resolve adverse effects that Project construction would have on the Mill Creek Swamp #1 and Mill Creek Swamp #2 sites. In the ICF work area limits, the Quonset Substation archaeological site is a low-density lithic scatter and the QDC Find Spot artifact is an isolated quartz flake; both resources are not eligible for the NRHP and are not archaeologically important.

Based on data collected during PAL's archaeological monitoring of geotechnical test pits and the Phase I survey at the OnSS and ICF (Forrest and Waller 2023), PAL found that route options within the onshore transmission cable envelope area lack stratigraphic integrity and were determined to not be archaeologically sensitive. Thus, PAL does not recommend further archaeological testing for the potential alternative routing of the onshore transmission cable identified in November 2021.

**Table 3.10-4. Terrestrial Cultural Resources within the Terrestrial Cultural Resources Geographic Analysis Area**

| Terrestrial Cultural Resources | Portion of Project | NRHP Eligibility |
|---|---|---|
| Mill Creek Swamp #1 | OnSS work area limits | Eligible |
| Mill Creek Swamp #2 | OnSS work area limits | Eligible |
| Quonset Substation | ICF work area limits | Not eligible |
| QDC Find Spot artifact | ICF work area limits | Not eligible |

Source: Forrest and Waller (2023).

Terrestrial cultural resources, especially archaeological sites, when NRHP eligible, tend to be eligible under Criterion D for their potential to contribute further information important to understanding history. Those that are TCPs, when present, tend to further be eligible under NRHP Criterion A for their important contributions to broad events in tribal history, Criterion B for their connection to important figures in tribal history, and/or Criterion C for their distinctive characteristics of composition.

The Project and other ongoing and reasonably foreseeable activities would result in an adverse effect when it alters, directly or indirectly, any of the characteristics of a terrestrial cultural resource that qualify the resource for the NRHP in a manner that would diminish the integrity of the NRHP-eligible terrestrial cultural resource's location, design, setting, materials, workmanship, feeling, or association per 36 CFR 800.5(a)(1). Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5(a)(1)). NRHP-eligible terrestrial cultural resources, including TCPs, would be susceptible to adverse effects from physical destruction of or damage to the resource by the Project or other ongoing and reasonably foreseeable activities (36 CFR 800.5(a)(2)(i)). Impacts to NRHP-eligible cultural resources that are determined to be **moderate** or **major** as defined in this EIS would rise to the level of adverse effect per the criteria of adverse effect under NHPA Section 106. Impacts to cultural resources that are determined to be **negligible** or **minor** as defined in this EIS would not rise to the level of adverse effects under the criteria of adverse effect under NHPA Section 106.

#### 3.10.1.3 Viewshed Resources

Geographic analysis area: This section addresses cultural resources located within the viewshed of Project elements. The viewshed includes the onshore and offshore visual effects assessment GAA. The cultural resources within the viewshed, which are typically aboveground historic properties, are referred to herein as viewshed resources. All other visual resources are addressed in Section 3.20.

BOEM defines the APE for visual impact analysis (hereafter the viewshed APE) as the geographic areas from which the offshore and onshore Project components could be seen. Onshore Project components where new development would occur have a viewshed radius of 3 miles around the ICF and OnSS (Figure 3.10-3). The onshore transmission cable and ICF interconnection ROW will be buried, without potential for enduring visual impacts to cultural resources. Onshore components where redevelopment of existing facilities could occur have a viewshed radius of 1 mile around O&M facilities at the Port of Davisville at Quonset Point and Port Robinson (see Figure 3.10-3). However, the 1-mile radius at the Davisville-Quonset Point O&M facility is completely subsumed within the 3-mile radius around the ICF and OnSS. Offshore Project components (e.g., WTGs) have a much larger viewshed radius of 40 miles around the edge of the Lease Area (Figure 3.10-4). The 1-mile, 3-mile, and 40-mile radii represent the maximum limit of theoretical visibility for each respective onshore or offshore Project component; however, these radii do not define the viewshed APE. Within these radii, the APE for viewshed resources is defined by those geographic areas only with a potential visibility of Project components and excludes areas with obstructed views of Project components. Visibility and views of Project components were determined through a viewshed analysis (EDR 2021a, 2023a; Revolution Wind 2022). The viewshed analysis applied GIS modeling to take into account the true visibility of the Project (e.g., visual barriers such as topography, vegetation, and non-historic structures that obstruct the visibility of Project components) (EDR 2021a, 2023a) (see Figures 3.10-3 and 3.10-4).

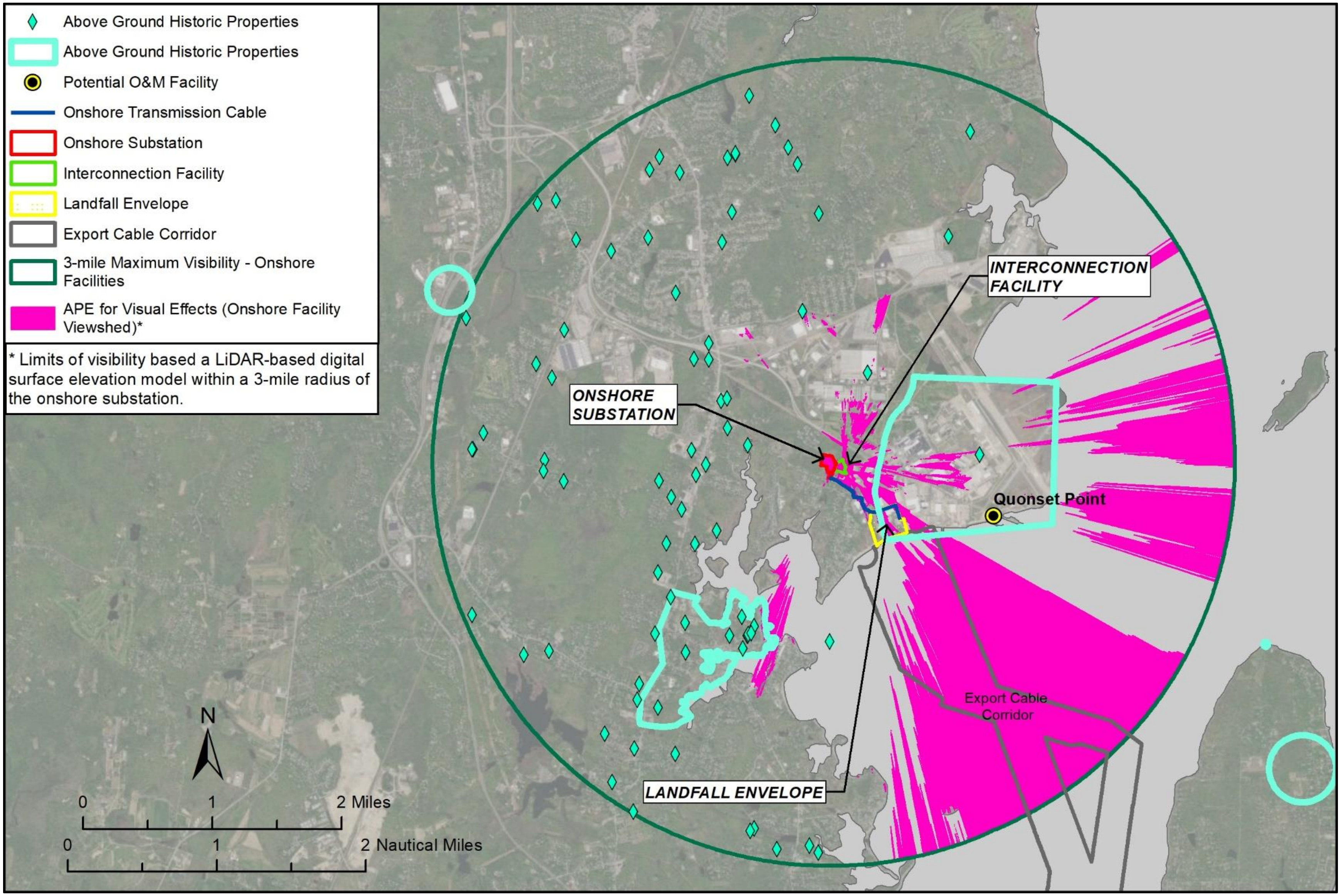


**Figure 3.10-3. Viewshed area of potential effects and visual effects assessment geographic analysis area – onshore.**

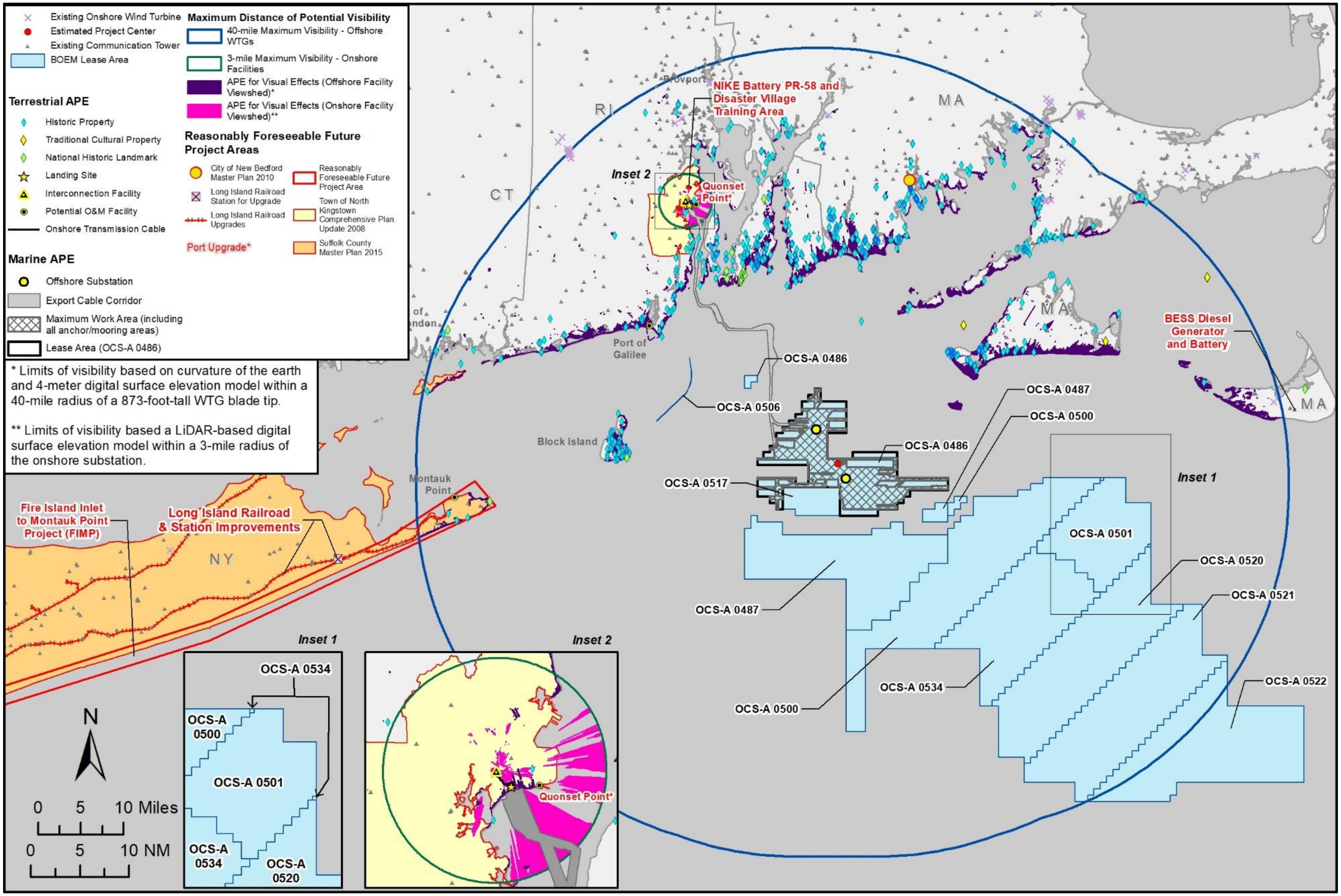


**Figure 3.10-4. Viewshed area of potential effects and visual effects assessment geographic analysis area – offshore.**

Affected environment: For the onshore components viewshed, the HRVEA identified a total of 80 aboveground viewshed resources, within 3 miles of the proposed OnSS and ICF, that consist of 16 NRHP-listed properties, two properties that have been determined by the RIHPHC to be eligible for the NRHP, nine properties included in the RIHPHC inventory but without formal determinations of NRHP eligibility, and 53 Rhode Island Historical Cemeteries Commission–identified Rhode Island Historical Cemeteries (EDR 2021a). Viewshed analyses determined that of these 80 viewshed resources, two are within the viewshed APE (see Figure 3.10-3 and Table 3.10-5). These two resources are located within the viewshed of the OnSS and ICF. The viewshed analysis determined that neither are within the viewshed of any of the five potential O&M facility locations. At 1.1 miles away from the OnSS and ICF location is the NRHP-listed Wickford Historic District; at 0.25 mile away is the Quonset Point Naval Air Station, determined by the State of Rhode Island to be NRHP eligible (EDR 2021a).

**Table 3.10-5. National Register of Historic Places–Eligible and Listed Resources within the Viewshed Area of Potential Effects for Onshore Development**

| Visually Sensitive Resource | Distance to OnSS and ICF (miles) |
|---|---|
| Wickford Harbor/Wickford Village | 1.0 |
| Quonset Point Naval Air Station | 0.25 |

Source: EDR (2023b).

In relation to the offshore Project components, the HRVEA identified a total of 451 aboveground viewshed resources within the viewshed APE that consist of 98 NRHP-listed properties, 73 properties that have been determined eligible for the NRHP, 280 properties included in the RIHPHC and the Massachusetts Historical Commission (MHC) historic inventories but without formal determinations of NRHP eligibility (EDR 2023a; Revolution Wind 2022). Those viewshed resources without formal determinations of NRHP eligibility are treated as NRHP-eligible cultural resources for the purposes of this analysis and compliance with NHPA Section 106.

Twelve of the 98 NRHP-listed viewshed resources are also NHLs (EDR 2022, 2023a). These are the Montauk Point Lighthouse, Block Island Southeast Lighthouse, Original U.S. Naval War College Historic District, Fort Adams Historic District, Battle of Rhode Island Historic District, Nantucket Historic District, New Bedford Historic District, Ocean Drive Historic District, Bellevue Avenue Historic District, The Breakers, Marble House, and William Watts Sherman House. BOEM's finding of adverse effects document in Appendix J provides further context on NHLs and the supplemental report *Revolution Wind Farm National Historic Landmarks* provides further detail on the 12 NHLs named here (EDR 2022).

Three resources in Massachusetts and extending to the OCS were documented specifically due to their categorization as TCPs, and these consist of the Nantucket Sound TCP, the Chappaquiddick Island TCP, and the Vineyard Sound and Moshup's Bridge TCP. Each of these three resources is represented by broad, complex cultural landscapes and connected seascapes (EDR 2023a). Examples of these include that, historically, much of the fishing by the region's Native American tribes was concentrated in nearshore marine and estuarine environments (Bennett 1955); recent BOEM consultation with Native American tribes in lease areas adjacent to the Project indicate that tribal subsistence fisheries continue to occur predominately in inshore areas (BOEM 2020b), and typical recreational fishing locations in the area are close to shore (within 1 mile of the coast) (see Section 3.18). The Nantucket Sound TCP is NRHP listed and the Chappaquiddick Island TCP and the Vineyard Sound and Moshup's Bridge TCP have previously been determined NRHP eligible by BOEM. BOEM's finding of adverse effects document in Appendix J provides further context on TCPs and the offshore HRVEA (COP Appendix U[32]) provides further TCP details.

For the offshore components, viewshed analyses for the WTGs and OSSs identified 451 cultural resources that may be eligible for the NRHP. Of these, 101 in the viewshed APE would be subject to potential moderate to major impacts from the Project, rising to the level of adverse effect under the NHPA Section 106 criteria for adverse effects (36 CFR 800.5). NRHP-eligible viewshed resource distribution is mapped on Figure 3.10-4. This analysis assessed the visibility of a WTG from the water level to the tip of an upright rotor blade at a height of 873 feet and further considered how distance and curvature of the Earth affect visibility as space between the viewing point and WTGs increases. The analysis further considered the nighttime lighting of offshore structures during their construction. Of the 101 resources in the viewshed APE that could be susceptible to moderate to major negative visual impacts from the offshore components of the Project, 37 are listed on the NRHP (five of which are also NHLs), 33 have been determined eligible for the NRHP, 31 are included in the RIHPHC and MHC historic inventories but without formal determinations of NRHP eligibility. Two of the cultural resources susceptible to moderate to major negative visual impacts within the viewshed APE are NRHP-eligible TCPs. Table 3.10-6 presents the 101 viewshed resources by order of distance to the nearest Project WTG.

**Table 3.10-6. Aboveground Historic Properties where Moderate to Major Visual Impacts Would Potentially Result in Adverse Effects under NHPA Section 106 Criteria**

| Visually Sensitive Resource | Municipality | County | State | Resource Designation | Distance to nearest WTG (miles) |
|---|---|---|---|---|---|
| Vineyard Sound and Moshup's Bridge | Aquinnah | Dukes | MA | NRHP-eligible resource (BOEM determined) | 5 |
| Sakonnet Light Station | Little Compton | Newport | RI | NRHP-listed resource | 12.7 |
| Warren Point HD | Little Compton | Newport | RI | NRHP-eligible resource (RIHPHC determined) | 12.9 |
| Abbott Phillips House | Little Compton | Newport | RI | RIHPHC historic resource | 13.0 |
| Flaghole | Chilmark | Dukes | MA | MHC historic inventory site | 13.3 |
| Stone House Inn | Little Compton | Newport | RI | NRHP-listed resource | 13.4 |
| Simon Mayhew House | Chilmark | Dukes | MA | MHC historic inventory site | 13.5 |
| 71 Moshup Trail | Aquinnah | Dukes | MA | MHC historic inventory site | 13.7 |
| Vanderhoop, Edwin DeVries Homestead | Aquinnah | Dukes | MA | NRHP-listed resource | 13.7 |

[32] The content of COP Appendix U contains sensitive information and is not available for public review, but a redacted version and non-technical summary are available on BOEM's website: https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan.

| Visually Sensitive Resource | Municipality | County | State | Resource Designation | Distance to nearest WTG (miles) |
|---|---|---|---|---|---|
| Gay Head - Aquinnah Shops Area | Aquinnah | Dukes | MA | MHC historic inventory site | 13.7 |
| Flanders, Ernest House, Shop, and Barn | Aquinnah | Dukes | MA | MHC historic inventory site | 13.8 |
| 3 Windy Hill Drive | Aquinnah | Dukes | MA | MHC historic inventory site | 13.9 |
| Gay Head Light | Aquinnah | Dukes | MA | NRHP-listed resource | 13.9 |
| Tom Cooper House | Aquinnah | Dukes | MA | MHC historic inventory site | 14 |
| Leonard Vanderhoop House | Aquinnah | Dukes | MA | MHC historic inventory site | 14 |
| Theodore Haskins House | Aquinnah | Dukes | MA | MHC historic inventory site | 14.1 |
| Gay Head - Aquinnah Coast Guard Station Barracks | Aquinnah | Dukes | MA | MHC historic inventory site | 14.1 |
| Gay Head - Aquinnah Town Center HD | Aquinnah | Dukes | MA | NRHP-listed resource | 14.2 |
| Gooseneck Causeway | Westport | Bristol | MA | MHC historic inventory site | 14.8 |
| Gooseberry Neck Observation Towers | Westport | Bristol | MA | MHC historic inventory site | 14.8 |
| Spring Street | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 14.9 |
| Capt. Mark L. Potter House | New Shoreham | Washington | RI | RIHPHC historic resource | 14.9 |
| Tunipus Goosewing Farm | Little Compton | Newport | RI | NRHP-eligible resource (RIHPHC Determined) | 15 |
| WWII Lookout Tower – Spring Street | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.1 |
| Westport Harbor | Westport | Bristol | MA | MHC historic inventory site | 15.2 |
| Bellevue Avenue HD | Newport | Newport | RI | NHL | 15.2 |
| Block Island Southeast Lighthouse NHL | New Shoreham | Washington | RI | NHL | 15.2 |
| New Shoreham HD | New Shoreham | Washington | RI | Local Historic | 15.3 |
| Spring Cottage | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.3 |
| Old Harbor Hist Dist. | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.3 |

| Visually Sensitive Resource | Municipality | County | State | Resource Designation | Distance to nearest WTG (miles) |
|---|---|---|---|---|---|
| Capt. Welcome Dodge Sr. | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.3 |
| Caleb W. Dodge Jr. House | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.3 |
| Spring House Hotel | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.4 |
| Pilot Hill Road and Seaweed Lane | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.4 |
| Ocean Drive HD | Newport | Newport | RI | NHL | 15.7 |
| Marble House | Newport | Newport | RI | NHL | 15.7 |
| Ochre Point – Cliffs HD | Newport | Newport | RI | NRHP-listed resource | 15.8 |
| WWII Lookout Tower at Sands Pond | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.8 |
| Sea View Villa | Middletown | Newport | RI | RIHPHC historic resource | 15.9 |
| Rosecliff/Oelrichs (Hermann) House/ Mondroe (J. Edgar) House | Newport | Newport | RI | NRHP-listed resource | 15.9 |
| The Breakers | Newport | Newport | RI | NHL | 15.9 |
| Corn Neck Road | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.9 |
| Clam Shack Restaurant | Westport | Bristol | MA | MHC historic inventory site | 15.9 |
| Horseneck Point Lifesaving Station | Westport | Bristol | MA | MHC historic inventory site | 15.9 |
| Whetstone | Middletown | Newport | RI | RIHPHC historic resource | 16.0 |
| The Bluff/John Bancroft Estate/ Purgatory Chasm | Middletown | Newport | RI | NRHP-eligible resource (RIHPHC determined) | 16.0 |
| Clambake Club Of Newport | Middletown | Newport | RI | NRHP-listed resource | 16.0 |
| Old Town and Center Roads | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.0 |
| Beach Avenue | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.1 |
| Mitchell Farm | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.1 |

| Visually Sensitive Resource | Municipality | County | State | Resource Designation | Distance to nearest WTG (miles) |
|---|---|---|---|---|---|
| Indian Head Neck Road | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.4 |
| Westport Point Revolutionary War Properties | Westport | Bristol | MA | MHC historic inventory site | 16.2 |
| Stonybrook HD (Indian Avenue HD) | Middletown | Newport | RI | NRHP-listed resource | 16.2 |
| St. Georges School | Middletown | Newport | RI | NRHP-listed resource | 16.3 |
| Hygeia House | New Shoreham | Washington | RI | NRHP-listed resource | 16.3 |
| US Weather Bureau Station | New Shoreham | Washington | RI | NRHP-listed resource | 16.3 |
| Miss Abby E. Vaill/ 1 of 2 Vaill cottages | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.4 |
| Hon. Julius Deming Perkins/Bayberry Lodge | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.4 |
| Lakeside Drive and Mitchell Lane | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.5 |
| Land Trust Cottages | Middletown | Newport | RI | NRHP-eligible resource (RIHPHC determined) | 16.6 |
| Russell Hancock House | Chilmark | Dukes | MA | MHC historic inventory site | 16.6 |
| Westport Point HD (1) | Westport | Bristol | MA | NRHP-eligible resource (MHC determined) | 16.7 |
| Westport Point HD (2) | Westport | Bristol | MA | NRHP-listed resource | 16.7 |
| Mohegan Cottage / Everett Barlow House | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.7 |
| Paradise Rocks HD | Middletown | Newport | RI | RIHPHC historic resource | 16.8 |
| Lewis-Dickens Farm | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.0 |
| Island Cemetery/Old Burial Ground | New Shoreham | Washington | RI | RI Historical Cemetery | 16.8 |
| Kay St.-Catherine St.-Old Beach Road HD / The Hill | Newport | Newport | RI | NRHP-listed resource | 16.9 |
| Beacon Hill Road | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.9 |
| Nathan Mott Park | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.1 |

| Visually Sensitive Resource | Municipality | County | State | Resource Designation | Distance to nearest WTG (miles) |
|---|---|---|---|---|---|
| Champlin Farm | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.1 |
| Block Island North Lighthouse | New Shoreham | Washington | RI | NRHP-listed resource | 17.1 |
| Hippocampus/Boy's camp/Beane Family | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.2 |
| US Lifesaving Station | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.4 |
| US Coast Guard Brick House | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.4 |
| Peleg Champlin House | New Shoreham | Washington | RI | NRHP-listed resource | 17.5 |
| Hancock, Captain Samuel - Mitchell, Captain West House | Chilmark | Dukes | MA | NRHP-eligible resource (MHC determined) | 17.6 |
| Scrubby Neck Schoolhouse | West Tisbury | Dukes | MA | MHC historic inventory site | 18.0 |
| Point Judith Lighthouse | Narragansett | Washington | RI | NRHP-listed resource | 18.2 |
| Bailey Farm | Middletown | Newport | RI | NRHP-listed resource | 18.3 |
| Beavertail Light | Jamestown | Newport | RI | NRHP-listed resource | 18.4 |
| Horsehead/Marbella | Jamestown | Newport | RI | NRHP-listed resource | 18.6 |
| Ocean Road HD | Narragansett | Washington | RI | NRHP-listed resource | 18.9 |
| Dunmere | Narragansett | Washington | RI | NRHP-listed resource | 19.2 |
| Puncatest Neck HD | Tiverton | Newport | RI | RIHPHC historic resource | 19.4 |
| Fort Varnum/Camp Varnum | Narragansett | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 19.6 |
| Salters Point | Dartmouth | Bristol | MA | MHC historic inventory site | 19.7 |
| Dunes Club | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| Life Saving Station at Narragansett Pier | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| The Towers HD | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| Narragansett Pier MRA | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| The Towers / Tower Entrance of Narragansett Casino | Narragansett | Washington | RI | NRHP-listed resource | 19.9 |

| Visually Sensitive Resource | Municipality | County | State | Resource Designation | Distance to nearest WTG (miles) |
|---|---|---|---|---|---|
| Chappaquiddick Island TCP | Edgartown | Dukes | MA | NRHP-eligible resource (BOEM determined) | 20 |
| Brownings Beach HD | South Kingstown | Washington | RI | NRHP-listed resource | 21.8 |
| Tarpaulin Cove Light | Gosnold | Dukes | MA | NRHP-listed resource | 22.1 |
| Clark's Point Light | New Bedford | Bristol | MA | NRHP-listed resource | 24.6 |
| Fort Rodman | New Bedford | Bristol | MA | NRHP-eligible resource (MHC determined) | 24.6 |
| Fort Taber HD | New Bedford | Bristol | MA | NRHP-listed resource | 24.6 |
| 744 Sconticut Neck Rd. | Fairhaven | Bristol | MA | MHC historic inventory site | 25.9 |
| Butler Flats Light Station | New Bedford | Bristol | MA | NRHP-listed resource | 25.6 |
| Nobska Point Lighthouse | Falmouth | Barnstable | MA | NRHP-listed resource | 28.0 |

Source: EDR (2023a): Attachment A.
Note: HD = Historic District, MA = Massachusetts, RI = Rhode Island.

The identified viewshed resources susceptible to visual impacts tend to be those eligible for the NRHP under Criterion C for their distinctive characteristics of construction or composition or additionally under Criterion A for their important contributions to broad events in history. TCPs tend to further be eligible for the NRHP under Criterion B for their connection to important figures in tribal history and under Criterion D for their potential to contribute further information important to understanding tribal history. NHLs have elevated recognition for their exceptional significance at the national level representing an outstanding aspect of American history and culture. NHLs are further treated under the special requirements of NHPA Section 110(f) and 36 CFR 800.10 to minimize harm to them. NRHP-eligible viewshed resources identified as susceptible to visual impacts within the viewshed APE retain important historic settings that contribute to the resources' NRHP eligibility along with other aspects of integrity.

The Project and other ongoing and reasonably foreseeable activities would result in an adverse effect when it alters, directly or indirectly, any of the characteristics of a viewshed resource that qualify the resource for the NRHP in a manner that would diminish the integrity of the NRHP-eligible viewshed resource's location, design, setting, materials, workmanship, feeling, or association per 36 CFR 800.5(a)(1). Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5(a)(1)). NRHP-eligible aboveground cultural resources would be susceptible to adverse effects that diminish the integrity of the resource's significant historic features from the introduction of visual elements by the Project or other ongoing and reasonably foreseeable activities (36 CFR 800.5(a)(2)(v)). Larger-scale historic properties (e.g., expansive TCP landscapes and historic districts that contain multiple integral sites and features) are more likely to have views of Project elements and to have views of more Project structures and lighting than smaller individual historic properties, based on the results of the HRVEA (EDR 2023a); although, greater quantities of individual historic properties are located in the viewshed APE and, therefore, would be exposed to visual impacts in greater numbers. Impacts to any NRHP-eligible cultural resource, including viewshed resources, that are determined to be **moderate** or **major** as defined in this EIS, would rise to level of adverse effect per the criteria of adverse effect under NHPA Section 106. Impacts to cultural resources, that determined to be negligible or **minor** as **defined** in this EIS, would not rise to the level of adverse effects under the criteria of adverse effect under NHPA Section 106.

## 3.10.2 Environmental Consequences

### 3.10.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

Impacts on cultural resources—marine, terrestrial, and viewshed resources—are based on up to 100 WTGs and two OSSs, for a total of up to 102 foundations in the analysis area, the maximum-case scenario for foundation structures and connecting cables and infrastructure or facilities as considered in the PDE. Appendix D presents additional information on the PDE and maximum-case scenario.

If Revolution Wind instead installed fewer than 100 WTGs and WTGs larger in size than 8 MW, then potential variances in impacts would be anticipated. If 12-MW WTGs were to be installed, then the maximum height of the blade tip for WTGs would be 873 feet above the surface, compared to 696 feet for the 8-MW WTGs. Because the WTGs would exceed 699 feet, the FAA specifies additional mid-tower lighting, in addition to lighting at the top of the nacelle (FAA 2018). The taller WTGs and additional lighting would result in greater visual impacts within the viewshed APE, somewhat but not entirely offset by fewer WTGs being needed. The selection of a higher capacity turbine within the PDE (up to a 12-MW WTG) would proportionately reduce the number of WTGs and associated IAC in the Lease Area and increase the ability for the Project to avoid impacts to submerged marine cultural resources when compared to the 8-MW WTG option.

See Appendix E1 for a summary of IPFs analyzed for cultural resources across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have only a negligible potential for negative effects are excluded from Chapter 3 and provided in Appendix E1:Table E2-9. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.10-7 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations.

The impact of any alternative would be **negligibl**e to **major** negative, depending on whether resources are unavoidable or discovered during Project activities or have unobscured views of Project structures. If previously undiscovered or unimpacted historic are identified and moderate to major negative effects cannot be avoided, BOEM would require that Revolution Wind implement the appropriate onshore or offshore post-review discovery plan (see Appendix J) to assess and resolve any negative effects pursuant to the MOA. NRHP-eligible cultural resources, if adversely affected, would be mitigated through the NHPA Section 106 process.

The impacts would be relatively uniform between the action alternatives, except Alternative E, where setbacks of WTGs from Martha's Vineyard, adjacent areas of mainland Rhode Island at Newport County (Aquidneck Island), and Block Island would provide advantages for avoiding and reducing **moderate** to **major** negative impacts to marine cultural resources and viewshed resources over the other action alternatives.

**Table 3.10-7. Alternative Comparison Summary for Cultural Resources**

<table>
<tr><th>Impact-Producing Factor</th><th>No Action Alternative</th><th>Alternative B (Proposed Action)<br>Up to 100 WTGs</th><th>Alternative C<br>(Habitat Alternative)<br>64–65 WTGs</th><th>Alternative D<br>(Transit Alternative)<br>78–93 WTGs</th><th>Alternative E<br>(Viewshed Alternative)<br>64–81 WTGs</th><th>Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs</th><th>Alternative G<br>(Preferred Alternative)</th></tr>
<tr><td colspan="8">Marine Cultural Resources</td></tr>
<tr><td>Accidental releases and discharges</td><td>The accidental release of hazardous materials or debris and any associated cleanup that migrate from future offshore wind activities that are nearby could impact submerged marine cultural resources in the marine APE for the Project. Although not expected, a large-scale accidental release and associated cleanup could result in permanent, geographically extensive and temporary to long-term minor to major negative impacts on marine cultural resources.</td><td>Offshore: The Proposed Action could contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions under the No Action Alternative. The risk would be increased primarily during construction but also would be present during operations and decommissioning. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects accidental releases and discharges would have localized temporary to short-term negligible impacts on marine cultural resources.<br>The contribution from the Proposed Action would be a low percentage of the overall spill risk from ongoing and future activities. As a result, the Proposed Action when combined with past, present, and reasonably foreseeable activities would be expected to have temporary to short-term negligible to minor cumulative impacts to marine cultural resources.</td><td colspan="4">Offshore: Impacts from accidental releases and discharges from Alternatives C through F on marine cultural resources would be similar to those described for the Proposed Action due to the similarity in Project activities and associated spill risks. Any spills from construction and O&M activities associated with Alternatives C through F would occur infrequently at discrete locations and vary widely in space and time. As a result, impacts from accidental releases and discharges are anticipated to be localized and temporary to short term negligible.<br>Likewise, temporary to short-term negligible to minor cumulative impacts to marine cultural resources are anticipated.</td><td>Offshore: Similar to Alternatives C- through F, impacts from accidental releases and discharges from Alternative G on marine cultural resources during construction or O&M would be similar to those described for the Proposed Action and are anticipated to be localized and temporary to short term negligible.<br>Likewise, temporary to short-term negligible to minor cumulative impacts to marine cultural resources are anticipated.</td></tr>
<tr><td>Anchoring</td><td>The development of future offshore wind activities could negatively affect marine cultural resources that connect to the current marine APE. Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact within its Lease Area and export cable corridor would be avoided and would result in no impacts by other reasonably foreseeable offshore wind activities.</td><td>Offshore: Vessel anchoring would be associated with seafloor disturbance activities (short and long term) proposed for the Project consisting of clearing/leveling of the seafloor, monopile foundation (and associated cable protection) construction, export cable installation, and OSS-link cable and IAC installation (preparation, trenching, burial, maintenance, replacement, etc.). Anchoring disturbance would affect up to 3,204 acres of the seafloor under the maximum-case scenario (see Table E4-1). The impacts to marine cultural resources would be irreversible and major negative unless all NRHP-eligible marine cultural resources and marine cultural resources significant to Native American tribes can be avoided during anchoring.<br>The MARA identified 32 marine cultural resources within the RWF and RWEC, 19 of which are potential shipwrecks and 13 of which are ancient submerged landform features of significance to Native American tribes. Revolution Wind would</td><td colspan="4">Offshore: Alternatives C through F would involve the same types or numbers of marine cultural resources at the RWF and RWEC offshore development areas as under the Proposed Action (see Figure 3.10-1). However, these alternatives could decrease the risk of disturbance and impacts to marine cultural resources because the number of constructed WTGs may be reduced and associated cable trenching may also decrease, resulting in greater Project flexibility for avoiding these resources. Therefore, vessel anchoring would result in less seafloor disturbance than is anticipated for the Proposed Action. The decreased number of WTGs anticipated for these alternatives would also reduce the length of IAC required and therefore reduce the acreage of seafloor disturbed by anchors during construction and installation.<br>Potential anchorage disturbance is expected to reduce from the 3,203 acres under Alternative B to 2,066–2,098 acres under Alternative C, 2,510–2,985 acres under Alternative D, 2,066 or 2,605 acres under Alternative D, and as little as 1,812 acres under Alternative F (see Table E4-1).<br>Compared to the Proposed Action, Alternative C would place WTG locations farther from seven of the 32 marine cultural resources, specifically 2.8 to 3.0 miles farther from ancient submerged landforms (Targets 28 and 27, respectively) and 0.25 mile to 2.5 miles farther from shipwrecks (Targets 2, 8, 17, 18, and 19, in order of increasing distance). Distances to other ancient submerged landforms and shipwrecks would not change under Alternative C.<br>Alternative D could decrease the risk of disturbance and impacts to one potential shipwreck (Target 04) because the nearest WTG would be sited approximately 3.5 miles</td><td>Offshore: Similar to Alternatives C through F, Alternative G would involve the same types or numbers of marine cultural resources at the RWF and RWEC offshore development areas as under the Proposed Action (see Figure 3.10-1), and because the number of constructed WTGs and associated cables would be reduced, the acreage of seafloor disturbed by anchors during construction and installation would also be reduced.<br>Potential anchorage disturbance is expected to reduce from the 3,204 acres under Alternative B to 2,098 acres under Alternative G (see Table E4-1).<br>Compared to the Proposed Action, the 65 WTG turbine configuration of Alternatives G1, G2, and G3 would place WTG locations farther from nine of the 32 marine cultural resources, consisting of six potential shipwrecks (Targets 2, 3, 17, 18, 19, and 20), two shipwrecks (Targets 8 and 9), and one ancient submerged landform</td></tr>
</table>

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| | | be expected under any BOEM approval of the COP to conduct O&M activities on equipment in areas that have been surveyed and found to contain no marine cultural resources and/or in areas that have previously experienced disturbance during construction. Therefore, impacts of anchoring on identified marine cultural resources, including shipwrecks and ancient submerged landforms, would be **negligible** during O&M activities. Decommissioning activities would be expected to take place in previously disturbed areas and therefore impacts to confirmed submerged cultural resources and identified ancient submerged landform features from anchoring would be **negligible** over the long term. | more distant from that shipwreck. Impacts would remain the same as the Proposed Action, however, if Alternative D retains WTG proximity to that shipwreck. As a result, Alternative D would not have the potential to reduce anchoring impacts to marine cultural resources as much as Alternative C (for progressive comparison to the other action alternatives, see Section 3.10.2.5). Alternative D would also maintain similar configurations to the Proposed Action at the other 28 marine cultural resources in the marine APE.<br>Compared to the Proposed Action, the 64 WTG turbine configuration of Alternative E1 would place WTG locations farther from seven of the 32 marine cultural resources, consisting of two ancient submerged landforms (Targets 24 and 26), three known shipwrecks (Targets 01, 06, and 09), and two possible shipwrecks (Targets 07 and 16). Compared to the Proposed Action, the 81 WTG turbine configuration of Alternative E2 would place WTG locations farther from two marine cultural resources, consisting of one ancient submerged landform (Target 24) and one possible shipwreck site (Target 09). Either configuration of Alterative E would have more potential for anchoring impacts to marine cultural resources than Alternative C but less potential for anchoring impacts than either Alternative D or the Proposed Action. However, Alternative E increases the distance of Project WTGs to a different range of marine cultural resources than either Alternative C or Alternative D. Alternative E would result in similar impacts to the Proposed Action at the 22 to 27 marine cultural resources in the marine APE where its configurations do not provide farther avoidance distances.<br>Vessel anchoring associated with Alternative F, which combines alternative WTG reduction options, would result in less seafloor disturbance than is anticipated for the Proposed Action or, potentially, the other action alternatives.<br>Alternatives C through F would use the same RWEC as that of the Proposed Action. These alternatives would result in irreversible and **major** negative impacts to NRHP-eligible marine cultural resources if these resources could not be avoided during construction of the RWEC.<br>Due to the similarity in Project activities and locations, the impacts of anchoring on identified marine cultural resources and ancient submerged landforms from O&M and decommissioning activities associated with Alternatives C through F would be similar to the Proposed Action. The impacts of anchoring or use of a jack-up barge on identified marine cultural resources, including shipwrecks and ancient submerged landforms, would be **negligible** during O&M, because O&M activities would be restricted to areas that have been surveyed and found to contain no marine cultural resources or that have previously experienced disturbance during construction. Decommissioning activities would be expected to take place in previously disturbed areas and therefore impacts to confirmed submerged cultural resources and identified ancient submerged landform features from anchoring would be long term **negligible** to **minor**.<br>The reduced scale of Alternatives C through F would result in fewer potential impacts from seafloor disturbance activities than the Proposed Action. Anchoring from other future wind energy activities is not expected in the marine APE for the current Project; however, anchoring from other reasonably foreseeable non-wind activities in the marine APE could impact marine cultural resources. Should these impacts be added to by unavoidable impacts on marine cultural resources under Alternatives C through F, anchoring would result in irreversible and **negligible** to **major** negative cumulative impacts on marine cultural resources. | | | | (Target 24). Alternative G1 could decrease the risk of disturbance and impacts to one ancient submerged landform (Target 27) because the maximum work area immediately adjacent to the target would be reduced by approximately 30 acres compared to the Proposed Action. WTG distances to other ancient submerged landforms and shipwrecks would not change under Alternative G1. Any of the Alternative G configurations would have less potential for anchoring impacts to marine cultural resources than the other alternatives or the Proposed Action.<br>Alternative G would use the same RWEC as that of the Proposed Action. This alternative would result in irreversible and **major** negative impacts to NRHP-eligible marine cultural resources if these resources could not be avoided during construction of the RWEC.<br>Due to the similarity in Project activities and locations, the impacts of anchoring on identified marine cultural resources and ancient submerged landforms from O&M and decommissioning activities associated with Alternative G would be similar to the Proposed Action. The impacts of anchoring or use of a jack-up barge on identified marine cultural resources, including shipwrecks and ancient submerged landforms, would be **negligible** during O&M because O&M activities would be restricted to areas that have been surveyed and found to contain no marine cultural resources or that have previously experienced disturbance during construction. Decommissioning activities would be expected to take place in previously disturbed areas and therefore impacts to confirmed submerged cultural resources and identified ancient submerged landform features from anchoring would be long term **negligible** to **minor**.<br>The reduced scale of Alternative G would result in fewer potential impacts from seafloor disturbance activities than the Proposed Action. Anchoring from other future wind energy activities is not expected in the marine APE for the current Project; however, anchoring from other reasonably foreseeable non-wind |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| | | | | | | | activities in the marine APE could impact marine cultural resources. Should these impacts be added to by unavoidable impacts on marine cultural resources under Alternative G, anchoring would result in irreversible and **negligible** to **major** negative cumulative impacts on marine cultural resources. |
| Climate change | The contribution of offshore wind energy projects on slowing or arresting global warming and climate change–related impacts could help reduce these climate change impacts and be beneficial to marine cultural resources. Although the degree to which future offshore wind activities would reduce the impacts of climate change trends on marine cultural resources in the marine APE is unknown, impacts from climate change trends are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on marine cultural resources would remain effectively permanent and therefore long term. | **Offshore**: The contribution of the Proposed Action on slowing or arresting global warming and climate change–related impacts could help reduce climate change impacts and be beneficial to marine cultural resources. The Proposed Action's contribution to effects from climate change trends on marine cultural resources would be **negligible** and impacts from climate change trends are anticipated to remain **minor** to **moderate** negative.<br>Cumulative impacts from climate change trends are anticipated to remain **minor** to **moderate** negative even with the benefits of this Project since the ongoing effects of climate change on marine cultural resources would remain effectively permanent and therefore long term. | **Offshore**: Impacts from climate change trends on marine cultural resources from Alternatives C through F would be similar to those described for the Proposed Action. The overall magnitude of potential impacts resulting from climate change trends are uncertain but are anticipated to qualify as **minor** to **moderate** negative and long term. Renewable energy development by the Project under any action alternative and future offshore wind activities are anticipated to reduce the impacts of climate change trends to an unknown degree, but offshore wind development alone is anticipated to result in **negligible** contributions to impacts from climate change trends. Therefore, cumulative impacts from climate change trends are anticipated to remain **minor** to **moderate** negative. | | | | **Offshore**: Similar to Alternatives C through F, impacts from climate change trends on marine cultural resources from Alternative G would be similar to those described for the Proposed Action: **minor** to **moderate** negative and long term. Renewable energy development by the Project under any action alternative and future offshore wind activities are anticipated to reduce the impacts of climate change trends to an unknown degree, but offshore wind development alone is anticipated to result in **negligible** contributions to impacts from climate change trends. Therefore, cumulative impacts from climate change trends are anticipated to remain **minor** to **moderate** negative. |
| New cable emplacement/ maintenance | Cable installation from future offshore wind activities and other submarine cables could physically impact marine cultural resources. However, no new cable emplacement or maintenance is anticipated within the current Project's marine APE from future offshore wind activities. Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact would be avoided and would result in no impacts by other reasonably foreseeable offshore wind activities. | **Offshore**: Installation of the IAC, OSS-link cable, and RWEC would impact the seafloor within the Lease Area and along the RWEC route. This includes potential MEC/UXOs removal in advance of seafloor preparation for RWEC installation. The construction and installation footprint for the RWEC would impact 1,390 acres of the seafloor (see Table E4-1). The operational footprint for the RWEC is calculated at 39.2 acres, and the cable would be emplaced to depths of up to 13 feet below the seafloor (see Table 2.1-8). The IAC and OSS-link cable would be emplaced at depths of up to 10 feet below the seafloor and require up to 2,619 acres of horizontal seafloor disturbance (see Table E4-1).<br>Revolution Wind recommended a 50-m (164-foot) avoidance buffer on the 19 targets identified as shipwreck archaeological sites. Where Revolution Wind would avoid the shipwreck sites by a distance of 50 m (164 feet), the Project would have no impact on them. If these shipwreck and ancient submerged landforms are determined | **Offshore**: Cable emplacement for Alternatives C through F could impact marine cultural resources. The acreage of seafloor impacts associated with the RWEC under Alternatives C through E would be the same as the Proposed Action, but the acreage of the IAC emplaced would be reduced due to the reduction in WTGs installed under Alternatives C through F.<br>As noted in the discussion of anchoring impacts above, Alternative C would place the WTGs and their connecting IAC farther from two ancient submerged landforms and five shipwrecks than the Proposed Action by placing WTGs 0.25 to 3.0 miles farther away. Where Alternative C is able to avoid more NRHP-eligible shipwreck sites and ancient submerged landforms than the Proposed Action through a reduction in and increased distances from cable emplacement, Alternative C would have less impacts on marine cultural resources than the Proposed Action.<br>Alternative D would either avoid one or more shipwreck site(s) or, dependent on WTG configuration, have the same potential impacts on marine cultural resources as compared to the maximum-case scenario under the Proposed Action. In either case, Alternative D would not have the potential to reduce impacts from cable emplacement at marine cultural resources as much as Alternative C.<br>Alternative E would place the WTGs and their connecting IAC farther from one to two ancient submerged landforms and one to five shipwreck sites than the Proposed Action by placing WTGs 0.8 to 4.4 miles farther away. Either analyzed configuration of Alterative E would have the potential to increase cable emplacement impacts to marine cultural resources compared to Alternative C and to reduce the potential for cable emplacement impacts in comparison to Alternative D and the Proposed Action; although, Alternative E | | | | **Offshore**: Similar to Alternatives C through F, cable emplacement for Alternative G could impact marine cultural resources. The acreage of seafloor impacts associated with the RWEC under Alternative G would be the same as the Proposed Action, but the acreage of the IAC emplaced would be reduced to 2,010 acres (up to 23% less than the Proposed Action—see Table E4-1). This reduction is due to the reduction in WTGs installed under Alternative G.<br>Alternative G would place the WTGs and their connecting IAC farther from two ancient submerged landforms and three to eight shipwreck sites than the Proposed Action by placing WTGs 1.9 to 3.7 miles farther away. However, the shift in WTG locations would result in a shift of IAC cabling, and the cabling shift would potentially increase impacts to one possible historic shipwreck (Target 10) and one ancient submerged landform (Target 28) by moving or increasing IAC cabling within these |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
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| | | eligible for the NRHP and they cannot be avoided by new cable emplacement, then the impacts would be irreversible and **major** negative.<br>Although no new cables would be emplaced during O&M or decommissioning, Revolution Wind anticipates that it may be necessary to uncover or rebury portions of the IAC, OSS-link cable, and RWEC over the life of the Project. As a result, O&M and decommissioning activities related to cables are expected to result in long-term **negligible** to **minor** impacts to marine cultural resources.<br>Cable installation from the Proposed Action, future offshore wind activities, and other submarine cable activities could impact marine cultural resources. Cable emplacement and maintenance from future offshore wind activities and other reasonably foreseeable activities are not expected in the marine APE at identified marine cultural resources and would not add cumulative impacts to the general impacts from Project cabling. Cumulative impacts from the Project in relation to other reasonably foreseeable offshore cabling activities would be **negligible** for the long term. | increases distance of Project WTGs to a different range of marine cultural resources than either Alternative C or Alternative D.<br>The acreage of seafloor impacts associated with the installation of the RWEC and IAC under Alternative F would be somewhat less than the Proposed Action, but that cannot be quantified until the WTGs to be removed are identified. The acreage of the IAC emplaced would be reduced due to the reduction in WTGs installed under Alternative F. If Alternative F is able to avoid more NRHP-eligible shipwreck sites and ancient submerged landforms than the Proposed Action through a reduction in cable emplacement, then Alternative F could have less impacts on marine cultural resources than the Proposed Action.<br>Where NRHP-eligible shipwreck sites and ancient submerged landforms remain unavoidable by Alternatives C through F, impacts from cable emplacement would be irreversible and long term **negligible** to **major** negative.<br>Although no new cables would be emplaced during O&M or decommissioning activities for Alternatives C through F, Revolution Wind anticipates that it may be necessary to uncover or rebury portions of the RWEC over the life of the Project. As noted for the Proposed Action, it is expected that most, if not all, of the bottom disturbance associated with O&M and decommissioning would be located within previously disturbed areas. Avoidance or mitigation measures that were implemented for construction would be employed should activities extend outside previously disturbed areas (VHB 2023:552). For these reasons the potential impacts to marine cultural resources from cable maintenance under Alternatives C through F are similar to the Proposed Action for O&M and decommissioning and would be irreversible and long term **negligible** to **minor**.<br>Cable emplacement under Alternatives C through F could impact marine cultural resources. The acreage of seafloor impacts associated with the RWEC under Alternatives C through F would be the same as the Proposed Action, but the acreage of IAC emplaced would be less due to the reduction in WTGs installed under Alternatives C through F. Where Alternatives C through F are able to avoid more NRHP-eligible shipwreck sites and ancient submerged landforms than the Proposed Action, Alternatives C through F would have less impacts on marine cultural resources than the Proposed Action. Where NRHP-eligible shipwreck sites and ancient submerged landforms remain unavoidable by Alternatives C through F, impacts from cable emplacement and maintenance would be irreversible and long term **negligible** to **major** negative.<br>Similar to the Proposed Action, cable emplacement and maintenance from future wind energy activities and other reasonably foreseeable activities are not expected in the marine APE at identified marine cultural resources and would not add cumulative impacts to Alternatives C through F. Cumulative impacts from any action alternative for the Project in relation to other reasonably foreseeable offshore cabling activities would be **negligible** for the long term. | | | | two targets (three IAC cables in parallel under Alternative G instead of one under the Proposed Action). Alternative G would also move IAC cabling 0.28 mile closer to one ancient submerged landform (Target 25).<br>The three analyzed configurations of Alterative G would have the potential to increase cable emplacement impacts to marine cultural resources compared to Alternative C and Alternative E1 and to reduce the potential for cable emplacement impacts in comparison to Alternative D, Alternative E2, and the Proposed Action.<br>Where NRHP-eligible shipwreck sites and ancient submerged landforms remain unavoidable by Alternative G, impacts from cable emplacement would be irreversible and long term **negligible** to **major** negative.<br>Although no new cables would be emplaced during O&M or decommissioning activities for Alternative G, Revolution Wind anticipates that it may be necessary to uncover or rebury portions of the RWEC over the life of the Project. As noted for the Proposed Action, it is expected that most, if not all, of the bottom disturbance associated with O&M and decommissioning would be located within previously disturbed areas. Avoidance or mitigation measures that were implemented for construction would be employed should activities extend outside previously disturbed areas (VHB 2023:552). For these reasons, the potential impacts to marine cultural resources from cable maintenance under Alternative G are similar to the Proposed Action for O&M and decommissioning and would be irreversible and long term **negligible** to **minor**.<br>Similar to Alternatives C- through F, cable emplacement under Alternative G could impact marine cultural resources. The acreage of seafloor impacts associated with the RWEC under Alternative G would be the same as the Proposed Action, but the acreage of IAC emplaced would be less due to the reduction in WTGs installed under Alternative G. Where Alternative G is able to avoid more NRHP- |

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| | | | | | | | eligible shipwreck sites and ancient submerged landforms than the Proposed Action, Alternative G would have less impacts on marine cultural resources than the Proposed Action. Where NRHP-eligible shipwreck sites and ancient submerged landforms remain unavoidable by Alternative G, impacts from cable emplacement and maintenance would be irreversible and long term **negligible** to **major** negative.<br>Similar to the Proposed Action, cable emplacement and maintenance from future wind energy activities and other reasonably foreseeable activities are not expected in the marine APE at identified marine cultural resources and would not add cumulative impacts to Alternative G. Cumulative impacts from any action alternative for the Project in relation to other reasonably foreseeable offshore cabling activities would be **negligible** for the long term. |
| Presence of structures | Future offshore wind activities could impact marine cultural resources with the placement of in-water structures with foundations in the seafloor. However, no new structures are anticipated within the current Project's marine APE from future offshore wind activities or other reasonably foreseeable activities within the Project marine APE that do not require federal approval. Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact would be avoided and would result in no impacts by future offshore wind activities. | **Offshore**: Placement of the WTGs and OSSs would impact the seafloor within the Lease Area. The Project anticipates impacting up to 734.4 acres of seafloor for construction of the up to 100 WTG and up to two OSS locations (see Table E4-1). For shipwreck and ancient submerged landforms determined NRHP eligible and that can be avoided by the placement of WTGs and OSSs, the impacts would be long term **negligible**. Revolution Wind recommended a 50-m (164-foot) avoidance buffer for shipwrecks. If the shipwreck and ancient submerged landforms are determined NRHP eligible, and they cannot be avoided by construction of structures, then the impacts would be long term **major** negative.<br>O&M and decommissioning activities at WTG and OSS structures would be located within previously disturbed areas or surveyed areas outside of identified marine cultural resources are expected to result in long-term **negligible** to **minor** impacts.<br>Revolution Wind has determined it could avoid impacts to marine cultural resources within the Lease Area. Other future offshore wind energy activities would not place structures in the RWF Lease Area. Based on these factors, cumulative | **Offshore**: The elimination of WTGs under Alternatives C through F would reduce seafloor impacts over the Proposed Action. See anchoring and new cable emplacement/maintenance impacts, above, for analysis of the placement of WTGs (and the IACs that connect to them) relative to NRHP-eligible shipwreck sites and ancient submerged landforms.<br>Potential construction disturbance for WTG and OSS locations is expected to reduce from the 734.4 acres under Alternative B to 475.2–482.4 acres under Alternative C, 576–84 acres under Alternative D, 475.2–597.6 acres under Alternative D, and as little as 417.6 acres under Alternative F (see Table E4-1).<br>Where Alternatives C through F are able to avoid more NRHP-eligible shipwreck sites and ancient submerged landforms than the Proposed Action through a reduction in seafloor disturbance and increased distances from Project structures, these alternatives would have less impacts on marine cultural resources than the Proposed Action. Where NRHP-eligible shipwreck sites and ancient submerged landforms remain unavoidable by Alternatives C through F, impacts from Project structures would be irreversible and long term **negligible** to **major** negative.<br>It is expected that O&M and decommissioning activities at the WTG and OSS structures under Alternatives C through F would be similar to the Proposed Action. As a result, the impacts to marine cultural resources from the presence of structures under Alternatives C through F would be similar to the Proposed Action and remain long term **negligible** to **minor**.<br>Although Alternatives C through F would have reduced impacts to marine cultural resources over the Proposed Action, other future offshore wind energy activities would not place structures in the RWF Lease Area, and therefore the cumulative effects of Project structures on marine cultural resources would be the same under Alternatives C through E | | | | **Offshore**: Similar to Alternatives C through F, the elimination of WTGs under Alternative G would reduce seafloor impacts over the Proposed Action. See anchoring and new cable emplacement/maintenance impacts, above, for analysis of the placement of WTGs (and the IACs that connect to them) relative to NRHP-eligible shipwreck sites and ancient submerged landforms.<br>Potential construction disturbance for WTG and OSS locations is expected to reduce from the 734.4 acres under Alternative B to 482.4 acres under Alternative G (see Table E4-1).<br>Where Alternative G is able to avoid more NRHP-eligible shipwreck sites and ancient submerged landforms than the Proposed Action through a reduction in seafloor disturbance and increased distances from Project structures, this alternative would have fewer impacts on marine cultural resources than the Proposed Action. Where NRHP-eligible shipwreck sites and ancient submerged landforms remain unavoidable by Alternative G, impacts from Project structures would be irreversible and long term **negligible** to **major** negative. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action)<br>Up to 100 WTGs | Alternative C<br>(Habitat Alternative)<br>64–65 WTGs | Alternative D<br>(Transit Alternative)<br>78–93 WTGs | Alternative E<br>(Viewshed Alternative)<br>64–81 WTGs | Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs | Alternative G<br>(Preferred Alternative) |
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| | | impacts from the Project in relation to other future offshore wind energy activities would be **negligible** for the long term. | as the Proposed Action. The cumulative impacts to marine cultural resources from the Project in relation to other future offshore wind energy activities would be **negligible** for the long term. | | | | It is expected that O&M and decommissioning activities at the WTG and OSS structures under Alternative G would be similar to the Proposed Action. As a result, the impacts to marine cultural resources from the presence of structures under Alternative G would be similar to the Proposed Action and remain long term **negligible** to **minor**.<br>Although Alternative G would have reduced impacts to marine cultural resources over the Proposed Action, other future offshore wind energy activities would not place structures in the RWF Lease Area and therefore the cumulative effects of Project structures on marine cultural resources would be the same under Alternative G as the Proposed Action. The cumulative impacts to marine cultural resources from the Project in relation to other future offshore wind energy activities would be **negligible** for the long term. |
| **Terrestrial Cultural Resources** | | | | | | | |
| Accidental releases and discharges | Construction of reasonably foreseeable onshore elements of future offshore wind activities could result in the accidental release of hazardous materials or debris; however, releases would generally be temporary to short term, localized, and in limited amounts (see Section 3.10.1). Such an accidental release could result in impacts to terrestrial cultural resources and TCPs associated with the cleanup of contaminated soils. No future offshore wind projects other than the RWF are known to have planned development activities or the potential for impacts on terrestrial cultural resources within the terrestrial APE. Beyond the Project's terrestrial APE, impacts to terrestrial cultural resources from other projects' construction-related activities would be short to long term and localized **negligible** to **minor** negative because of the low probability of an accidental release, the low volumes of material typically released in individual incidents, accepted practices | **Onshore**: Construction of onshore Project elements could result in the accidental release of hazardous materials or debris; however, releases would generally be temporary to short term, localized, and in limited amounts. Indirect physical impacts would be long term and **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required. Other indirect but primarily temporary to short-term impacts could include noise, vibration, and dust as well as visual impacts associated with cleanup activity related to accidental releases and discharges. These temporary to short-term impacts would be **negligible** to **minor** negative and minimized or avoided through application of state and local laws and regulations.<br>The impacts from accidental releases and discharges resulting from Project O&M and decommissioning activities associated with the Proposed Action would be the same as those described for Project construction and installation. Indirect physical impacts would be | **Onshore**: Impacts from accidental releases and discharges from onshore Project activities or facilities on terrestrial cultural resources under Alternatives C through F, if any, would be the same as those described for the Proposed Action. Such impacts would be temporary to short term, localized, and in limited amounts to terrestrial cultural resources. Indirect physical impacts would be long term **negligible** to **major** negative and indirect temporary to short term. Impacts related to cleanup activities would be **negligible** to **minor** negative and minimized or avoided through the application of state and local laws and regulations.<br>The impacts from accidental releases and discharges resulting from O&M and decommissioning activities associated with Alternatives C through F would be the same as those described for the Proposed Action and No Action Alternative. The overall magnitude of potential impacts resulting from accidental releases and discharges would be long term **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required.<br>Similar to the Proposed Action, Alternatives C through F would contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions present under the No Action Alternative. Within the terrestrial APE, no contribution is anticipated from other future offshore wind activities. Releases from other future development activities, if any, or ongoing use and maintenance of the historic Quonset Point Naval Air Station, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized and temporary to short-term **negligible** cumulative impacts on terrestrial cultural resources at the Quonset Point Naval Air Station. | | | | **Onshore**: Similar to Alternatives C through F, impacts from accidental releases and discharges from onshore Project activities or facilities on terrestrial cultural resources under Alternative G, if any, would be the same as those described for the Proposed Action. Such impacts would be temporary to short term, localized, and in limited amounts. Indirect physical impacts would be long term **negligible** to **major** negative and indirect temporary to short term. Impacts related to cleanup activities would be **negligible** to **minor** negative and minimized or avoided through the application of state and local laws and regulations.<br>The impacts from accidental releases and discharges resulting from O&M and decommissioning activities associated with Alternative G would be the same as those described for the Proposed Action and No Action Alternative: long term **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, |

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| | used to prevent accidental releases, and the localized nature of such events. | long term **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required.<br>The Proposed Action would contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions present under the No Action Alternative. The risk of impact from accidental releases and discharges would be increased primarily during construction but also would be present during Project operations and decommissioning. Releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized temporary to short-term **negligible** negative cumulative impacts on terrestrial cultural resources within the terrestrial APE. | | | | | and the extent and intensity of cleanup activities required.<br>Similar to the Proposed Action, Alternative G would contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions present under the No Action Alternative. Within the terrestrial APE, no contribution is anticipated from other future offshore wind activities. Releases from other future development activities, if any, or ongoing use and maintenance of the historic Quonset Point Naval Air Station would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized and temporary to short-term **negligible** cumulative impacts on terrestrial cultural resources at the Quonset Point Naval Air Station. |
| Climate change | As noted for marine cultural resources, the degree to which future offshore wind activities would reduce the impacts of climate change on terrestrial cultural resources in the terrestrial APE is unknown. Impacts from climate change trends are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on terrestrial cultural resources would remain effectively permanent and therefore long term. | **Onshore**: The impacts of the Proposed Action would be the same as the No Action Alternative as relates to climate change. The contribution of the Project on slowing or arresting global warming and climate change–related impacts could help reduce these potential negative impacts and be beneficial to terrestrial cultural resources. Because of this, the Proposed Action's contribution to effects from climate change on these resources would be **negligible**. Although the degree to which future offshore wind activities would reduce the impacts of climate change on terrestrial cultural resources in the terrestrial APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Proposed Action since the ongoing effects of climate change on terrestrial cultural resources would remain effectively permanent and therefore long term.<br>Cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative. | **Onshore**: Impacts from climate change on terrestrial cultural resources under Alternatives C through F would be similar to those described for the Proposed Action. The overall magnitude of potential impacts resulting from climate change are uncertain but are anticipated to qualify as **minor** to **moderate** negative and long term. Renewable energy development by the Project under any action alternative and future offshore wind activities are anticipated to reduce the impacts of climate change to an unknown degree, but offshore wind development alone is anticipated to result in long-term **negligible** contributions to impacts from climate change. Therefore, cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative. | | | | **Onshore**: Similar to Alternatives C through F, impacts from climate change on terrestrial cultural resources under Alternative G would be similar to those described for the Proposed Action: **minor** to **moderate** negative and long term. Renewable energy development by the Project under any action alternative and future offshore wind activities are anticipated to reduce the impacts of climate change to an unknown degree, but offshore wind development alone is anticipated to result in long-term **negligible** contributions to impacts from climate change. Therefore, cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative. |
| Presence of structures | Reasonably foreseeable onshore activities could physically disturb archaeological sites in the terrestrial APE or surrounding areas, such as through new building construction. No historic buildings or | **Onshore**: The construction of onshore Project components would physically disturb two NRHP-eligible archaeological sites within the OnSS work area limits; one NRHP-ineligible archaeological site and one NRHP-ineligible isolated | **Onshore**: The onshore activities proposed under Alternatives C through F would be the same as those under the Proposed Action. Therefore, the potential for permanent **negligible** to **major** negative impacts to result from the presence of structures under Alternatives C through F on terrestrial cultural resources is anticipated. | | | | **Onshore**: Similar to Alternatives C through F, the onshore activities proposed under Alternative G would be the same as those under the Proposed Action: the potential for permanent **negligible** to **major** negative |

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| | structures are located within the terrestrial APE; although the terrestrial APE intersects a portion of the historic Quonset Point Naval Air Station area.<br>Future offshore wind activities will not result in onshore facility development in the terrestrial APE. As a result, within the Project's terrestrial APE, impacts to terrestrial cultural resources could be long term **negligible** negative. | archaeological artifact within the ICF work area limits; and the grounds of one aboveground historic property, the Quonset Point Naval Air Station area (Forrest and Waller 2023). Physical impacts to the historic Quonset Point Naval Air Station resources would be **negligible** to **minor** because no terrestrial cultural resources that contribute to the NRHP-eligibility of that aboveground historic property are anticipated in the terrestrial APE. Physical impacts would also be **negligible** to **minor** at the portions of the two archaeological sites within the OnSS work area limits where construction is able to avoid physical impacts and **moderate** to **major** negative in areas where construction is not able to avoid physical impacts to them. Overall, the potential is for permanent **negligible** to **major** negative impacts to result from the Project on terrestrial cultural resources.<br>O&M and decommissioning activities would be expected to remain in areas of existing construction disturbance or areas of previous terrestrial cultural resources Phase 1 archaeological survey work. Physical impacts to these resources would be short to long term **negligible** negative where avoided by O&M and decommissioning activities and long term **minor** to **major** negative where ground-disturbing activities are not able to avoid these impacts.<br>No future offshore wind projects other than the Project are expected to have development activities and impacts on terrestrial cultural resources within the terrestrial APE. The impacts from the presence of onshore structures under the Proposed Action would result in long-term **negligible** negative cumulative impacts within the terrestrial APE. | The impacts from the presence of structures on terrestrial cultural resources resulting from O&M and decommissioning activities associated with Alternatives C through F would be the same as those described for the Proposed Action. Overall, the potential is for permanent, **negligible** to **major** negative impacts. Project impacts would be **negligible** to **minor** where construction is able to avoid portions of the two NRHP-eligible archaeological sites and **moderate** to **major** negative where construction is not able to avoid these impacts.<br>Similar to the Proposed Action, under Alternatives C through F, no future offshore wind projects other than the Project are expected to have development activities and impacts on terrestrial cultural resources within the terrestrial APE. The impacts from the presence of onshore structures under any action alternative would result in long-term **negligible** cumulative impacts within the terrestrial APE. | | | | impacts to result from the presence of structures under Alternative G on terrestrial cultural resources is anticipated.<br>The impacts from the presence of structures on terrestrial cultural resources resulting from O&M and decommissioning activities associated with Alternative G would be the same as those described for the Proposed Action. Overall, the potential is for permanent, **negligible** to **major** negative impacts. Project impacts would be **negligible** to **minor** where construction is able to avoid portions of the two NRHP-eligible archaeological sites and **moderate** to **major** negative where construction is not able to avoid these impacts.<br>Similar to the Proposed Action, under Alternative G, no future offshore wind projects other than the Project are expected to have development activities and impacts on terrestrial cultural resources within the terrestrial APE. The impacts from the presence of onshore structures under any action alternative would result in long-term **negligible** cumulative impacts within the terrestrial APE. |
| New cable emplacement/ maintenance | New cable emplacement could affect terrestrial archaeological resources at onshore cable routes and at the landing site transitioning between onshore and offshore cabling from future offshore wind activities. Although the potential for permanent **minor** to **major** negative impacts on buried resources to result from other reasonably foreseeable | **Onshore**: The impacts from new cable emplacement and maintenance for the Proposed Action would not introduce greater impacts to terrestrial resources over the No Action Alternative in the terrestrial APE. The route selected for the onshore transmission cable is located within existing ROWs and would prioritize the avoidance and minimization of impacts to terrestrial cultural resources. The risk of | **Onshore**: The onshore activities proposed under Alternatives C through F would be the same as those under the Proposed Action. Therefore, impacts to terrestrial cultural resources from construction, O&M, and decommissioning of cable emplacement/maintenance would be long term **negligible** to **minor** as the risk of potentially encountering undisturbed archaeological deposits is minimal in these previously disturbed areas.<br>Within the terrestrial APE, no impacts from new cable emplacement/maintenance under any future offshore wind activities are anticipated. The impacts from new cable | | | | **Onshore**: Similar to Alternatives C through F, the onshore activities proposed under Alternative G would be the same as those under the Proposed Action. Therefore, impacts to terrestrial cultural resources from construction, O&M, and decommissioning of cable emplacement/maintenance would be long term **negligible** to **minor** as the risk of potentially encountering undisturbed archaeological |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
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| | activities would remain (see Appendix E), no future offshore wind activities are being considered within the terrestrial APE of the Project. Therefore, no potential impacts are expected. | potentially encountering undisturbed archaeological deposits is minimized in these areas, and the resultant impact to terrestrial cultural resources would be long term **negligible** to **minor** negative.<br>O&M and decommissioning activities associated with the Proposed Action for the onshore cable would be expected to remain in areas of existing construction disturbance or areas of previous terrestrial cultural resources Phase 1 archaeological survey work. Consequently, long-term **negligible** negative impacts would occur to terrestrial cultural resources during O&M and decommissioning activities.<br>Within the Project's terrestrial APE, no future offshore wind projects other than the RWF are expected to have development activities and impacts on terrestrial archaeological resources. The impacts from new cable emplacement/maintenance under the Proposed Action would result in long-term **negligible** cumulative impacts. | emplacement/maintenance under any action alternative would result in long-term **negligible** cumulative impacts. | | | | deposits is minimal in these previously disturbed areas.<br>Within the terrestrial APE, no impacts from new cable emplacement/maintenance under any future offshore wind activities are anticipated. The impacts from new cable emplacement/maintenance under any action alternative would result in long-term **negligible** cumulative impacts. |
| **Viewshed Resources** | | | | | | | |
| Climate change | The effects of climate change on viewshed resources would be similar to those noted for marine and terrestrial cultural resources. Increased erosion along coastlines could lead to the collapse of coastal viewshed resources and elements of TCPs included among the viewshed resources. However, the contribution of offshore wind energy projects on slowing or arresting global warming and climate change–related impacts could help reduce these potential negative impacts and be beneficial to viewshed resources by hindering changes to the shoreline settings important to these resources. Although the degree to which future offshore wind activities would reduce the impacts of climate change trends on viewshed resources in the viewshed APE is unknown, impacts from climate change trends are anticipated to remain **minor** to **moderate** negative even with the benefits | **Offshore**: The impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative. The Project's contribution to effects from climate change on these resources would be **negligible**. Although the degree to which future offshore wind activities would reduce the impacts of climate change on viewshed resources in the viewshed APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term.<br>Cumulative impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative: **minor** to **moderate** and long term. | **Offshore**: Impacts of Alternatives C through F as they relate to climate change would be similar to the Proposed Action. The overall magnitude of potential impacts resulting from climate change are uncertain but are anticipated to qualify as **minor** to **moderate** negative and long term. Renewable energy development by the Project under any action alternative and future offshore wind activities are anticipated to reduce the impacts of climate change to an unknown degree, but offshore wind development alone is anticipated to result in **negligible** contributions to impacts from climate change. Therefore, cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative.<br>Cumulative impacts of any action alternative as they relate to climate change would be the same as the No Action Alternative: **minor** to **moderate** and long term. | | | | **Offshore**: Impacts of Alternative G as they relate to climate change would be similar to the Proposed Action. The overall magnitude of potential impacts resulting from climate change are uncertain but are anticipated to qualify as **minor** to **moderate** negative and long term. Renewable energy development by the Project under any action alternative and future offshore wind activities are anticipated to reduce the impacts of climate change to an unknown degree, but offshore wind development alone is anticipated to result in **negligible** contributions to impacts from climate change. Therefore, cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative.<br>Cumulative impacts of any action alternative as they relate to climate change would be the same as the No Action Alternative: **minor** to **moderate** and long term. |

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| | of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term. | | | | | | |
| Light | Future offshore wind activities would impact viewshed resources in the long term from navigational and aviation lighting on structures and temporarily from construction lighting. Impacts from lighting would be most visible at night and from cultural resources that are along shorelines or on elevated locations with unobstructed views. A limited number of cultural resources would be affected and would include those for which the nighttime sky is a contributing element to historic integrity, such as resources on the nearest shores of Rhode Island and Massachusetts and their offshore islands. Construction lighting and decommissioning lighting associated with both onshore and offshore wind facilities would have temporary, intermittent, and localized impacts, whereas operations lighting would have longer term, continuous, and localized impacts, where not adequately obscured or diffused. Under the No Action Alternative, lighting from future offshore wind activities would have temporary to long-term **negligible** to **major** negative impacts on viewshed resources. | **Offshore**: Impacts from construction and installation lighting would be most visible at night and from cultural resources that are along shorelines or on elevated locations with unobstructed views. A limited number of the 451 NRHP-eligible viewshed resources identified in the HRVEA would be affected and would include those for which the nighttime sky is a contributing element to aspects of its integrity, such as resources on the nearest shores of Rhode Island and Massachusetts and their offshore islands. Of the 451 NRHP-eligible viewshed resources identified in the HRVEA, 350 would experience **negligible** to **minor** visual impacts, not rising to the level of adverse effects under the criteria of NHPA Section 106; seven of these are NHLs that would not experience harm in consideration of NHPA Section 110(f). Of the 451 NRHP-eligible viewshed resources, 101 are anticipated to experience **moderate** to **major** visual impacts (daytime or nighttime) from the WTGs or OSSs that would rise to the level of adverse effect under NHPA Section 106 (see Table 3.10-6). Of these 101 aboveground historic properties that would be negatively affected to a moderate to major extent that would rise to the level of adverse effect under the NHPA Section 106 criteria (36 CFR 800.5), five of these are NHLs, two are TCPs, and the remaining 91 are historic buildings, structures, and districts.<br>Construction lighting and decommissioning lighting associated with both onshore and offshore wind facilities would have temporary, intermittent, and localized impacts, whereas operations lighting would have longer term, continuous, and localized impacts, where not adequately obscured or diffused. Aircraft detection lighting system use would substantially reduce the visual impact from Project lighting and make lighting visibility much more intermittent but would not eliminate the impact fully. Under the Proposed Action, lighting would have | **Offshore**: Compared to the maximum-case scenario under the Proposed Action, Alternatives C through F could decrease impacts to viewshed resources from construction and installation lighting for offshore wind structures because the number of constructed WTGs and their viewshed would be reduced.<br>Lighting would be reduced from up to 100 WTGs under the Proposed Action to the following:<br>• 64 or 65 WTGs (up to 35% to 36% less, respectively) under Alternative C.<br>• 78 and 93 WTGs (up to 7% to 22% less) under Alternative D. These lighting impacts under Alternative D would remain greater than those of Alternative C. Alternative D3 would specifically remove the closest seven WTG locations to Block Island and have an increased advantage for reducing visual impacts on aboveground historic properties on the shores of that island over other action alternatives, except Alternative E2, which would remove even more WTGs on the Block Island side of the RWF, and Alternative G, which although differently configured, would have comparable WTG distances as Alternative D yet have fewer WTGs overall.<br>• Between 64 and 81 WTGs (up to 36% to 19% less) under Alternative E. Alternative E1 configuration, in particular, would reduce the proximity of WTG lighting to Martha's Vineyard and toward mainland Rhode Island (see Figure 2.1-20). Alternative E2 would remove the closest WTGs to Martha's Vineyard and be most advantageous for reducing WTG proximity to Block Island; however, it would not be as effective overall as Alternative E1 for reducing WTG proximity to onshore areas. Although the distance of WTGs from Martha's Vineyard would increase under Alternative E specifically compared to other alternatives, the total number of lights and lighting impacts would remain greater than those of Alternative C and would reach the potential lower limit of light numbers and impacts of Alternative D. Alternative E is primarily focused on setbacks of WTGs from Martha's Vineyard and would effectively increase distances of Project lights to viewshed resources there, especially under Alternative E1 (see Figure 2.1-20). This especially includes increased setbacks from viewshed resources important to Native American tribes at Aquinnah, inclusive of the Edwin DeVries Vanderhoop Homestead, Gay Head Light, and Gay Head - Aquinnah Shops. Alternative E also further increases setbacks from Newport and Block Island (see Figure 2.1-21), including the Breakers, Marble House, and the Ocean Drive Historic District, Bellevue Avenue Historic District, and Southeast Lighthouse NHLs. The Alternative E setbacks for RWF WTGs would increase the distances to viewshed resources at Aquinnah by between approximately 0.25 and 1 mile, at Newport and mainland Rhode Island by approximately 4 miles, and at Block Island variably beginning at less than 1 mile and extending to over 4 miles. Therefore, Alternative E would be more effective in reducing visual impacts from the nearest potential WTGs to viewshed resources at Martha's Vineyard and along Rhode Island shores compared to other action alternatives but would not eliminate visual impacts to all viewshed resources and | | | | **Offshore**: Compared to the maximum-case scenario under the Proposed Action, Alternative G could decrease impacts to viewshed resources from construction and installation lighting for offshore wind structures because the number of constructed WTGs and their viewshed would be reduced.<br>Lighting would be reduced from up to 100 WTGs under the Proposed Action to 65 WTGs (35% less) under Alternative G.<br>Alternative G would reduce the proximity of WTG lighting to Block Island and Martha's Vineyard and toward Newport and mainland Rhode Island (see Figure 2.1-22). Alternatives G1, G2, and G3 are similar to each other in terms of the reduction of WTG lighting to Martha's Vineyard and Block Island and toward Newport and mainland Rhode Island (see Figure 2.1-23, Figure 2.1-24, and Figure 2.1-25). Alternatives G1 and G2 would retain two WTGs closer to Martha's Vineyard, which Alternative G3 would remove, and Alternatives G1 and G3 would retain two WTGs closer to Block Island, which Alternative G2 would remove. See Appendix K, Figures K-15, K-16, and K-17.<br>Alternatives G1, G2, and G3 would remove more of the closest WTGs to mainland Rhode Island, Newport, Martha's Vineyard, and Block Island when compared to the Proposed Action, Alternative C, and Alternatives D1 and D2. Alternatives G1, G2, and G3 would remove more of the closest WTGs to mainland Rhode Island, Newport, and Martha's Vineyard but would retain a comparable amount in proximity to Block Island, in comparison to Alternative D3. Alternatives G1, G2, and G3 would remove fewer of the closest WTGs to mainland Rhode Island, Newport, and Martha's Vineyard but would retain a comparable—yet differently configured—amount in proximity to Block Island, in comparison to Alternative E1. Alternatives G1, G2, and G3 would remove a |

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| | | temporary to long-term **negligible** to **major** negative impacts on viewshed resources.<br>Long-term **negligible** to **major** negative impacts would continue for viewshed resources during O&M. O&M would not add further to these impacts; however, removing WTGs and OSSs through decommissioning would provide a remedy to previous visual impacts created by lighting.<br>The Proposed Action would add offshore lighting impacts from navigational and aviation hazard lighting systems on the WTGs and OSSs. The addition would include up to 100 WTGs with red aviation hazard flashing lights and up to 100 WTGs and two OSSs with marine navigation lighting, compared to the future offshore wind activities' potential of up to 955 WTGs and three OSS locations offshore of Rhode Island and Massachusetts (including RWF), as evaluated in a maximum-case scenario for the cumulative visibility analysis for the Project (EDR 2021b). Cumulatively, the Proposed Action when combined with past, present, and reasonably foreseeable activities could have intermittent and from temporary to long-term **negligible** to **major** negative impacts on viewshed resources. | would not result in fewer visible WTGs and offshore RWF lighting sources than Alternatives C or F.<br>• As few as 56 WTGs (up to 44% less than the maximum of 100 WTG under the Proposed Action) under Alternative F when combined with any of the action alternatives (C1, C2, or E1) intended to allow for the fulfillment of the existing three PPAs' generation requirement of at least 704 MW. These lighting impacts under Alternative F could potentially be reduced from those of the other action alternatives, where WTG numbers are comparatively less.<br>Although the level of impact would be reduced, the layout modification and construction activities proposed under Alternatives C through F would still include the same viewshed resources visually impacted under the Proposed Action and the same potential for impacts to these resources. Portions of all RWF WTGs would potentially be visible from approximately most of the 101 NRHP-eligible viewshed resources moderately to majorly impacted under the action alternatives. All action alternatives, regardless of planned WTG numbers, would have the WTG visibility reduced somewhat due to intervening land areas and with setback distance from the coastline. As described, those action alternatives with the fewest WTGs and the greatest distances of setback would have the least degree of potential visual impacts on viewshed resources. Under Alternatives C through F, the construction and installation of offshore Project components with lighting would have temporary to long-term **negligible** to **major** negative impacts to viewshed resources, similar to those of the Proposed Action.<br>O&M and decommissioning of offshore Project components with lighting would have temporary to long-term **negligible** to **major** negative impacts to viewshed resources under Alternatives C through F, similar to those of the Proposed Action. Impacts from Project lighting would be removed upon completion of decommissioning.<br>To the potential 955 WTGs modeled in a maximum-case scenario for other future offshore wind activities (EDR 2021b), Alternatives C through F would add offshore lighting impacts from navigational and aviation hazard lighting systems. The same 101 NRHP-eligible viewshed resources would continue to be negatively affected from a moderate to major degree by offshore lighting impacts in the viewshed APE under Alternatives C through F as the Proposed Action (per the criteria of adverse effects in 36 CFR 800). The cumulative offshore lighting impacts on viewshed resources in the viewshed APE associated with Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be long term **negligible** to **major** negative, until decommissioning of the Project. However, for Alternative E, the visual proximity for impacts from offshore Project elements would specifically have increased setbacks from viewshed resources at Martha's Vineyard and the nearest shores of Rhode Island. | | | | comparable but differently configured amount of the closest WTGs to mainland Rhode Island, Newport, Martha's Vineyard, and Block Island in comparison to the Alternative E2.<br>Alternative G would also have a narrowed visible extent of WTG lights in a line across the horizon (within from 24 to 41 degree fields of view [EDR 2023c]), visible from NHLs at Block Island and Newport in proportion to the maximum number of proposed WTGs (65 total). From the Newport area, only Alternative D2 would have a narrower field of view of WTG lights (ranging from 35 to 37 degrees) across the horizon (EDR 2023c) but would have up to 92 WTGs, proportionately 42% more than Alternative G.<br>Although the distances and configurations of WTGs from Block Island, Martha's Vineyard, and mainland areas would vary under Alternative G from the other alternatives, the total number of lights and lighting impacts under Alternative G would be greater than Alternative F, would remain similar to those of Alternative C and Alternative E1, but would be lower than the potential lower limit of light numbers and impacts of Action Alternatives B, D, and E2. As one of the action alternatives with the lowest number of proposed WTGs, where Alternative G increases distances to WTGs from sensitive viewshed resources at the nearest points of land—Block Island, Martha's Vineyard, Newport, and mainland Rhode Island, Alternative G would effectively reduce visual impacts (see Figure 2.1-22). This especially includes increased setbacks from viewshed resources important to Native American tribes at Aquinnah, inclusive of the Edwin DeVries Vanderhoop Homestead, Gay Head Light, and Gay Head - Aquinnah Shops. Alternative G also further increases setbacks from Newport and Block Island (see Figure 2.1-22), including the Breakers, Marble House, and the Ocean Drive Historic District, Bellevue Avenue Historic District, and Southeast Lighthouse NHLs.<br>Compared to the Proposed Action, Alternative G setbacks for RWF WTGs would increase the distances to viewshed resources at Aquinnah by |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | a minimum of approximately 1.25 miles, at Newport and mainland Rhode Island by 1.15 mile, and up to 3.5 miles, depending on the WTG configuration used. In relation to Block Island, Alternative G would reduce the number of closest WTGs and remove the line of WTGs visible on the horizon from Block Island, removing the massing of RWF WTGs southeast and northeast of Block Island in comparison to the Proposed Action. Alternative G, in comparison to Alternative C, would continue to have WTGs in about the same proximity to Martha's Vineyard, although fewer of them under Alternative G, and the same changes as Alternative C in relation to Block Island, Newport, and mainland Rhode Island (in comparison to the Proposed Action). Alternative G, in comparison to Alternative D, would have increased setbacks from Martha's Vineyard, Newport, and mainland Rhode Island; however, in comparison to Alternative D3, Alternative G would have about the same increased setback distances from Block Island over the Proposed Action (with WTGs differently configured). Alternative G would not remove as many WTGs as far back from Martha's Vineyard as the nearest Alternative E1 WTG (which would be approximately 2 miles farther) or from Newport (which would be approximately 1.15 to 3.5 miles farther). Nor would Alternative G reduce WTG proximity as much from Block Island as Alternative E2 (where WTGs would begin at the same distance as Alternative G, but then recede further to the northwest, to distances of 1.15 to approximately 5.5 miles farther away). The distances by which Alternative F would increase WTG setbacks from shore in relation to the other action alternatives cannot be quantified until the additional WTGs to be removed are identified.<br><br>With the combination of reduced WTG numbers and farther setbacks from shorelands, Alternative G would be more effective in reducing visual impacts from the nearest potential WTGs to viewshed resources at Martha's Vineyard, on Block Island, and along |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action)<br>Up to 100 WTGs | Alternative C<br>(Habitat Alternative)<br>64–65 WTGs | Alternative D<br>(Transit Alternative)<br>78–93 WTGs | Alternative E<br>(Viewshed Alternative)<br>64–81 WTGs | Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs | Alternative G<br>(Preferred Alternative) |
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| | | | | | | | Rhode Island shores compared to other action alternatives, except Alternative E and potentially Alternative F (where Alternative F reduces WTG numbers by 14% lower than Alternative G). Nevertheless, Alternative G would not eliminate visual impacts to all viewshed resources and would not result in fewer visible WTGs and offshore RWF lighting sources than Alternatives C, E1, or F.<br>Although the level of impact would be reduced, the layout modification and construction activities proposed under Alternative G would still include the same viewshed resources visually impacted under the Proposed Action and the same potential for impacts to these resources. Portions of all RWF WTGs would potentially be visible from approximately most of the 101 NRHP-eligible viewshed resources moderately to majorly impacted under the action alternatives. All action alternatives, regardless of planned WTG numbers, would have the WTG visibility reduced somewhat due to intervening land areas and with setback distance from coastlines. As described, those action alternatives with the fewest WTGs and the greatest distances of setback would have the least degree of potential visual impacts on viewshed resources. Under Alternative G, the construction and installation of offshore Project components with lighting would have temporary to long-term **negligible** to **major** negative impacts to viewshed resources, similar to those of the Proposed Action.<br>O&M and decommissioning of offshore Project components with lighting would have temporary to long-term **negligible** to **major** negative impacts to viewshed resources under Alternative G, similar to those of the Proposed Action. Impacts from Project lighting would be removed upon completion of decommissioning. |
| | | **Onshore**: Based on a field review of the viewshed analyses, the OnSS and ICF construction areas would be readily visible from two NRHP-eligible viewshed resources (EDR 2021a) within the viewshed APE. Temporary **negligible** negative impacts from lighting of onshore Project activities | **Onshore**: Temporary **negligible** impacts from lighting of onshore Project activities or facilities resulting from construction and installation of Alternatives C through F are expected on viewshed resources, similar to the Proposed Action.<br>Impacts from lighting of onshore Project components during O&M and decommissioning would be the same for Project installation and construction under Alternatives C through F | | | | **Onshore**: Temporary **negligible** impacts from lighting of onshore Project activities or facilities resulting from construction and installation of Alternative G are expected on viewshed resources, similar to the Proposed Action. |

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| | | or facilities during construction and installation are expected on viewshed resources.<br>The impacts from light resulting from O&M activities associated with the Proposed Action would be the same as those described for Project installation and construction: **negligible** but long-term.<br>Long-term **negligible** impacts from lighting of onshore Project activities or facilities are expected on cultural resources in the viewshed APE, and these would not add cumulatively to the potential lighting impacts of other reasonably foreseeable activities. | as for the Proposed Action. Long-term **negligible** impacts to cultural resources from lighting of onshore Project activities or facilities would be expected in the viewshed APE.<br>The same as the Proposed Action, light would result in no cumulative impacts to viewshed resources from Alternatives C through F. | | | | Impacts from lighting of onshore Project components during O&M and decommissioning would be the same for Project installation and construction under Alternative G as for the Proposed Action. Long-term **negligible** impacts to cultural resources from lighting of onshore Project activities or facilities would be expected in the viewshed APE.<br>The same as the Proposed Action, light would result in no cumulative impacts to viewshed resources from Alternative G. |
| Presence of structures | Within the viewshed APE, if BOEM selects the No Action Alternative, the development of future offshore wind projects' onshore infrastructure (the presence of structures) could introduce new visible elements to the setting of viewshed resources that would diminish their historic integrity, where there is an unimpeded line of sight from the viewshed resource to the onshore infrastructure. Within the offshore viewshed APE, the maximum-case scenario of 955 WTGs from all other future offshore wind activities would have a greater visual impact on most aboveground historic properties within the viewshed APE upon full build-out than would the RWF alone with its up to 100 WTGs. Under the No Action Alternative, the construction, installation, and O&M of future offshore wind activities could locate WTGs in the viewshed APE. Beginning at approximately 11 miles from NRHP-eligible viewshed resources at Nomans Land Island and extending to over 30 miles at NRHP-eligible viewshed resources at Long Island, New York, and mainland Connecticut, impacts from future offshore wind projects would result in long-term **negligible** to **major** negative visual impacts to NRHP-eligible viewshed resources in the viewshed APE, including NHLs. | **Offshore**: The construction of the offshore Project components would result in modifications to the existing setting of aboveground historic properties within the viewshed APE because a range of RWF WTG structures would be visible on the horizon from various viewshed resources on the shore during the daytime and structure lighting would be visible at night as addressed in the light impact discussion (EDR 2023a; see also Section 3.20 for further discussion). Visibility of WTG structures would have long term, intermittent, and localized impacts, where and when not adequately obscured or diffused. Of the 451 NRHP-eligible viewshed resources within the viewshed APE, 350 would have noncritical and/or limited views of WTGs. These 350 NRHP-eligible viewshed resources would experience **negligible** to **minor** visual impacts. The remaining 101 NRHP-eligible viewshed resources of the 451 are anticipated to experience **moderate** to **major** visual impacts (daytime or nighttime) from the WTGs or OSS. These 101 resources include five NHLs and two TCPs. Under the Proposed Action, the presence of offshore Project wind facilities would have long-term **negligible** to **major** negative impacts on viewshed resources for Project installation and construction through the life of the Project until decommissioning is complete.<br>The Proposed Action would add up to 100 additional WTGs and up to two OSSs to the condition of the No Action Alternative within the viewshed APE. Visual impacts to viewshed resources from the Project would be long term | **Offshore**: Alternatives C through F could decrease impacts to viewshed resources when compared to the Proposed Action because the number of constructed WTGs and their viewshed would be reduced by up to 35% to 36% for Alternative C, 7% to 22% for Alternative D, 19% to 36% for Alternative E, and as much as 44% for Alternative F (when combined with Alternative C1, C2, or E1), as compared to the maximum-case scenario under the Proposed Action. Comparative analysis of Alternatives C through F and proportionality of visual impacts from the daytime visibility of offshore WTGs and OSSs on viewshed resources is the same as for nighttime lighting of these Project structures.<br>Although the level of impact would be reduced, the layout modification and construction activities proposed under these alternatives would still include the same viewshed resources visually impacted under the Proposed Action and the same potential for impacts to these resources. Therefore, the construction and installation of offshore Project structures would have long-term **negligible** to **major** negative impacts to viewshed resources under Alternatives C through F, similar to those of the Proposed Action.<br>The O&M and decommissioning of offshore Project components would have long-term **negligible** to **major** negative impacts to viewshed resources under Alternatives C through F, similar to but reduced from those of the Proposed Action. Impacts from the presence of structures offshore would be removed once decommissioning is complete. While the visual impacts from offshore Project structures described for construction and installation (see Section 3.10.2.4.1) would persist through O&M and decommissioning activities at 101 NRHP-eligible viewshed resources, including five NHLs and two TCPs, impacts would remain **negligible** to **minor** at the remaining 350 NRHP-eligible viewshed resources in the viewshed APE.<br>To the potential 955 WTGs modeled in a maximum-case scenario for other future offshore wind activities (EDR 2021b), Alternatives C through F would add fewer WTGs than the Proposed Action. The same 101 NRHP-eligible viewshed resources continue to be negatively affected from a moderate to major degree by offshore presence of structures in the viewshed APE as the Proposed Action (per the criteria of adverse effects in 36 CFR 800). The cumulative visual impacts on viewshed resources in the viewshed APE associated with Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be long term **negligible** to **major** negative, until decommissioning of the Project. However, for Alternative E, the visual proximity for | | | | **Offshore**: Alternative G could decrease impacts to viewshed resources when compared to the Proposed Action, Alternative D, and Alternative E2 because the number of constructed WTGs and their viewshed would be reduced by 35% for Alternative G as compared to the maximum-case scenario under the Proposed Action and by at least 20% for the minimum case for these alternatives. The 35% reduction under Alternative G is comparable to the amount of reduction as would occur under Alternative C and Alternative E1, based on their WTG numbers; however, WTGs under Alternative G would be differently configured than under other alternatives, as discussed under Lighting, above. Alternative F would have 14% fewer WTGs than Alternative G, and the potential for an equivalent proportion of reduced visual impact on viewshed resources (although WTG setback distance changes cannot be quantified until the additional WTGs to be removed are identified under Alternative F). Comparative analysis of Alternative G and proportionality of visual impacts from the daytime visibility of offshore WTGs and OSSs on viewshed resources are the same as for nighttime lighting of these Project structures.<br>Alternative G would also have a narrowed visible extent of WTGs in a line across the horizon (within fields of view from 24 to 41 degrees [EDR 2023c]), visible from NHLs at Block Island and Newport, in proportion to the maximum number of proposed WTGs (65 total). |

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| | | and **negligible** to **major** negative, minimized with distance and obstructions. The Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **major** negative cumulative negative impacts on NRHP-eligible viewshed resources, represented by aboveground historic properties, in the viewshed APE. | impacts from offshore Project elements would specifically have increased setbacks from viewshed resources at Martha's Vineyard and the nearest shores of Rhode Island. | | | | From the Newport area, only Alternative D2 would have a narrower field of view of WTGs (ranging from 35 to 37 degrees) across the horizon (EDR 2023c) but would have up to 92 WTGs, proportionately 42% more than Alternative G.<br>Although the level of impact would be reduced, the layout modification and construction activities proposed under Alternative G would still include the same viewshed resources visually impacted under the other action alternatives and the same potential for impacts to these resources. Therefore, the construction and installation of offshore Project structures would have long-term **negligible** to **major** negative impacts to viewshed resources under Alternative G, similar to those of the Proposed Action and other action alternatives.<br>The O&M and decommissioning of offshore Project components would have long-term **negligible** to **major** negative impacts to viewshed resources under Alternative G, similar to, but reduced from, those of the Proposed Action, Alternative D, and Alternative E2, and about the same, but differently configured from, Alternatives C and E1. Impacts from the presence of structures offshore would be removed once decommissioning is complete. While the visual impacts from offshore Project structures described for construction and installation (see Section 3.10.2.4.1) would persist through O&M and decommissioning activities at 101 NRHP-eligible viewshed resources, including five NHLs and two TCPs, impacts would remain **negligible** to **minor** at the remaining 350 NRHP-eligible viewshed resources in the viewshed APE.<br>To the potential 955 WTGs modeled in a maximum-case scenario for other future offshore wind activities (EDR 2021b), Alternative G would add more WTGs than Alternative F; fewer WTGs than the Proposed Action, Alternative D, and Alternative E2; and approximately the same number of WTGs as Alternative C and Alternative E1. Under Alternative G, the same 101 NRHP-eligible viewshed resources continue to be negatively |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| | | | | | | | affected from a moderate to major degree by the offshore presence of structures in the viewshed APE as the other action alternatives (per the criteria of adverse effects in 36 CFR 800). The cumulative visual impacts on viewshed resources in the viewshed APE associated with Alternative G when combined with past, present, and reasonably foreseeable activities would be long term **negligible** to **major** negative until decommissioning of the Project. However, for Alternative G, the visual proximity for impacts from offshore Project elements would specifically have increased setbacks from viewshed resources at Martha's Vineyard, on Block Island, and the nearest shores of Newport compared to the other action alternatives, except Alternative E. |
| | | **Onshore**: For the onshore viewshed APE, construction and installation of the onshore Project facilities could introduce new visible elements to the setting of NRHP-eligible viewshed resources that would diminish their historic integrity, where there is an unimpeded line of sight between the resource and the onshore Project facilities. Although the NRHP-eligible Quonset Point Naval Air Station and Wickford Historic District are within the viewshed APE of the OnSS and ICF, these onshore Project facilities would be in scale and character with the current use of the Quonset Point Naval Air Station and would not introduce contrasting visual elements inconsistent with the existing setting of the Wickford Historic District. As a result of the construction and installation, O&M, and decommissioning of the onshore Project facilities, the potential visual impacts to the NRHP-eligible Quonset Point Naval Air Station and the Wickford Historic District would be long term **negligible** to **minor.**<br>The Proposed Action's onshore facilities would not add cumulative impacts from the presence of structures resulting from other reasonably foreseeable activities. | **Onshore**: For the onshore viewshed APE, construction and installation of the onshore Project facilities under Alternatives C through F would be the same as those under the Proposed Action. Therefore, impacts to viewshed resources within the viewshed APE would be short to long term **negligible** to **minor** (the same as the Proposed Action).<br>Impacts from the presence of structures resulting from O&M and decommissioning activities associated with onshore Project components would be the same for Project installation and construction under Alternatives C through F as for the Proposed Action. As a result of the O&M and decommissioning of the onshore Project facilities, the potential visual impacts to viewshed resources are anticipated to be **negligible** to **minor** for the long term.<br>The same as the Proposed Action, the presence of onshore structures would result in no cumulative impacts from Alternatives C through F or the Proposed Action to viewshed resources. | | | | **Onshore**: For the onshore viewshed APE, construction and installation of the onshore Project facilities under Alternative G would be the same as those under the Proposed Action. Therefore, impacts to viewshed resources within the viewshed APE would be short to long term **negligible** to **minor** (the same as the Proposed Action).<br>Impacts from the presence of structures resulting from O&M and decommissioning activities associated with onshore Project components would be the same for Project installation and construction under Alternative G as for the Proposed Action. As a result of the O&M and decommissioning of the onshore Project facilities, the potential visual impacts to viewshed resources are anticipated to be **negligible** to **minor** for the long term.<br>The same as the Proposed Action, the presence of onshore structures would result in no cumulative impacts from Alternative G or the Proposed Action to viewshed resources. |

### 3.10.2.2 Alternative A: Impacts of the No Action Alternative on Marine Cultural Resources

#### 3.10.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for marine cultural resources (see Section 3.10.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and permitted and constructed offshore wind COP projects within the cultural resources GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.10.2.2.2 Cumulative Impacts

This section discloses potential marine cultural resources impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

Accidental releases and discharges: The accidental release of hazardous materials or debris and any associated cleanup that migrate from future offshore wind activities that are nearby could impact submerged marine cultural resources in the marine APE for the Project. However, most releases would be temporary to short term and **negligible** negative and not measurably contribute to resource impacts because of the low probability of occurrence, low persistence time, and EPMs implemented to prevent releases. Although not expected, a large-scale accidental release and associated cleanup could result in permanent, geographically extensive and temporary to long-term **minor** to **major** negative impacts on marine cultural resources.

Anchoring: Development of future offshore wind activities is not expected within the Project's marine APE; however, the development of future offshore wind activities could negatively affect marine cultural resources that connect to the current marine APE. At the boundaries of the RWF Lease Area, the SFWF Lease Area does intersect ancient submerged landform features (Targets 27 and 28; see Table 3.10-3) and a shipwreck along the lease edge (Target 20; see Table 3.10-2). Deploying and repositioning anchors with associated wire rope, cable, and chain during construction and maintenance activities could impact the bottom surface and potentially disturb shipwrecks and ancient submerged landforms, resulting in the irreversible loss of cultural resources. The SFWF would avoid impacts to these lease-edge and other marine cultural resources within its lease area by design, but not all marine cultural resources are avoidable within the SFWF export cable corridor (BOEM 2021). Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact within its Lease Area and export cable corridor would be avoided and would result in no impacts by other reasonably foreseeable offshore wind activities. For other reasonably foreseeable activities within the Project marine APE that do not require its federal approval, BOEM would have no ability to add historic preservation requirements, and impacts to marine cultural resources could go unmitigated as a result of activities that are not federally reviewed.

Climate change: Factors related to climate change, including sea level rise, increased storm severity/frequency, increased sedimentation and erosion, and ocean acidification, could also result in long-term and permanent impacts on marine cultural resources. Ancient submerged landforms and associated cultural resources on the OCS have already experienced the effects of climate change because they were inundated when the last ice age ended (BOEM 2012:3-423). This includes being exposed to erosion during and after inundation. Climate change could introduce new erosive factors at ancient submerged landforms and shipwrecks. Federal studies on the negative effects of climate change on shallow water shipwrecks point to accelerated decomposition (National Ocean Service 2021). Conversely, the contribution of offshore wind energy projects on slowing or arresting global warming and climate change–related impacts could help reduce these climate change impacts and be beneficial to marine cultural resources. Because of this, the Project's contribution to effects from climate change on these resources would be **negligible** negative. Although the degree to which future offshore wind activities would reduce the impacts of climate change on marine cultural resources in the marine APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on marine cultural resources would remain effectively permanent and therefore long term.

<u>New cable emplacement/maintenance:</u> Cable installation from future offshore wind activities and other submarine cables could physically impact marine cultural resources. This includes removal of potential MEC/UXOs in advance of seafloor preparation for RWEC installation. In addition to general horizontal acreage of seafloor disturbance, the extent of potential impacts to marine cultural resources increases with depth of disturbance into the seafloor, and cable emplacement and maintenance could reach depths able to impact more shallowly buried ancient submerged landforms, if present, as well as shallowly sediment-covered shipwrecks. The RI-MA WEA contains numerous shipwrecks, related debris fields, and ancient submerged landform features, which future offshore construction activities could impact, as indicated by the MARA and previous wind farm studies in the vicinity (Gray & Pape 2019, 2020; SEARCH 2023). See Figure 1.1-2 for New England WEAs. However, no new cable emplacement or maintenance is anticipated within the current Project's marine APE from future offshore wind activities. Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact would be avoided and would result in no impacts by other reasonably foreseeable offshore wind activities. For other reasonably foreseeable activities within the Project's marine APE that do not require its federal approval, BOEM would have no ability to add historic preservation requirements. Any sunken military craft and debris fields would continue to be protected under Public Law 108–375 Title XIV. Impacts to other marine cultural resources could go unmitigated as a result of activities that are not federally reviewed.

<u>Presence of structures:</u> Future offshore wind activities could impact marine cultural resources with the placement of in-water structures with foundations in the seafloor. In addition to general horizontal acreage of seafloor disturbance, the extent of potential impacts to marine cultural resources increases with depth of disturbance into the seafloor and WTG and OSS foundations would typically reach depths able to penetrate ancient submerged landforms if present, as well as sediment-covered shipwrecks. The RI-MA WEA contains numerous shipwrecks, related debris fields, and ancient submerged landform features, which future offshore construction activities could impact as indicated by the MARA and previous wind farm studies in the vicinity (Gray & Pape 2019, 2020; SEARCH 2023). However, no new structures are anticipated within the current Project's marine APE from future offshore wind activities or other reasonably foreseeable activities within the Project marine APE that do not require federal approval. Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact would be avoided and would result in no impacts by future offshore wind activities.

#### 3.10.2.2.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on marine cultural resources associated with the Project would not occur. No new structures, cable emplacement, or maintenance activities are anticipated within the Project's marine APE from future offshore wind activities.

Under the No Action Alternative, BOEM anticipates those marine cultural resources that the RWF has the potential to impact would be avoided and would result in no impacts by future offshore wind activities. Marine cultural resources in the marine APE consist of ancient submerged landforms and shipwrecks. Although the effects of climate change would continue on these marine cultural resources in the marine APE, the degree to which the future offshore wind activities analyzed would reduce these impacts is unknown. However, the contribution of offshore wind energy activities, including the Project, to the impacts of climate change would be **negligible**, but the overall impacts of climate change on marine cultural resources would effectively be permanent.

Considering all the IPFs together, BOEM anticipates that no impacts would result from future offshore wind activities in the marine APE. For other reasonably foreseeable activities within the Project marine APE that do not require its federal approval, BOEM would have no ability to add historic preservation requirements, and impacts to marine cultural resources could go unmitigated as a result of activities that are not federally reviewed and therefore could be long term **negligible** to **major** negative.

### 3.10.2.3 Alternative A: Impacts of the No Action Alternative on Terrestrial Cultural Resources

#### 3.10.2.3.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for terrestrial cultural resources (see Section 3.10.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the cultural resources GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.10.2.3.2 Cumulative Impacts

This section discloses potential terrestrial cultures resources impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

<u>Accidental releases and discharges:</u> Construction of reasonably foreseeable onshore elements of future offshore wind activities could result in the accidental release of hazardous materials or debris; however, releases would generally be temporary to short term, localized, and in limited amounts (see Section 3.10.1). Such an accidental release could result in impacts to terrestrial cultural resources and TCPs associated with the cleanup of contaminated soils. Indirect physical impacts would be long term and **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required. Archaeological resources and TCPs are more likely to experience indirect physical impacts through damage to or destruction of cultural materials or tribally sensitive resources during the removal of contaminated soils than are aboveground standing structures. Other indirect but primarily temporary to short-term impacts could include noise, vibration, and dust as well as visual impacts associated with cleanup activity related to accidental releases and discharges. These temporary to short-term impacts

would be **negligible** to **minor** and minimized or avoided through application of state and local laws and regulations regarding air quality (see Section 3.4.1). No future offshore wind projects other than the RWF are known to have planned development activities or the potential for impacts on terrestrial cultural resources within the terrestrial APE. Beyond the Project's terrestrial APE, impacts to terrestrial cultural resources from other projects' construction-related activities would be short to long term and localized **negligible** to **minor** negative because of the low probability of an accidental release, the low volumes of material typically released in individual incidents, accepted practices used to prevent accidental releases, and the localized nature of such events.

<u>Climate change:</u> As noted for marine cultural resources, climate change is anticipated to also result in long-term **minor** to **moderate** negative permanent impacts on terrestrial cultural resources. Sea level rise could lead to the inundation of terrestrial cultural resources, and increased storm severity and frequency would be expected to increase the severity and frequency of damage to coastal terrestrial cultural resources. Ocean acidification could impact traditional uses of coastal TCPs. However, the contribution of offshore wind energy projects on slowing or arresting global warming and climate change–related impacts could help reduce these potential negative impacts and be beneficial to terrestrial cultural resources. Because of this, the Project's contribution to effects from climate change on these resources would be long term and **negligible**. Although the degree to which future offshore wind activities would reduce the impacts of climate change on terrestrial cultural resources in the terrestrial APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on terrestrial cultural resources would remain effectively permanent and therefore long term.

<u>Presence of structures</u>: Reasonably foreseeable onshore activities could physically disturb archaeological sites in the terrestrial APE or surrounding areas, such as through new building construction. No historic buildings or structures are located within the terrestrial APE. Future offshore wind activities will not result in onshore facility development in the terrestrial APE. As a result, within the Project's terrestrial APE, impacts to terrestrial cultural resources could be long term **negligible** negative. For other reasonably foreseeable activities within the Project terrestrial APE that do not require federal approval, BOEM would have no ability to add historic preservation requirements, and impacts to terrestrial cultural resources could go unmitigated as a result of activities that are not federally reviewed.

<u>New cable emplacement/maintenance:</u> New cable emplacement could affect terrestrial archaeological resources at onshore cable routes and at the landing site transitioning between onshore and offshore cabling from future offshore wind activities. Although BOEM would be able to add terrestrial cultural resources identification requirements and mitigation measures for future offshore wind projects, the potential for permanent **minor** to **major** negative impacts on buried resources to result from other reasonably foreseeable activities would remain. However, because no future offshore wind activities are being considered within the terrestrial APE of the Project, no potential impacts are expected.

#### 3.10.2.3.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on terrestrial cultural resources associated with the Project would not occur. Examples of individual terrestrial cultural resources are terrestrial archaeological sites and TCPs. Impacts could vary widely because the impacts are dependent on the unique characteristics of the individual resources. However, future offshore wind activities are not known to have impacts occurring in the terrestrial APE of the proposed Project. As described in Appendix E1, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be long term **negligible** to **major** negative, where impacts to terrestrial cultural resources could go unmitigated as a result of activities that are not federally reviewed.

Considering all the IPFs together, BOEM anticipates that long-term **negligible** to **major** negative impacts would result only from other ongoing activities, reasonably foreseeable activities other than offshore wind, and reasonably foreseeable environmental trends and not from other future offshore wind activities since none are planned in the terrestrial APE. Where not avoidable, these impacts would be **negligible** to **major** negative on terrestrial cultural resources because they would be irreversible and long term. The NRHP-eligible Mill Creek Swamp #1 and #2 archaeological sites could be subject to future development, potentially without federal historic preservation requirements, even if the proposed Project were not to occur.

### 3.10.2.4 Alternative A: Impacts of the No Action Alternative on Viewshed Resources

#### 3.10.2.4.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for viewshed resources (see Section 3.10.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the cultural resources GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.10.2.4.2 Cumulative Impacts

This section discloses potential viewshed resources impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

Climate change: The effects of climate change on viewshed resources would be similar to those noted for marine and terrestrial cultural resources. Increased erosion along coastlines could lead to the collapse of coastal viewshed resources and elements of TCPs included among the viewshed resources. However, the contribution of offshore wind energy projects on slowing or arresting global warming and climate change–related impacts could help reduce these potential negative impacts and be beneficial to viewshed resources by hindering changes to the shoreline settings important to these resources. Because of this, the Project's contribution to effects from climate change on these resources would be long term **negligible** negative. Although the degree to which future offshore wind activities would reduce the impacts of climate change on viewshed resources in the viewshed APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term.

Light: Future offshore wind activities would impact viewshed resources in the long term from navigational and aviation lighting on structures and temporarily from construction lighting. Impacts from lighting would be most visible at night and from cultural resources that are along shorelines or on elevated locations with unobstructed views. A limited number of cultural resources would be affected and would include those for which the nighttime sky is a contributing element to historic integrity, such as resources on the shores of Rhode Island and Massachusetts and their offshore islands. Future offshore wind activities could locate WTGs a minimum of 11.3 miles from Nomans Land Island, 15.0 miles from Martha's Vineyard, 16.8 miles from Nantucket Island, 16.9 miles from Block Island, 23.1 miles from mainland Rhode Island at Point Judith, 24.5 miles from Newport, and 30.5 miles from Long Island. The distances between the areas with viewshed resources and the nearest offshore wind lighting sources would reduce the intensity but not eliminate negative lighting impacts at all viewshed resources. The intensity of lighting impacts would also be reduced by the number, luminosity, and proximity of existing light sources near the resources (building and streetlights, onshore vehicle and offshore vessel lights). The intensity of lighting impacts would further be limited by atmospheric and environmental conditions (clouds, fog, and waves) that could partially or completely obscure or diffuse sources of light from offshore and onshore wind Project components. Construction lighting and decommissioning lighting associated with both onshore and offshore wind facilities would have temporary, intermittent, and localized impacts, whereas operations lighting would have longer term, continuous, and localized impacts, where not adequately obscured or diffused. Under the No Action Alternative, lighting from future offshore wind activities would have temporary to long-term **negligible** to **major** negative impacts on viewshed resources.

<u>Presence of structures:</u> For the onshore viewshed APE, if BOEM selects the No Action Alternative, the development of future offshore wind projects' onshore infrastructure (the presence of structures) could introduce new visible elements to the setting of viewshed resources that would compromise their historic integrity, where there is an unimpeded line of sight from the viewshed resource to the onshore infrastructure. Within the offshore viewshed APE, a maximum-case scenario of 955 WTGs from all other future offshore wind activities (as modeled specific to viewshed resources [EDR 2021b])[33] would have a greater visual impact on most locations within the viewshed APE upon full build-out than would the RWF alone with its up to 100 WTGs. Far more of the 451 NRHP-eligible viewshed resources (including 12 NHLs) identified in the viewshed APE would be negatively affected from a moderate to major degree by future offshore wind projects collectively than the 101 NRHP-eligible viewshed resources (including five NHLs) anticipated to be adversely affected (as defined under the NHPA Section 106 regulations at 36 CFR 800.5). Cumulative effects from the additive visual effects that would occur across future offshore wind projects. Under the No Action Alternative, the construction, installation, and O&M of future offshore wind activities could locate WTGs in the viewshed APE. Beginning at approximately 11 miles from NRHP-eligible viewshed resources at Nomans Land Island and extending to over 30 miles at NRHP-eligible viewshed resources at Long Island, New York, and mainland Connecticut, impacts from future offshore wind projects would result in long-term **negligible** to **major** negative visual impacts to NRHP-eligible viewshed resources in the viewshed APE. These impacts would be temporary from construction vessels and long term from O&M vessels, and minimized with distance and intervening factors such as atmospheric haze, angle of view of the viewshed resource, and other screening elements in the environment, such as trees and buildings or structures. Decommissioning would remove the visual impacts of the Project.

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[33] Please note that the modelling for the cumulative development of future offshore wind activities for viewshed resources (EDR 2021b), which is based on the maximum-case scenario of 955 WTGs (or 1,055 when RWF WTGs are included under the Proposed Action), carries over from and is retained for consistency with the CHRVEA (SWCA 2023); therefore, the number differs from the 876 WTG total for the OCS (without the Proposed Action) that is presented for other resources in Table E4-1.

#### 3.10.2.4.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on viewshed resources associated with the Project would not occur. However, ongoing and future activities would continue to have short to long-term **negligible** to **major** negative impacts on viewshed resources, primarily through the presence of structures and lighting that would be readily visible from these resources during the day and at night.

BOEM anticipates that the range of impacts for future offshore wind activities would be long term **negligible** to **major** negative, depending on the scale and extent of impacts and the unique characteristics of the viewshed resource. Examples of individual viewshed resources are historic aboveground structures and TCPs. Impacts vary widely because the impacts are dependent on the unique characteristics of the individual resources. As described in Appendix E1, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be long-term **negligible** to **major** negative, for similar reasons.

Considering all the IPFs together, BOEM anticipates that long-term **negligible** to **major** negative impacts would result from future offshore wind activities in the viewshed APE when combined with ongoing activities and reasonably foreseeable activities other than offshore wind. This is because, where not avoidable, the overall impact on viewshed resources would be long term and potentially permanent.

### 3.10.2.5 Alternative B: Impacts of the Proposed Action on Marine Cultural Resources

#### 3.10.2.5.1 Construction and Installation

##### Offshore Activities and Facilities

<u>Accidental releases and discharges</u>: The Proposed Action could contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions under the No Action Alternative. The risk would be increased primarily during construction but also would be present during O&M and decommissioning. All vessels would comply with USCG requirements for the prevention and control of oil and fuel spills. Proper vessel regulations and operating procedures would minimize impacts resulting from the release of debris, fuel, hazardous material, or waste on marine cultural resources (BOEM 2012). Additionally, required training and awareness of BMPs proposed for waste management and mitigation of marine debris for RWF Project personnel would reduce the likelihood of occurrence to a very low risk. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects accidental releases and discharges would have localized temporary to short-term **negligible** negative impacts on marine cultural resources.

<u>Anchoring:</u> Vessel anchoring would be associated with seafloor disturbance activities (short and long term) proposed for the Project consisting of clearing/leveling of the seafloor, monopile foundation (and associated cable protection) construction, export cable installation, and OSS-link cable and IAC installation (preparation, trenching, burial, maintenance, replacement, etc.). Anchoring disturbance would affect up to 3,178 acres of the seafloor under the maximum-case scenario (see Table E4-1). Revolution Wind has committed to prioritizing and giving preference to the avoidance and minimization of impacts to potential submerged archaeological sites and ancient submerged landforms in siting the RWF and RWEC (VHB 2023). A plan for construction-related vessels would be developed prior to construction to

identify no-anchorage areas to avoid documented sensitive resources. Additionally, a post-review discovery plan (in Appendix J) would be implemented that would include stop-work and notification procedures to be followed if a potentially significant cultural resource is encountered during construction. The impacts to many of the identified potential submerged historic-period cultural resources and some of the potential ancient submerged landforms may be avoided or minimized through redesign. However, some of the potential ancient submerged landforms are large and may not be avoidable by the RWEC during construction. Revolution Wind recommended 50-m (164-foot) avoidance buffers on the 19 targets identified as possible shipwreck archaeological sites. The impacts to marine cultural resources would be irreversible and **major** negative unless all NRHP-eligible marine cultural resources and marine cultural resources significant to Native American tribes can be avoided during anchoring.

Climate change: The impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on marine cultural resources in the marine APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Proposed Action since the ongoing effects of climate change on marine cultural resources would remain effectively permanent and therefore long term.

New cable emplacement/maintenance: Cable emplacement for the Proposed Action could physically impact marine cultural resources. Installation of the IAC, OSS-link cable, and RWEC would impact the seafloor within the Lease Area and along the cable route. These impacts result from preparation of the seafloor for installation of new cables by sandwave leveling and clearance of debris, boulders, and other objects as well as from the cable lay and burial. This could include removal of potential MEC/UXOs in advance of seafloor preparation for RWEC installation. The construction and installation footprint for the RWEC would impact 1,390 acres of the seafloor (see Table E4-1). The operational footprint for the RWEC is calculated at 39.2 acres, and the cable would be emplaced to depths of up to 13 feet below the seafloor (see Table 2.1-8). The IAC and OSS-link cable would be emplaced at depths of up to 10 feet below the seafloor and require up to 2,619 acres of horizontal seafloor disturbance. Revolution Wind recommended a 50-m (164-foot) avoidance buffer on the 19 targets identified as shipwreck archaeological sites (see Table E4-1). Three of the 19 shipwreck archaeological sites (Targets 11, 13, and 14) and eight of the 13 ancient submerged landforms (Targets 21, 22, 23, 29, 30, 31, 32, and 33) are located along the RWEC. Seven of the shipwreck archaeological sites (Targets 06, 07, 08, 09, 10, 16, and 19) and three ancient submerged landforms (Targets 26, 27, and 28) are located in planned IAC corridors within the RWF. Where Revolution Wind would avoid the shipwreck sites by a distance of 50 m (164 feet), the Project would have no impact on them. Although a large portion of each of the three ancient submerged landforms is located below the maximum vertical extent for the installation of the IACs, portions of all three may be impacted. As discussed in Anchoring above, impacts to some of the shipwreck archaeological sites and ancient submerged landforms may be avoided by adjustments to cable route and by using a DP vessel instead of an anchored vessel for the cable lay. If these shipwreck and ancient submerged landforms are determined eligible for the NRHP and they cannot be avoided by new cable emplacement, then the impacts would be irreversible and **major** negative.

Presence of structures: Placement of the WTGs and OSSs would impact the seafloor within the Lease Area. Revolution Wind selected monopile foundations as the WTG for the Proposed Action (VHB 2023). The limits of the Proposed Action were defined as the 200-m (656-foot) radius temporary workspace limit surrounding each WTG. The Project anticipates impacting up to 734.4 acres of seafloor for construction of the up to 100 WTG and up to two OSS locations (see Table E4-1). Revolution Wind recommended a 50-m (164-foot) avoidance buffer on targets identified as shipwreck archaeological sites. One shipwreck archaeological site (Target 05) and two ancient submerged landforms (Targets 25 and 28) are located within 200 m of a WTG foundation location. Two of ancient submerged landforms (Targets 27 and 28) would be avoidable through Project micrositing (SEARCH 2023). For shipwreck and ancient submerged landforms determined NRHP eligible and that can be avoided by the placement of WTGs and OSSs, the impacts would be long term **negligible** negative. If these shipwreck and ancient submerged landforms are determined NRHP eligible, and they cannot be avoided by construction of structures, then the impacts would be long term **major** negative.

#### 3.10.2.5.2 Operations and Maintenance and Decommissioning

##### Offshore Activities and Facilities

Accidental releases and discharges: Accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions could occur during O&M and decommissioning. The contribution of releases during these activities would be the same as during construction (refer to section 3.10.2.2.1), and for this reason, BOEM expects localized and temporary **negligible** negative impacts on marine cultural resources from accidental releases and discharges.

Anchoring: Revolution Wind would be expected under any BOEM approval of the COP to conduct O&M activities on equipment in areas that have been surveyed and found to contain no marine cultural resources and/or in areas that have previously experienced disturbance during construction. Because of this, during O&M, Revolution Wind would avoid the no-anchorage areas identified to avoid documented sensitive resources. Therefore, impacts of anchoring or use of a jack-up barge on identified marine cultural resources, including shipwrecks and ancient submerged landforms, would be **negligible** during O&M activities. Decommissioning activities would be expected to take place in previously disturbed areas and therefore impacts to confirmed submerged cultural resources and identified ancient submerged landform features from anchoring would be **negligible** over the long term.

Climate change: The impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on marine cultural resources in the marine APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on marine cultural resources would remain effectively permanent and therefore long term.

New cable emplacement/maintenance: Although no new cables would be emplaced during O&M or decommissioning, Revolution Wind anticipates that it may be necessary to uncover or rebury portions of the IAC, OSS-link cable, and RWEC over the life of the Project. It is expected that most, if not all, of the bottom disturbance would be located within previously disturbed areas or surveyed areas outside identified marine cultural resources. However, should it be necessary for maintenance activities to extend outside previously disturbed areas, avoidance or mitigation measures implemented for construction would be employed (VHB 2023). As a result, O&M and decommissioning activities related to cables are expected to result in long-term **negligible** to **minor** negative impacts to marine cultural resources.

Presence of structures: It is expected that O&M and decommissioning activities at WTG and OSS structures would be located within previously disturbed areas or surveyed areas outside of identified marine cultural resources. As a result, O&M and decommissioning activities related to WTGs and OSSs are expected to result in long-term **negligible** to **minor** negative impacts to marine cultural resources.

### 3.10.2.5.3 Cumulative Impacts

### Offshore Activities and Facilities

Accidental releases and discharges: The Proposed Action could contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions present under the No Action Alternative. The risk would be increased primarily during construction but also would be present during O&M and decommissioning. Refer to Section 3.10.2.2.1 for a discussion of the risk for spills and the measures put in place to avoid, minimize, and mitigate them. These accidental releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized and temporary to short-term **negligible** negative impacts from accidental releases and discharges on marine cultural resources. As a result, the Proposed Action when combined with past, present, and reasonably foreseeable activities would be expected to have temporary to short-term **negligible** to **minor** negative cumulative impacts to marine cultural resources.

Anchoring: Seafloor disturbance from anchoring would occur during construction of the RWF and RWEC. Revolution Wind has committed to prioritizing and giving preference to the avoidance and minimization of impacts to potential submerged archaeological sites and ancient submerged landforms in siting the RWF and RWEC (VHB 2023) and to implementing an anchoring plan and a post-review discovery plan. As noted for the No Action Alternative, impacts from a combination of reasonably foreseeable offshore projects to submerged cultural resources, or the larger submerged landforms within which these submerged cultural resources are identified, would result in cumulative impacts to these resources. Within its EPMs, Revolution Wind would prioritize avoidance; however, avoidance may not be feasible for all marine cultural resources identified along the export cable corridor. Although anchoring from other future wind energy activities is not expected, anchoring from other reasonably foreseeable activities in the marine APE could impact marine cultural resources. Should these impacts be added to by unavoidable impacts of the Proposed Action on marine cultural resources along its export cable corridor, anchoring would result in irreversible and **negligible** to **major** negative cumulative impacts on marine cultural resources.

Climate change: Cumulative impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on marine cultural resources in the marine APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of this Project since the ongoing effects of climate change on marine cultural resources would remain effectively permanent and therefore long term.

New cable emplacement/maintenance: Cable installation from the Proposed Action, future offshore wind activities, and other submarine cable activities could impact marine cultural resources. Installation of the IAC, OSS-link cable, and RWEC would impact the seafloor within the Lease Area and along the RWEC route. These impacts result from preparation of the seafloor for installation of new cables by sandwave leveling and clearance of debris, boulders, and other objects as well as from the cable lay and burial. The Project and other future offshore wind activities are expected to implement plans to avoid and minimize impacts on submerged marine cultural resources. Since shipwrecks are typically limited in extent, it is often possible to avoid impacting them during cable installation and maintenance. Ancient submerged landforms are generally larger and may extend substantially beyond the maximum work area or Lease Area for an undertaking; for this reason, it is not always feasible to avoid these features through redesign of a project. Although Revolution Wind has determined it could avoid impacts to marine cultural resources within the Lease Area, it is likely that all construction disturbances associated with the Project would not be avoidable at NRHP-eligible marine cultural resources within the export cable route. Cable emplacement and maintenance from future offshore wind activities and other reasonably foreseeable activities are not expected in the marine APE at identified marine cultural resources and would not add cumulative impacts to the general impacts from Project cabling. Cumulative impacts from the Project in relation to other reasonably foreseeable offshore cabling activities would be **negligible** negative for the long term.

<u>Presence of structures:</u> WTG and OSS placement by the Proposed Action and future offshore wind activities could impact marine cultural resources as described in Section 3.10.2.2.1 above. The Project and other future offshore wind activities are expected to implement plans to avoid and minimize impacts on submerged marine cultural resources during construction, O&M, and decommissioning. Revolution Wind has determined it could avoid impacts to marine cultural resources within the Lease Area. Other future offshore wind energy activities would not place structures in the RWF Lease Area. Based on these factors, cumulative impacts from the Project in relation to other future offshore wind energy activities would be **negligible** negative for the long term.

#### 3.10.2.5.4 Conclusions

Under the Proposed Action, the construction and installation of offshore components, as well as their O&M, would have long-term **major** negative impacts on marine cultural resources that are not avoidable by seafloor-disturbing activities from the Project. **Major** negative impacts would be limited to those unavoidable impacts that result in a substantial loss of qualifying characteristics of a marine cultural resource for NRHP inclusion. **Major** negative impacts from the Proposed Action would result from the physical disturbance or damage of all or part of an NRHP-eligible marine cultural resource. Although these impacts would be constrainable to the portions of ancient submerged landform features that Revolution Wind is unable to avoid during RWEC installation, the final magnitude of these impacts would be long term **minor** to **moderate** negative. Measures determined by BOEM and stipulated within the ROD to avoid, minimize, and/or mitigate negative effects on NRHP-eligible marine cultural resources would reduce the level of impact. The exception is where impacts would render the resource ineligible for the NRHP even with mitigation, in which case the impact on the marine cultural resource would remain **major**. Also, impacts to previously undiscovered marine cultural resources identified during implementation of the Proposed Action could be long term **minor** to **major** negative. However, BOEM would require that Revolution Wind implement the offshore post-review discovery plan pursuant to the MOA (see Appendix J), which includes provisions for stop-work and notification procedures to be followed if a marine cultural resource is encountered during construction and installation, O&M, and decommissioning. This plan would serve to reduce the level of impact to previously undiscovered, NRHP-eligible marine cultural resources to long term **moderate** negative or lower (**minor** or **negligible**).

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from long term **negligible** to **major** negative. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **major** negative impacts to marine cultural resources. BOEM made this determination because, while overall moderate to major negative effects to NRHP-eligible marine cultural resources would be mitigated in accordance with NHPA Section 106 regulations, irreversible and long-term impacts would remain.

### 3.10.2.6 Alternative B: Impacts of the Proposed Action on Terrestrial Cultural Resources

#### 3.10.2.6.1 Construction and Installation

##### Onshore Activities and Facilities

Accidental releases and discharges: As discussed in the No Action Alternative (see Section 3.10.1.2), construction of onshore Project elements could result in the accidental release of hazardous materials or debris; however, releases would generally be temporary to short term, localized, and in limited amounts. Indirect physical impacts would be long term and **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required. Other indirect but primarily temporary to short-term impacts could include noise, vibration, and dust as well as visual impacts associated with cleanup activity related to accidental releases and discharges. These temporary to short-term impacts would be **negligible** to **minor** negative and minimized or avoided through application of state and local laws and regulations.

Climate change: The impacts of the Proposed Action would be the same as the No Action Alternative as relates to climate change and would be **negligible**. Refer to Section 3.10.1.2 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on terrestrial cultural resources in the terrestrial APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Proposed Action since the ongoing effects of climate change on terrestrial cultural resources would remain effectively permanent and therefore long term.

Presence of structures: The construction of onshore Project components would physically disturb the two archaeological sites within the OnSS work area limits and the one archaeological site and one isolated archaeological artifact within the ICF work area limits (Forrest and Waller 2023). The Mill Creek Swamp #1 and Mill Creek Swamp #2 archaeological sites within the OnSS work area limits are eligible for the NRHP, and physical impacts to these resources would be **negligible** to **minor** in site portions that construction is able to avoid and **moderate** to **major** negative in site portions where construction is not able to avoid physical impacts. The Quonset Substation archaeological site and the QDC Find Spot artifact within the ICF work area limits are recommended not eligible for the NRHP, and any physical impact to them would result in **negligible** to **minor** negative impacts.

Overall, the potential is for permanent **negligible** to **major** negative impacts to result from the Project on terrestrial cultural resources. Where the NRHP-eligible Mill Creek Swamp #1 and Mill Creek Swamp #2 archaeological sites cannot be avoided by OnSS development, BOEM would require further archaeological mitigation at these resources, in compliance with NHPA Section 106. BOEM would require that Revolution Wind implement the onshore post-review discovery plan (see Appendix J) during ground-disturbing activities at any of the four terrestrial cultural resources should any further archaeological resources be discovered during construction, O&M, or decommissioning.

New cable emplacement/maintenance: The impacts from new cable emplacement and maintenance for the Proposed Action would not introduce greater impacts to terrestrial resources over the No Action Alternative in the terrestrial APE (see Section 3.10.1.2.1). The cable landing envelope use and the crossing of the historic Quonset Point Naval Air Station would produce **negligible** negative long-term impacts. The route selected for the onshore transmission cable is located within existing ROWs and would minimize impacts to, or avoid, potential terrestrial cultural resources. Additionally, the onshore transmission cable route has been substantially altered by development, demolition, remediation, and associated grading activities postdating 1941. Also, BOEM would require that Revolution Wind implement the onshore post-review discovery plan pursuant to the MOA (see Appendix J), which includes provisions for stop-work and notification procedures to be followed if a terrestrial cultural resource is encountered during cable emplacement or maintenance. This plan would serve to reduce the level of impact to previously undiscovered, NRHP-eligible terrestrial cultural resources to long term **moderate** negative or lower (**minor** or **negligible**). Therefore, the risk of potentially encountering undisturbed archaeological deposits is minimized in these areas, and the resultant impact to terrestrial cultural resources would be long term **negligible** to **minor** negative.

#### 3.10.2.6.2 Operations and Maintenance and Decommissioning

##### Onshore Activities and Facilities

Accidental releases and discharges: The impacts from accidental releases and discharges resulting from Project O&M and decommissioning activities associated with the Proposed Action would be the same as those described for Project construction and installation (see Section 3.10.2.3.1). As a result, indirect physical impacts would be long term **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required.

Climate change: The impacts of the Proposed Action would be the same as the No Action Alternative as it relates to climate change and would be long-term **negligible**, and impacts from climate change are anticipated to remain long term **minor** to **moderate** negative.

Presence of structures: O&M and decommissioning activities would remain in areas of existing construction disturbance, areas mitigated for archaeology prior to construction, and areas of previous terrestrial cultural resources Phase 1 survey work found not to contain NRHP-eligible archaeology sites. Therefore, these activities would proceed outside of, and avoid, unmitigated areas of NRHP-eligible archaeological sites Mill Creek Swamp #1 and #2. Should unmitigated areas of Mill Creek Swamp #1 and #2 archaeological sites not be avoidable by O&M or decommissioning at the OnSS, then BOEM would require further archaeological mitigation at these resources, in compliance with NHPA Section 106. BOEM would require that Revolution Wind implement that the post-review discovery plan prepared for Project construction (see Appendix J) during ground-disturbing O&M or decommissioning to address any additional buried archaeological deposits unexpectedly encountered during these activities.

Physical impacts to these resources would be short to long term **negligible** negative when avoided by O&M and decommissioning activities and long term **minor** to **major** negative if ground-disturbing activities are not able to avoid these impacts.

New cable emplacement/maintenance: The impacts from new cable emplacement/maintenance resulting from O&M and decommissioning activities associated with the Proposed Action would not introduce greater impacts to terrestrial resources over the No Action Alternative in the terrestrial APE. Maintenance of the cable within the historic Quonset Point Naval Air Station would produce impacts that are long term and **negligible**. O&M and decommissioning activities for the onshore cable would be expected to remain in areas of existing construction disturbance or areas of previous terrestrial cultural resources Phase 1 survey work. Consequently, long-term **negligible** negative impacts would occur to terrestrial cultural resources during O&M and decommissioning activities.

#### 3.10.2.6.3 Cumulative Impacts

### Onshore Activities and Facilities

Accidental releases and discharges: The Proposed Action would contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions present under the No Action Alternative. The Proposed Action would have development activities potentially occurring at the historic Quonset Point Naval Air Station. The risk of impact from accidental releases and discharges would be increased primarily during construction but also would be present during Project operations and decommissioning. Compliance with federal, state, and local requirements for the prevention and control of accidental releases and discharges would minimize impacts on terrestrial cultural resources (BOEM 2012). Releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized temporary to short-term **negligible** negative cumulative impacts on terrestrial cultural resources within the terrestrial APE.

Climate change: Cumulative impacts of the Proposed Action would be the same as the No Action Alternative as it relates to climate change and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on terrestrial cultural resources in the terrestrial APE is unknown, cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on terrestrial cultural resources would remain effectively permanent and therefore long term.

Presence of structures: No future offshore wind projects other than the Project are expected to have development activities and impacts on terrestrial cultural resources within the terrestrial APE. The impacts from the presence of structures under the Proposed Action could result in long-term **negligible** negative cumulative impacts within the terrestrial APE. The Proposed Action is anticipated to result in impacts to the Mill Creek Swamp #1 and #2 archaeological sites; no cumulative effects from the onshore components of reasonably foreseeable offshore wind activities are anticipated at these two terrestrial cultural resources.

New cable emplacement/maintenance: Within the Project's terrestrial APE, no future offshore wind projects other than the RWF are expected to have development activities and impacts on terrestrial archaeological resources. The impacts from new cable emplacement/maintenance under the Proposed

Action could result in long-term **negligible** cumulative impacts at the historic Quonset Point Naval Air Station where combined with other non-offshore wind project development or ongoing use or maintenance at that site.

#### 3.10.2.6.4 Conclusions

Under the Proposed Action, the construction and installation of onshore components, as well as their O&M and decommissioning, would have long-term **negligible** to **major** negative impacts on terrestrial cultural resources within the terrestrial APE. **Negligible** impacts would occur where NRHP-eligible terrestrial cultural resources could be avoided and would be temporary to short term. **Minor** impacts would occur and be temporary to short term (for the period of Project activity) where Project impacts might take place on an NRHP-eligible terrestrial cultural resource, such as the Quonset Point Naval Air Station, but not alter any qualifying characteristics that make the resource eligible for NRHP inclusion. **Moderate** to **major** negative long-term impacts would be limited to unavoidable impacts that would result in the loss of qualifying characteristics of a terrestrial cultural resource for NRHP inclusion. **Moderate** to **major** negative impacts from the Proposed Action would result from the physical disturbance or damage of all or part of a NRHP-eligible terrestrial cultural resource and be long term and irreversible. Also, impacts to previously undiscovered, NRHP-eligible terrestrial cultural resources identified during implementation of the Proposed Action could be irreversible and long-term **major** negative. However, BOEM would require that Revolution Wind implement the onshore post-review discovery plan pursuant to the MOA (see Appendix J), which includes provisions for stop-work and notification procedures to be followed if a cultural resource is encountered during construction and installation, O&M, and decommissioning. This plan would serve to reduce the level of impact to previously undiscovered, NRHP-eligible terrestrial cultural resources to **moderate** negative or lower levels of impact; however, impacts would remain long term and irreversible.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **major** negative. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **major** negative impacts to terrestrial cultural resources within the terrestrial APE. BOEM made this determination because, while overall moderate to major negative effects to NRHP-eligible terrestrial cultural resources would be mitigated in accordance with NHPA Section 106 regulations, irreversible and long-term impacts would remain. In comparison, the No Action Alternative is expected to result in long-term **negligible** to **major** negative effects to terrestrial cultural resources in the terrestrial APE, depending on whether cultural resources can be avoided.

### 3.10.2.7 Alternative B: Impacts of the Proposed Action on Viewshed Resources

#### 3.10.2.7.1 Construction and Installation

#### Offshore Activities and Facilities

<u>Climate change:</u> The impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative and would be **negligible**. Refer to Section 3.10.1.3 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on viewshed resources in the viewshed APE is unknown, impacts from climate

change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term.

Light: The Project would impact viewshed resources from navigational and aviation lighting on offshore wind Project components. Impacts from construction and installation lighting would be most visible at night and from cultural resources that are along shorelines or on elevated locations with unobstructed views. A limited number of the 451 NRHP-eligible viewshed resources identified in the HRVEA would be affected and would include those for which the nighttime sky is a contributing element to aspects of its integrity, such as resources on the nearest shores of Rhode Island and Massachusetts and their offshore islands. The majority of the 451 resources with potential views of the Project, and therefore determined to be in the viewshed APE, are along the coastlines with potential ocean views. Of the 451 NRHP-eligible viewshed resources, 350 would experience **negligible** to **minor** visual impacts, not rising to the level of adverse effects under the criteria of NHPA Section 106 regulations (36 CFR 800.5); seven of these are NHLs that would not experience harm in consideration of NHPA Section 110(f). Of the 451 NRHP-eligible viewshed resources, 101 are anticipated to experience **moderate** to **major** visual impacts (daytime or nighttime) from the WTGs or OSSs that would rise to the level of adverse effect under NHPA Section 106 (see Table 3.10-6). Of the 101 aboveground historic properties that would be negatively affected to a moderate to major extent, five are NHLs, two are TCPs, and the remainder are historic buildings, structures, and districts.

In relation to the negatively affected viewshed resources, the Project could locate WTGs at approximately 6 miles from the Vineyard Sound and Moshup's Bridge TCP boundary offshore of Nomans Land Island and range to just over 28 miles from the Nobska Point Lighthouse near Falmouth, Massachusetts. Mostly, only the closer of the 101 moderately to majorly affected viewshed resources would have views of marine navigation lighting (consisting of flashing yellow lights) on WTGs or the OSSs. Increasing distances between viewshed resources and the nearest offshore RWF lighting sources would limit the intensity and begin eliminating negative lighting impacts at these 101 viewshed resources from red aviation warning lights atop WTG nacelles at distances beyond approximately 27 miles, based on postconstruction studies of the nearby BIWF's visibility at night (HDR 2019). See Section 3.10.1.3.1 for a discussion of how the intensity of lighting impacts would be reduced by proximity of existing light sources and atmospheric and environmental conditions. The use of an aircraft detection lighting system (ADLS) would substantially reduce the visual impact from Project lighting and make lighting visibility much more intermittent but would not eliminate the impact fully. Under the Proposed Action, lighting would have temporary to long-term **negligible** to **major** negative impacts on viewshed resources.

Presence of structures: The construction of the offshore Project components would result in modifications to the existing viewshed within the viewshed APE because a range of RWF WTG structures would be visible on the horizon from various viewshed resources on the shore during the daytime and structure lighting would be visible at night, as addressed in the Light impact discussion above (EDR 2023a; see also Section 3.20 for further discussion). Visibility of WTG structures would have long term, intermittent, and localized impacts, where and when not adequately obscured or diffused. Of the 451 NRHP-eligible viewshed resources identified by the HRVEA within the viewshed APE, 350 would have noncritical and/or limited views of WTGs. For a portion of the 350 resources, this is because the view to/from the resource's setting is not a critical aspect supporting the integrity of the viewshed resource for NRHP eligibility (EDR 2023b). For some of the other 350 resources, views are substantially limited because of screening by topography, vegetation, other buildings/structures, and environmental conditions (clouds, fog, and waves) compounded by distance to the offshore Project structures (EDR 2023b). These 350 NRHP-eligible viewshed resources would experience **negligible** to **minor** visual impacts not rising to the level of adverse effects under the criteria of NHPA Section 106; seven of these are NHLs that would not experience harm in consideration of NHPA Section 110(f). The remaining 101 NRHP-eligible viewshed resources of the 451 are anticipated to experience **moderate** to **major** visual impacts (daytime or nighttime) from the WTGs or OSS that would rise to the level of adverse effect under NHPA Section 106 (see Table 3.10-6). These 101 resources do have open ocean views that contribute to their significance, integrity, and NRHP eligibility. These 101 resources include five NHLs and two TCPs. The 101 resources also include historic districts that may encompass a range of contributing elements. As noted in the Lighting impacts discussion, the Project could locate WTGs approximately 6 miles from the nearest moderately to majorly affected NRHP-eligible viewshed resource at the Vineyard Sound and Moshup's Bridge TCP boundary offshore of Nomans Land Island. Moderate to major visual impacts from the Project would range to just over 28 miles at the negatively affected Nobska Point Lighthouse near Falmouth, Massachusetts. The distances between the areas with viewshed resources and the nearest RWF lighting sources would limit the intensity but not eliminate negative WTG visibility impacts to NRHP-eligible viewshed resources. Further moderating the visual impacts, the RWF WTGs would have consistent structural appearances (monopoles, three-rotor blades, and matching color schema), which contribute to a homogeneous view of wind farms on the horizon. The color of the RWF WTGs (less than 5% gray tone) would blend well with the sky at the horizon and eliminate the need for daytime lights or red paint marking the blade tips. For NRHP-eligible viewshed resources with ocean views important to their setting, the WTGs would be a new feature in the visual setting. Views in which strongly frontlit WTGs are viewed against a darker sky or strongly backlit WTGs were viewed against a light sky tend to heighten the visual impact, meaning the intensity of the effect may vary by time of day and year. Under the Proposed Action, the presence of offshore Project wind facilities would have long-term **negligible** to **major** negative impacts on viewshed resources.

### Onshore Activities and Facilities

Light: Based on a field review of the viewshed analyses, the OnSS and ICF construction areas would be readily visible from two NRHP-eligible viewshed resources (EDR 2021a) within the viewshed APE; see further discussion under the Presence of structures section immediately below. For nighttime construction work, RWF would use portable, downward-facing floodlights with a maximum height of approximately 18 feet. The OnSS and ICF would largely blend with the existing Quonset Point Naval Air Station, would be partially obscured by other intervening residential development and vegetation, and would not introduce contrasting visual elements inconsistent with the existing setting of the Wickford Historic District (EDR 2021a). Temporary **negligible** negative impacts from lighting of onshore Project activities or facilities during construction and installation are expected on viewshed resources.

Presence of structures. For the onshore viewshed APE, construction and installation of the onshore Project facilities could introduce new visible elements to the setting of NRHP-eligible viewshed resources that would compromise their historic integrity, where there is an unimpeded line of sight between the resource and the onshore Project facilities. At the OnSS and ICF, Revolution Wind would use external yard lighting and task lighting, consisting of switched lights (in use if someone is in the yards), ranging from 35- to 300-watt lamps, depending on use. The mounting heights for the lighting would range from 10 to 25 feet off the ground, and lights would be mounted on lamp posts, substation buildings, firewalls, or steel substation structures. The OnSS and ICF would be readily visible from two NRHP-eligible viewshed resources (EDR 2021a). From the OnSS and ICF location, the Wickford Historic District is 1.1 miles away and the Quonset Point Naval Air Station is 0.25 mile away.

The Quonset Point Naval Air Station is an approximately 974-acre World War II–era naval training facility improved with industrial buildings and parking lots that currently serves as a Rhode Island Air National Guard Base (EDR 2021a). The OnSS and ICF would be in scale and character with the existing development and use of the Quonset Point Naval Air Station. As a result of the construction and installation of the onshore Project facilities, the potential visual impacts to the NRHP-eligible Quonset Point Naval Air Station would be long term **negligible** to **minor** negative.

The Wickford Historic District retains eighteenth-century residences and its setting as a small-scale maritime community in Rhode Island. The Wickford Historic District remains primarily a residential community with some commercial buildings that support a seasonal recreation economy (EDR 2021a). The viewshed APE mostly reaches the area within the district along the Main Street pier. The OnSS and ICF would largely blend with the existing Quonset Point Naval Air Station; would be partially obscured by other intervening residential development and vegetation; and would not introduce contrasting visual elements inconsistent with the existing setting of the Wickford Historic District (EDR 2021a). As a result of the development of the onshore Project facilities, the potential visual impacts to the Wickford Historic District would be long term **negligible** to **minor** negative.

#### 3.10.2.7.2 Operations and Maintenance and Decommissioning

##### Offshore Activities and Facilities

Climate change: The impacts of the Proposed Action would be the same as the No Action Alternative as it relates to climate change and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on viewshed resources in the viewshed APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term.

Light: The visual impacts from WTG and OSS lighting described in construction and installation in Section 3.10.2.4.1 would persist through O&M activities at 101 NRHP-eligible viewshed resources, including five NHLs and two TCPs. Impacts would remain **negligible** to **minor** at the remaining 350 NRHP-eligible viewshed resources in the viewshed APE. However, for offshore WTGs, Revolution Wind would install ADLS technology. Consequently, nighttime visual impacts (and to a lesser degree, daytime visual impacts) to the 101 moderately to majorly affected viewshed resources would be reduced although not eliminated. Long-term **negligible** to **major** negative impacts would continue for viewshed resources during O&M. O&M would not add further to these impacts; however, removing WTGs and OSSs through decommissioning would provide a remedy to previous visual impacts created by lighting.

Presence of structures: This would be the same as for Project installation and construction through the life of the Project until decommissioning is complete. The visual impacts from offshore Project structures described for construction and installation in Section 3.10.2.4.1 would persist through O&M activities at 101 NRHP-eligible viewshed resources, including five NHLs and two TCPs, until the Project is decommissioned. Impacts would remain **negligible** to **minor** at the remaining 350 NRHP-eligible viewshed resources in the viewshed APE. **Negligible** to **major** negative impacts would continue for the long term at viewshed resources during O&M. O&M would not add further to these impacts; however, by removing WTGs and the OSS, decommissioning would provide a remedy to previous visual impacts created by visible offshore Project structures.

### Onshore Activities and Facilities

Light: The impacts from light resulting from O&M activities associated with the Proposed Action would be the same as those described for Project installation and construction (see Section 3.10.2.4.1). Long-term **negligible** negative impacts from lighting of onshore Project activities or facilities are expected on viewshed resources from onshore activities and facilities.

Presence of structures: The impacts from the presence of structures resulting from O&M and decommissioning activities associated with the Proposed Action would be the same as those described for Project installation and construction (see Section 3.10.2.4.1). Although the NRHP-eligible Quonset Point Naval Air Station and Wickford Historic District are within the viewshed APE of the OnSS and ICF, these onshore Project facilities would be in scale and character with the current use of the Quonset Point Naval Air Station and would not introduce contrasting visual elements inconsistent with the existing setting of the Wickford Historic District. As a result of O&M and decommissioning of the onshore Project facilities, the potential visual impacts to the Quonset Point Naval Air Station and Wickford Historic District are anticipated to be long term **negligible** to **minor** negative.

### 3.10.2.7.3 Cumulative Impacts

### Offshore Activities and Facilities

Climate change: Cumulative impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on viewshed resources in the viewshed APE is unknown, cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term.

Light: The Proposed Action would add offshore lighting impacts from navigational and aviation hazard lighting systems on the WTGs and OSSs. The addition would include up to 100 WTGs with red aviation hazard flashing lights and up to 100 WTGs and two OSSs with marine navigation lighting from RWF, compared to the future offshore wind activities' modeled maximum-case scenario of up to 955 WTGs and three OSS locations offshore of Rhode Island and Massachusetts (EDR 2021b). The 100 potential Project WTGs and two OSS locations represent, proportionally, nearly 10% to nearly 90% of the total cumulative offshore wind structures modeled as potentially visible from the 101 NRHP-eligible viewshed resources within the viewshed APE. The impacts of the Project and other future wind developments will vary and be relative to the position of each unique resource (SWCA 2023). Cumulatively, the Proposed Action when combined with past, present, and reasonably foreseeable activities could have intermittent and from temporary to long-term **negligible** to **major** negative impacts on viewshed resources.

Presence of structures: The Proposed Action would add up to 100 additional WTGs and up to two OSSs to the condition of the No Action Alternative within the viewshed APE, reaching a cumulative total of 1,055 WTGs and five OSS for the maximum-case scenario analysis.[34] The Project has the potential to add to cumulative visual effects on the 101 NRHP-eligible viewshed resources identified as negatively affected from a moderate to major degree by the Project, when combined with the potential effects of other past, present, or reasonably foreseeable future actions (SWCA 2023). The Project would introduce new elements to the viewshed that could compromise the historic integrity of NRHP-eligible viewshed resources. The maximum-case Project scenario would proportionally range from nearly 10% to nearly 90% of the total WTG and OSS locations modeled to be cumulatively visible from the 101 NRHP-eligible viewshed resources in the maximum-case scenario of all future wind energy development proposed in the viewshed APE. This is based on full build-out of the Project (to up to 100 WTGs and two OSSs) and all other reasonably foreseeable offshore wind projects currently planned in the APE (modeled at 955 WTGs and three OSS [EDR 2023b]). The proportion of visible WTG elements added by the Project ranges from nearly 10% at Vineyard Sound and Moshup's Bridge TCP (where all modeled WTGs and OSS would potentially be visible) to nearly 90% at the historic U.S. Weather Bureau Station at Block Island (where the Project WTGs would be visible in greater numbers than the combination of all other future wind farms planned in adjacent OCS lease areas [41 Project WTGs would be visible there versus six WTGs from other planned projects]) (SWCA 2023). Visual impacts to sensitive receptors from the Project would be long term and **negligible** to **major** negative, minimized with distance and obstructions. The Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **major** negative cumulative impacts on NRHP-eligible viewshed resources in the viewshed APE.

### Onshore Activities and Facilities

Light: Long-term **negligible** negative impacts from lighting of onshore Project activities or facilities are expected on cultural resources in the viewshed APE, and these would not add cumulatively to the potential lighting impacts of other reasonably foreseeable activities.

Presence of structures: The Proposed Action's onshore facilities would not add cumulative impacts from the presence of structures resulting from other reasonably foreseeable activities.

### 3.10.2.7.4 Conclusions

Under the Proposed Action, the construction and installation of offshore Project components, as well as their O&M and decommissioning, would have long-term **negligible** to **major** negative impacts on viewshed resources. Long-term **negligible** to **minor** impacts would occur where visual impacts to NRHP-eligible viewshed resources could either be avoided or could be minimized to the extent that no adverse effect results under the NHPA Section 106 criteria (at 36 CFR 800.5). Long-term **moderate** to **major** negative impacts would be limited to unavoidable impacts to NRHP-eligible viewshed resources in the viewshed APE. These impacts would remain until removed with Project decommissioning.

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[34] Please note that the modeling for the cumulative development of future offshore wind activities for viewshed resources (EDR 2021b), which is based on the maximum-case scenario of 955 WTGs (or 1,055 when RWF WTGs are included under the Proposed Action), carries over from and is retained for consistency with the CHRVEA (SWCA 2023); therefore, the number differs from the 999 WTG total for MA/RI leases (without the Proposed Action) that is presented for other resources in Table E3-1.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts to viewshed resources under the Proposed Action resulting from individual IPFs would range from long term **negligible** to **major** negative. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **major** negative impacts to viewshed resources. Overall negative effects to NRHP-eligible viewshed resources in the viewshed APE would be avoided or minimized and mitigated in accordance with NHPA Section 106 regulations and, although long term, viewshed impacts would be removed upon Project decommissioning.

### 3.10.2.8 Alternatives C, D, E, and F: Marine Cultural Resources

Table 3.10-7 provides a summary of IPF findings for these alternatives.

#### 3.10.2.8.1 Conclusions

Alternatives C through F would reduce the number of WTGs and, in relation, increase the distance of WTGs and their associated cabling from some of the 32 marine cultural resources identified. This decrease in WTGs would have an associated reduction in seafloor disturbance in the marine APE. This would increase the ability of the RWF to avoid Project impacts to seven marine cultural resources under Alternative C, one shipwreck site under Alternative D, and between two and seven marine cultural resources under Alternative E, as compared to the Proposed Action. Impacts to marine cultural resources resulting from the Alternative F would be somewhat less than the Proposed Action and, potentially, the other action alternatives, but this cannot be quantified until the additional WTGs to be removed are identified. However, because the potential for impacts to the remaining marine cultural resources remains the same, the avoidance of impacts to all marine cultural resources in the Lease Area would be similarly sought under the Proposed Action as under Alternatives C through F. Also, because all action alternatives have the same export cable development proposed, impacts to marine cultural resources would remain the same at the RWEC corridor. The construction and installation of offshore components, as well as their O&M and decommissioning, would have long term **negligible** to **major** negative impacts to marine cultural resources under all of these action alternatives.

In the context of other reasonably foreseeable environmental trends and planned actions and for the same reasons, BOEM also expects that Alternatives C through F's cumulative impacts to marine cultural resources would be similar to the Proposed Action: long term **negligible** to **major** negative.

### 3.10.2.9 Alternatives C, D, E, and F: Terrestrial Cultural Resources

Table 3.10-7 provides a summary of IPF findings for these alternatives.

#### 3.10.2.9.1 Conclusions

Alternatives C through F would have the same Project activities and impacts in the terrestrial APE as the Proposed Action. BOEM expects that the impacts to terrestrial cultural resources resulting from Alternatives C through F would be the same as the Proposed Action. The construction and installation of onshore components, as well as their O&M and decommissioning, would have long-term **negligible** to **major** negative impacts to terrestrial cultural resources under any of the action alternatives.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's cumulative impacts to terrestrial cultural resources would be the same as the Proposed Action: long term **minor** to **major** negative.

### 3.10.2.10 Alternatives C, D, E, and F: Viewshed Resources

Table 3.10-7 provides a summary of IPF findings for these alternatives.

#### 3.10.2.10.1 Conclusions

Alternatives C through F could reduce the number of WTGs installed compared to the maximum-case scenario under the Proposed Action by 7% to 44% (depending on the action alternative combined with Alternative F), which would have proportional reductions in visual impacts. BOEM expects that the overall impacts to cultural resources in the viewshed APE resulting from Alternatives C through F would be similar in the number of viewshed resources impacted and the character of impacts to the Proposed Action; although, for Alternative E, the visual proximity for impacts from offshore Project elements would specifically have increased setbacks from viewshed resources at Martha's Vineyard and the nearest shores of Rhode Island. Alternative D3 would also remove the closest seven WTG locations to Block Island and have an increased advantage for reducing visual impacts on aboveground historic properties on the shores of that island over other action alternatives, except Alternative E2, which would remove even more WTGs, and Alternative G, which would remove a similar number of WTGs in different configurations, on the Block Island side of the RWF. While Alternative E2 would remove the closest WTGs to Martha's Vineyard, as well as being the most advantageous for reducing WTG proximity to Block Island, this alternative would not be as effective overall as Alternative E1 for reducing WTG proximity to onshore areas. The Alternative E1 configuration, in particular, would increase the overall distance of WTGs from Martha's Vineyard and toward mainland Rhode Island (see Figure 2.1-20); whereas, Alternative E2 (see Figure 2.1-21) would especially serve to decrease the frequency of silhouetted turbines visible from Aquinnah Overlook at sunset. Impacts to cultural resources in the viewshed APE resulting from Alternative F would be less than the Proposed Action and potentially the other action alternatives, but that cannot be quantified until the WTGs to be removed are identified. The construction and installation of offshore and onshore Project components, as well as their O&M and decommissioning, would have temporary to long-term **negligible** to **major** negative impacts to viewshed resources under any of the action alternatives. Decommissioning would remove these visual impacts. Overall, those action alternatives with the fewest WTGs and the greatest distances of setback would have the least degree of potential visual impacts on viewshed resources.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's cumulative impacts to viewshed resources would be similar to the Proposed Action: long term **negligible** to **major** negative. Decommissioning would remove the cumulative visual impacts of the Project. As with Project-specific visual impacts on viewshed resources, those action alternatives with the fewest WTGs and the greatest distances of setback would have the least degree of potential cumulative impacts on viewshed resources.

### 3.10.2.11 Alternative G: Impacts of the Preferred Alternative on Marine Cultural Resources

Table 3.10-7 provides a summary of IPF findings for this alternative.

#### 3.10.2.11.1 Conclusions

Alternative G would reduce the number of WTGs and, in relation, increase the distance of WTGs and their associated cabling from some of the 32 marine cultural resources identified, as compared to the Proposed Action, Alternative D, and Alternative E2, and would have approximately the same number of WTGs as Alternative C and Alternative E. This decrease in WTGs would have an associated reduction in seafloor disturbance in the marine APE (e.g., up to 2,619 acres of disturbance for IAC and OSS-link cable emplacement) under the Proposed Action as compared to 2,010 acres (23% less) under Alternative G. Although potentially greater than the other action alternatives, these reductions cannot be quantified for Alternative F because the additional Alternative F WTGs to be removed were not identified.

Reduction of disturbance areas would increase the ability of the RWF to further avoid Project impacts to 10 marine cultural resources under Alternative G as compared to seven marine cultural resources under Alternative C, one shipwreck site under Alternative D, and between two and seven marine cultural resources under Alternative E. However, because the potential for impacts to the remaining marine cultural resources remains the same, the avoidance of impacts to all marine cultural resources in the Lease Area would be similarly sought under the Proposed Action as under Alternative G and the other action alternatives. Also, because all action alternatives have the same export cable development proposed, impacts to marine cultural resources would remain the same at the RWEC corridor. The construction and installation of offshore components, as well as their O&M and decommissioning, would have long-term **negligible** to **major** negative impacts to marine cultural resources under Alternative G.

In the context of other reasonably foreseeable environmental trends and planned actions and for the same reasons, BOEM also expects that Alternative G's cumulative impacts to marine cultural resources would be similar to the Proposed Action: long term **negligible** to **major** negative.

### 3.10.2.12 Alternative G: Impacts of the Preferred Alternative on Terrestrial Cultural Resources

Table 3.10-7 provides a summary of IPF findings for this alternative.

#### 3.10.2.12.1 Conclusions

Alternative G would have the same Project activities and impacts in the terrestrial APE as the Proposed Action and the other action alternatives. BOEM expects that the impacts to terrestrial cultural resources resulting from Alternative G would be the same under all action alternatives. The construction and installation of onshore components, as well as their O&M and decommissioning, would have long-term **negligible** to **major** negative impacts to terrestrial cultural resources under Alternative G.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternative G's cumulative impacts to terrestrial cultural resources would be the same as the Proposed Action: long term **minor** to **major** negative.

### 3.10.2.13 Alternative G: Impacts of the Preferred Alternative on Viewshed Resources

Table 3.10-7 provides a summary of IPF findings for this alternative.

#### 3.10.2.13.1 Conclusions

Alternative G could decrease impacts to viewshed resources when compared to the Proposed Action, Alternative D, and Alternative E2 because the number of constructed WTGs and their viewshed would be reduced by 35% for Alternative G as compared to the maximum-case scenario under the Proposed Action and by at least 20% as compared to maximum-case scenario under Alternative D and Alternative E2. The 35% reduction under Alternative G is comparable to the amount of reduction as would occur under Alternative C and Alternative E1, based on their WTG numbers; however, WTGs under Alternative G would be differently configured than under other alternatives. Finally, Alternative F would have 14% fewer WTGs than Alternative G, and the potential for an equivalent proportion of reduced visual impact on viewshed resources, although WTG setback distances changes cannot be quantified until the additional WTGs to be removed are identified under Alternative F.

Compared to the maximum-case scenario under the Proposed Action, Alternative G could decrease visual impacts to viewshed resources from RWF offshore facility visibility and the visibility of construction and installation lighting, primarily because the number of constructed WTGs and their viewshed would be reduced. However, the WTG configuration for Alternative G would also reduce the proximity of WTGs to Block Island and Martha's Vineyard and toward Newport and mainland Rhode Island (see Figure 2.1-22). Alternatives G1, G2, and G3 are similar to each other in terms of the reduction of WTGs in proximity to Martha's Vineyard and Block Island and toward Newport and mainland Rhode Island (see Figure 2.1-23, Figure 2.1-24, and Figure 2.1-25). Alternatives G1 and G2 would retain two WTGs closer to Martha's Vineyard, which Alternative G3 would remove, and Alternatives G1 and G3 would retain two WTGs closer to Block Island, which Alternative G2 would remove.

Alternatives G1, G2, and G3 would remove more of the closest WTGs to mainland Rhode Island and Newport, Martha's Vineyard, and Block Island when compared to the Proposed Action, Alternative C, and Alternatives D1 and D2. Alternatives G1, G2, and G3 would remove more of the closest WTGs to mainland Rhode Island, Newport, and Martha's Vineyard but retain a comparable amount near Block Island in comparison to Alternative D3. Alternatives G1, G2, and G3 would remove fewer of the closest WTGs to mainland Rhode Island, Newport, and Martha's Vineyard but retain a comparable—yet differently configured—amount near Block Island in comparison to Alternative E1. Alternatives G1, G2, and G3 would remove a comparable but differently configured amount of the closest WTGs to mainland Rhode Island, Newport, Martha's Vineyard, and Block Island in comparison to Alternative E2.

Although the distances and configurations of WTGs from Block Island, Martha's Vineyard, and mainland areas would vary under Alternative G from the other alternatives, the total number of WTGs under Alternative G would be greater than Alternative F; would remain similar to those of Alternative C and Alternative E1; and would be lower than the minimum number of WTGs planned under Action Alternatives B, D, and E2. Being one of the action alternatives with the lowest number of proposed WTGs, Alternative G—where increasing distances to WTGs from sensitive viewshed resources at the nearest points of land (Block Island, Martha's Vineyard, and Newport and mainland Rhode Island)—would more effectively reduce visual impacts than most other action alternatives. This especially includes distances increasing setbacks from viewshed resources important to Native American tribes at Aquinnah, inclusive of the Edwin DeVries Vanderhoop Homestead, Gay Head Light, and Gay Head - Aquinnah Shops. Alternative G would also further increase setbacks from Newport and Block Island, Rhode Island, including the Breakers, Marble House, and the Ocean Drive Historic District; Bellevue Avenue Historic District; and Southeast Lighthouse NHLs.

In relation to the five adversely affected NHLs, at Block Island and Newport, Rhode Island, Alternative G would reduce the field of view in which WTGs would be seen in a line across the horizon. Under Alternative G, Southeast Lighthouse NHL would have comparatively the narrowest visible extent of WTGs across the horizon, within a 24 to 26 degree field of view, as compared to a 29 degree field of view of WTGs under Alternative E, a 33 to 38 degree field of view of WTGs under Alternative D, and the broadest 38 degree field of view for the Project under Alternative C and under the Proposed Action (EDR 2023c). NHLs in the Newport area would have proportionately the fewest WTGs (a maximum of 65) in combination with a narrowed field of view (37 to 41 degrees) for WTGs visible across the horizon; although, the reduction is not as much as for the field of view from Block Island (EDR 2023c). Only Alternative D2 would have a narrower line of turbines visible from those NHLs at Newport, within a 35 to 37 degree field of view (EDR 2023c); however, Alternative D would have a cluster of up to 92 WTGs on the horizon, proportionately 42% more than Alternative G.

Compared to the Proposed Action, Alternative G setbacks for WTGs would increase the distances to viewshed resources at Aquinnah by a minimum of approximately 1.25 miles and at Newport and mainland Rhode Island by 1.15 mile and up to 3.5 miles, dependent on the WTG configuration used. In relation to Block Island, Alternative G would reduce the number of closest WTGs and remove the line of WTGs visible on the horizon from Block Island, removing the massing of WTGs at southeast and northeast of Block Island compared to the Proposed Action. Compared to Alternative C, Alternative G would continue to have WTGs in approximately the same proximity to Martha’s Vineyard, although Alternative G would have fewer WTGs than Alternative C. Alternative G would have approximately the same changes as Alternative C in relation to Block Island, Newport, and mainland Rhode Island (compared to the Proposed Action). Compared to Alternative D, Alternative G would have increased setbacks from Martha’s Vineyard, Newport, and mainland Rhode Island. However, compared to Alternative D3, Alternative G would have approximately the same increased setback distances from Block Island, albeit, with a different WTG configuration under Alternative G and Alternative D3. Alternative E1 would begin placing WTGs farther from Martha’s Vineyard and from Newport than Alternative G, with Alternative G WTG placement beginning approximately 2 miles nearer from Martha’s Vineyard and approximately 1.15 to 3.5 miles from Newport than the nearest Alternative E1 WTG. Alternative G would not reduce WTG proximity to Block Island as much as would Alternative E2 (where WTGs would begin at the same distance as Alternative G but then begin receding more greatly to the northwest, to distances of 1.15 miles to approximately 5.5 miles farther away). The distances by which Alternative F would increase WTG setbacks from shore in relation to the other action alternatives cannot be quantified until the additional WTGs to be removed are identified.

With the combination of reduced WTGs numbers and farther setbacks from shorelands, Alternative G would be more effective in reducing visual impacts from the nearest potential WTGs to viewshed resources at Martha’s Vineyard, on Block Island, and along Rhode Island shores compared to other action alternatives, except Alternative E and potentially Alternative F (where Alternative F reduces WTG numbers by up to 14% fewer than Alternative G). Nevertheless, Alternative G would not eliminate visual impacts to all viewshed resources and would not result in fewer visible WTGs and offshore RWF lighting sources than Alternatives C, E1, or F.

Although the level of impact would be reduced, the layout modification and construction activities proposed under Alternative G would still include the same viewshed resources visually impacted under the Proposed Action and the same potential for impacts to these resources. Portions of all RWF WTGs could be visible from most of the 101 NRHP-eligible viewshed resources moderately to majorly impacted under the action alternatives. All action alternatives, regardless of planned WTG numbers, would have WTG visibility reduced somewhat due to intervening land areas and with setback distance from coastlines. As described, those action alternatives with the fewest WTGs and the greatest distances of setback would have the least degree of potential visual impacts on viewshed resources. Under Alternative G, the construction and installation of offshore Project components would have temporary to long-term **negligible** to **major** negative impacts to viewshed resources, similar to those of the Proposed Action.

O&M and decommissioning of offshore Project components with lighting would have temporary to long-term **negligible** to **major** negative impacts to viewshed resources under Alternative G, similar to the Proposed Action. Impacts from Project lighting would be removed upon completion of decommissioning.

Regarding the potential 955 WTGs modeled in a maximum-case scenario for other future offshore wind activities (EDR 2021b), Alternative G would add more WTGs than Alternative F; fewer WTGs than the Proposed Action, Alternative D, and Alternative E2; and approximately the same number of WTGs as Alternative C and Alternative E1. Under Alternative G, the same 101 NRHP-eligible viewshed resources would continue to be negatively affected from a moderate to major degree by the offshore presence of structures in the viewshed APE as the other action alternatives (per the criteria of adverse effects in 36 CFR 800). The cumulative visual impacts on viewshed resources in the viewshed APE associated with Alternative G when combined with past, present, and reasonably foreseeable activities would be long term **negligible** to **major** negative until decommissioning of the Project. However, for Alternative G, the visual proximity for impacts from offshore Project elements would specifically have increased setbacks from viewshed resources at Martha's Vineyard, on Block Island, and the nearest shores of Newport compared to the other action alternatives, except under Alternative E.

#### 3.10.2.14 Mitigation

Mitigation measures for cultural resources are addressed in Appendix F, Tables F-2 and F-3, and are in the memorandum of agreement (MOA), and its historic property treatment plans attached in Appendix J. Revolution Wind–committed measures identified in COP Appendix BB (Cultural Resources Avoidance, Minimization, and Mitigation Measures) would also be incorporated by BOEM into COP approval.

Pursuant to NHPA Section 106, the MOA and its requirements would be agreed to by the signatories, and BOEM would incorporate the MOA's requirements as appropriate as conditions of COP approval. Under the MOA, adverse effects from the Project to NRHP-eligible cultural resources, including NHLs and TCPs, would be avoided, minimized, or mitigated in accordance with the NHPA Section 106 regulations (36 CFR 800) and in compliance with Section 110(f).

# 3.11 Demographics, Employment, and Economics

## 3.11.1 Description of the Affected Environment for Demographics, Employment, and Economics

Geographic analysis area: The GAA for demographics, employment, and economics includes all of the ports listed in the COP as being potentially used during Project construction or operations, as shown in Figure 3.11-1. The figure also includes the top 11 commercial fisheries ports as described in Section 3.9 (all of which generated an average of over $5,000 per year in revenues from the Lease Area and the area affected by the RWEC).

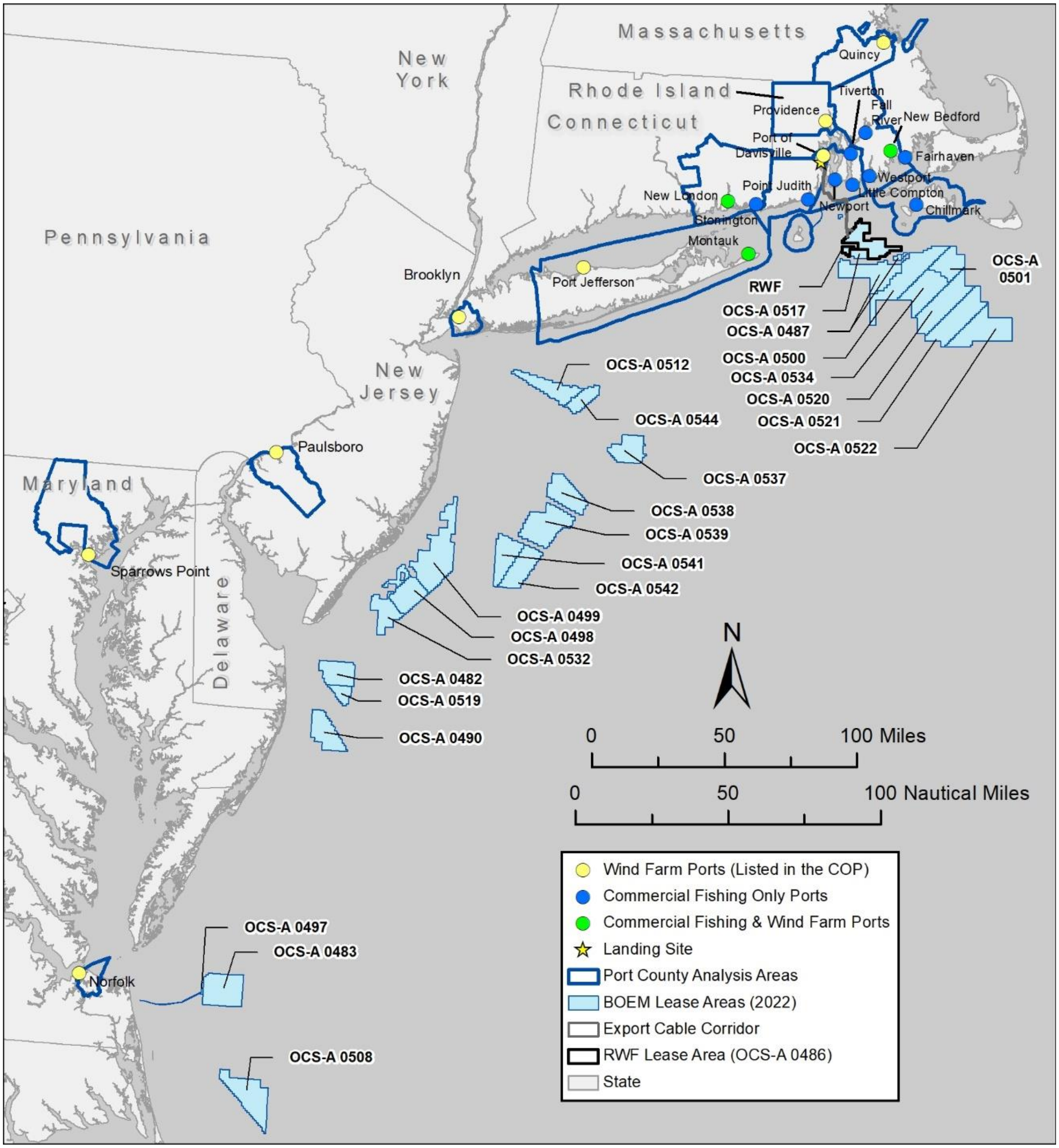



**Figure 3.11-1. Geographic analysis area for demographics, employment, and economics.**

Table 3.11-1 shows the ports listed in the COP as being potentially used to support construction or operations of the Proposed Action, and the wind farm–related activities that could occur at each port. Section 3.3.10 of the COP indicates that Revolution Wind has not made a final decision regarding the specific ports that would be used to support offshore construction, assembly and fabrication, crew transfers, and logistics. Section 3.5.6 of the COP notes that the Project is evaluating the use of the Port of Davisville at Quonset Point, Port Jefferson, Port of Montauk, and Cashman Shipyard to support O&M of the Project and other offshore wind energy projects. Table 3.11-1 also includes the top 10 commercial fishing ports that received landings harvested from within the Lease Area as described in Section 3.9.

Affected Environment: This subsection describes demographic characteristics and trends in the GAA. Table 3.11-2 describes each potentially affected county and city/town in terms of its area in square miles, population change between 2010 and 2020, population density, and median household income. A change in population has the potential to drive beneficial or adverse changes in other socioeconomic variables such as availability of housing and demand for public infrastructure and services.

Among the potentially affected counties, Kings County, New York, had the largest population, with over 2.7 million residents, as well as the highest population density. Within the GAA, Dukes County, Massachusetts, had the largest gain among counties, with nearly a 25% increase since 2010, whereas Montauk had the largest population gain among cities/towns with an increase of 30%. Five of the listed cities and towns experienced population declines between 2010 and 2020—New London and Stonington in Connecticut, Narragansett and Little Compton in Rhode Island, and Norfolk City in Virginia.

**Table 3.11-1. Ports, Cities/Towns, Counties, and States in the Geographic Analysis Area**

| Port/ Facility Name/ Place Name | City/Town | County, State | WTG Tower, Nacelle and Blade Storage, Pre-Commissioning and Marshalling | Foundation Marshalling and Advanced Foundation Component Fabrication | Construction Hub and/or O&M Activities | Commercial Fishing |
|---|---|---|---|---|---|---|
| Port of New London | New London | New London, CT | X | | | X |
| Stonington | Stonington | New London, CT | | | | X |
| Fairhaven | Fairhaven | Bristol, MA | | | | X |
| New Bedford Marine Commerce Terminal | New Bedford | Bristol, MA | X | | | X |
| Westport | Westport | Bristol, MA | | | | X |
| Chilmark/ Menemsha | Chilmark | Dukes, MA | | | | X |
| Cashman Shipyard | Quincy | Norfolk, MA | | | X | |
| Sparrow's Point | Edgemere | Baltimore, MD | | X | | |
| Paulsboro Marine Terminal | Paulsboro | Gloucester, NJ | X | X | | |
| Port of Montauk | Montauk | Suffolk, NY | | | X | X |
| Port Jefferson | Brookhaven | Suffolk, NY | | | X | |
| Port of Brooklyn | Brooklyn | Kings, NY | | | X | |
| Port of Providence* | Providence | Providence, RI | X | X | | |
| Point Judith | Narragansett | Washington, RI | | | | X |
| Port of Davisville at Quonset Point | North Kingstown | Washington, RI | | | X | |
| Newport | Newport | Newport, RI | | | | X |

| Port/ Facility Name/ Place Name | City/Town | County, State | WTG Tower, Nacelle and Blade Storage, Pre-Commissioning and Marshalling | Foundation Marshalling and Advanced Foundation Component Fabrication | Construction Hub and/or O&M Activities | Commercial Fishing |
|---|---|---|---|---|---|---|
| Little Compton | Little Compton | Newport, RI | | | | X |
| Port of Norfolk/ Norfolk International Terminal | Norfolk | Norfolk City, VA | X | | | |

Sources: Developed based on data from Table 3.3.10-1 in the COP (for ports directly related to the Project) and data from NMFS (2021).

Note: CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* The Port of Providence is also designated as the location of "electrical activities and support" in the COP.

### Table 3.11-2. Population and Median Income by City/Town and County

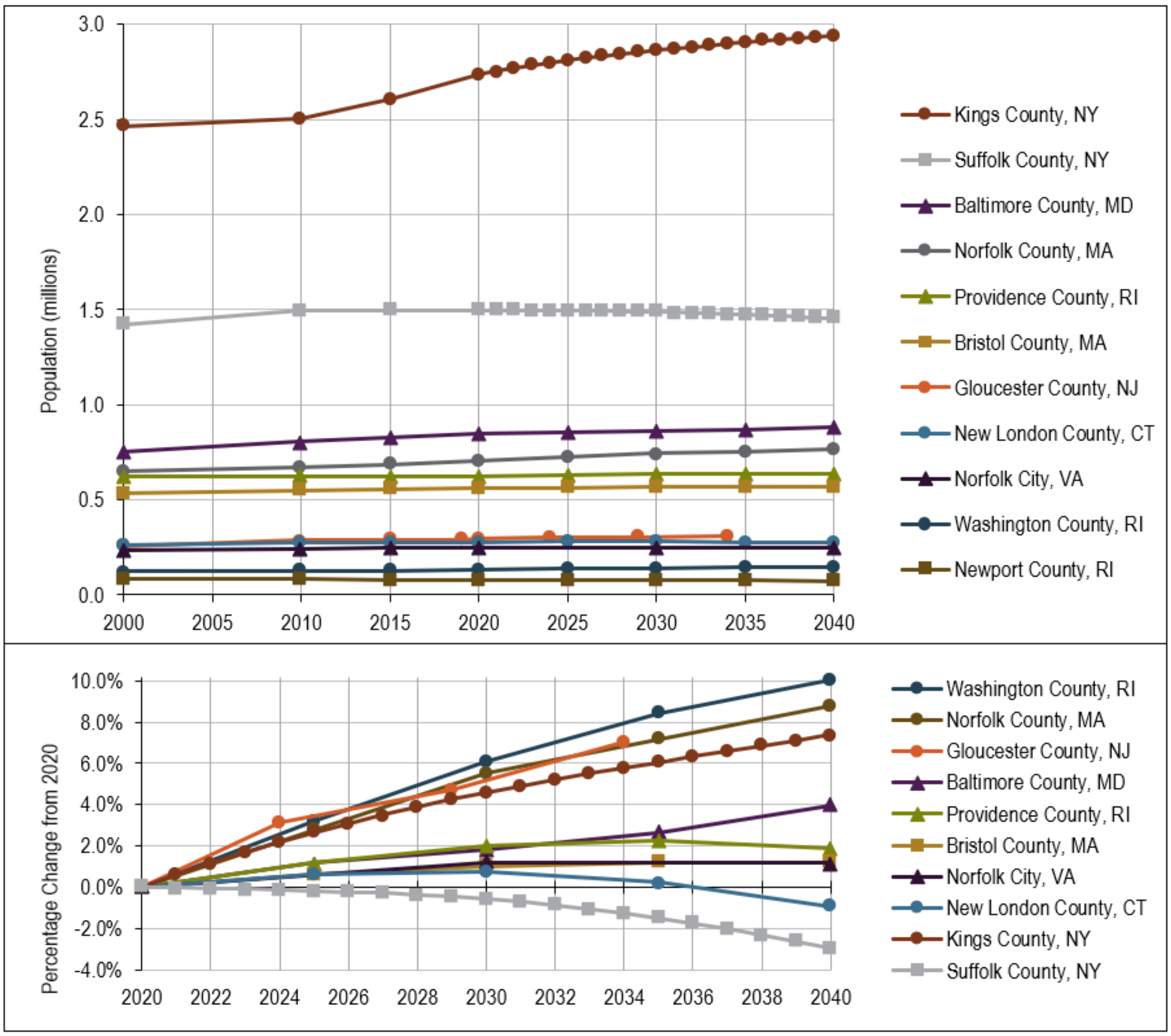
| State/County/City or Town | | Land Area (square miles) | Population (2010) | Population (2020) | Population Percent Change (2010–2020) | 2020 Population Density (population/ square mile) | Median Household Income (2019) |
|---|---|---|---|---|---|---|---|
| Connecticut | New London County | 665 | 274,055 | 268,555 | -2.0% | 404 | $73,490 |
| | New London | 6 | 27,620 | 27,367 | -0.9% | 4,870 | $46,298 |
| | Stonington | 39 | 18,545 | 18,335 | -1.1% | 474 | $81,667 |

| State/County/City or Town | | Land Area (square miles) | Population (2010) | Population (2020) | Population Percent Change (2010–2020) | 2020 Population Density (population/ square mile) | Median Household Income (2019) |
|---|---|---|---|---|---|---|---|
| Massachusetts | Bristol County | 553 | 548,285 | 579,200 | 5.6% | 1,047 | $69,095 |
| | New Bedford | 20 | 95,072 | 101,079 | 6.3% | 5,054 | $46,321 |
| | Fairhaven | 12 | 15,873 | 15,924 | 0.3% | 1,291 | $67,394 |
| | Westport | 50 | 15,532 | 16,339 | 5.2% | 328 | $79,895 |
| | Dukes County | 103 | 16,535 | 20,600 | 24.6% | 200 | $71,811 |
| | Chilmark/ Menemsha | 19 | 866 | 930 | 7.4% | 49 | $96,471 |
| | Norfolk County | 396 | 670,850 | 725,981 | 8.2% | 1,833 | $103,291 |
| | Quincy | 17 | 92,271 | 101,636 | 10.1% | 6,132 | $77,562 |
| Maryland | Baltimore County | 598 | 805,029 | 854,535 | 6.1% | 1,428 | $76,866 |
| | Edgemere | 11 | 8,669 | 9,069 | 4.6% | 837 | $80,307 |
| New Jersey | Gloucester County | 322 | 288,288 | 302,294 | 4.9% | 939 | $87,283 |
| | Paulsboro Borough | 2 | 6,097 | 6,196 | 1.6% | 3,261 | $45,450 |
| New York | Kings County (Brooklyn Borough) | 71 | 2,504,700 | 2,736,074 | 9.2% | 38,634 | $60,231 |
| | Suffolk County | 912 | 1,493,350 | 1,525,920 | 2.2% | 1,673 | $101,031 |
| | Montauk | 17 | 3,326 | 4,318 | 29.8% | 247 | $96,389 |
| | Port Jefferson | 3 | 7,750 | 7,962 | 2.7% | 2,602 | $111,442 |

| State/County/City or Town | | Land Area (square miles) | Population (2010) | Population (2020) | Population Percent Change (2010–2020) | 2020 Population Density (population/ square mile) | Median Household Income (2019) |
|---|---|---|---|---|---|---|---|
| Rhode Island | Providence County | 410 | 626,667 | 660,741 | 5.4% | 1,614 | $58,974 |
| | Providence | 18 | 178,042 | 190,934 | 7.2% | 10,377 | $45,610 |
| | Washington County | 329 | 126,979 | 129,839 | 2.3% | 394 | $85,531 |
| | Narragansett | 14 | 15,868 | 14,532 | -8.4% | 1,046 | $86,920 |
| | North Kingstown | 43 | 26,486 | 27,732 | 4.7% | 643 | $91,796 |
| | Newport County | 102 | 82,888 | 85,643 | 3.3% | 836 | $79,454 |
| | Newport | 8 | 24,672 | 25,163 | 2.0% | 3,281 | $67,102 |
| | Little Compton | 21 | 3,492 | 3,462 | -0.9% | 169 | $89,353 |
| Virginia | Norfolk City | 54 | 242,803 | 238,005 | -2.0% | 4,398 | $51,590 |

Sources: Unless otherwise noted, data are developed from U.S. Census Bureau (2021a). Data for Chilmark, Massachusetts, are from Wikipedia (2021a), Census Reporter (2021), and U.S. Census Bureau (2021b). Data for Montauk, New York, are from Wikipedia (2021b), Census Reporter (2021), and U.S. Census Bureau (2023). Data for Little Compton, Rhode Island, are from Wikipedia (2021c), Census Reporter (2021), and U.S. Census Bureau (2021b). Population data for Norfolk County, Massachusetts, and Quincy Massachusetts, are from U.S. Census Bureau (2022), and household income data are from U.S. Census Bureau (2020).

Figure 3.11-2 shows past and forecasted trends in population through 2040 for the counties in the GAA. The top panel contains population count forecasts, and the lower panel shows the projected future percentage change from the 2020 population estimate. Although the available population forecasts do not all use the same base year or the same set of assumptions with respect to future changes, they generally represent the best publicly available information. Four counties (Washington County, Rhode Island; Gloucester County, New Jersey; Kings County, New York; and Baltimore County, Maryland) have forecasts with increasing populations throughout the 20-year period. Population forecasts for four counties increase initially but then flatten while still remaining greater than 2020 (Dukes County, Massachusetts, Providence County, Rhode Island; Bristol County, Massachusetts; and Norfolk County, Virginia). Lastly, three counties are projected to see populations decline in the long run (New London County, Connecticut; Suffolk County, New York; and Newport County, Rhode Island).




Note: Figure panels developed using data from sources listed below.

Sources: Connecticut State Data Center (2018); Cornell Program on Applied Demographics (2018); Demographics Research Group (2019); Maryland State Data Center (2020); New Jersey Dept. of Labor and Workforce Development (2014); Rhode Island Statewide Planning Program (2013); UMASS Donahue Institute (2018).

**Figure 3.11-2. Population trends and forecasts of counties in the analysis area (2000–2040).**

#### 3.11.1.1 Economic Characteristics within the Geographic Analysis Area

This subsection summarizes economic characteristics of counties and states in the GAA, including gross domestic product (GDP) and employment. The GDP values represent the market value of goods and services produced by the labor and property located within a geographic area, but they do not include the value of intermediate or used goods in the area. A focus of this analysis is the GDP for the "ocean economy," which includes economic activity dependent upon the ocean, such as commercial fishing and seafood processing, marine construction, commercial shipping and cargo handling facilities, ship and boat building, marine minerals, harbor and port authorities, passenger transportation, boat dealers, and ocean-related tourism and recreation (National Ocean Economics Program 2022).

Most counties in the GAA display diverse economic activity, and many have well-developed ocean-based economic sectors. In particular, the ocean-related recreation and tourism sector plays a substantial role in many county economies affected by the Project (see Section 3.18). In addition, commercial fishing fleets are important to coastal communities because they generate employment and income for vessel owners and crews and create demand for shoreside products and services to maintain vessels and process seafood products (see Section 3.9). The marine transportation sector is expanding in some coastal counties, with the larger regional ports seeing increased vessel visits and undertaking upgrades to accommodate the increased utilization.

Table 3.11-3 summarizes trends in the annualized inflation-adjusted total GDP and ocean economy GDP of potentially affected states and counties. Among states, New York had both the largest total GDP and ocean economy GDP, and it experienced the largest increase in total GDP and ocean economy GDP from 2005 to 2020. Among counties, Kings County, New York, experienced a 67% increase in its ocean economy GDP from 2005 to 2020, and the ocean economy GDPs of Dukes County, Massachusetts; Gloucester, New Jersey; and Baltimore County, Maryland, also increased by more than 50%. Although Gloucester's ocean economy had a significant increase from 2005 to 2020, its overall economy declined by 16% in real terms. Norfolk City, Virginia, was the only city or county analyzed to experience a decline in both its overall economy and its ocean economy, with GDP declines of over 20% in real terms.

**Table 3.11-3. Annualized Total and Ocean Economy Gross Domestic Product of Counties and States in the Geographic Analysis Area**

| State/County | 2005 Total GDP (millions of 2020$) | 2020 Total GDP (millions of 2020$) | 2005–2020 Percent Change | Percentage of Analysis Area Total GDP in 2020 | 2005 Ocean Economy GDP (millions of 2020$) | 2020 Ocean Economy GDP (millions of 2020$) | 2005–2020 Percent Change | 2020 Ocean Economy GDP as a Percentage of 2020 Total GDP |
|---|---|---|---|---|---|---|---|---|
| **Connecticut** | $266,827 | $276,223 | 3.5% | 6.5% | $3,802 | $4,769 | 20.3% | 7.4% |
| New London County | $20,164 | $18,866 | -6.4% | – | $1,787 | $2,589 | 31.0% | – |
| **Maryland** | $340,791 | $410,931 | 20.6% | 9.7% | $5,627 | $9,244 | 39.1% | 14.3% |
| Baltimore County | $48,711 | $55,989 | 14.9% | – | $316 | $811 | 61.1% | – |
| **Massachusetts** | $444,671 | $585,150 | 31.6% | 13.8% | $5,491 | $7,292 | 24.7% | 11.3% |
| Bristol County | $23,109 | $27,685 | 19.8% | – | $555 | $1,057 | 47.5% | – |
| Dukes County | $1,296 | $1,581 | 22.0% | – | $44 | $101 | 56.1% | – |
| Norfolk County | $46,055 | $54,512 | 18.4% | – | $386 | $578 | 33.3% | – |
| **New Jersey** | $566,560 | $620,086 | 9.4% | 14.6% | $8,876 | $10,927 | 18.8% | 16.9% |
| Gloucester County | $16,184 | $13,533 | -16.4% | – | $209 | $452 | 53.7% | – |
| **New York** | $1,321,086 | $1,740,805 | 31.8% | 41.0% | $20,261 | $20,935 | 3.2% | 32.5% |
| Kings County | $66,040 | $107,034 | 62.1% | – | $639 | $1,922 | 66.8% | – |
| Suffolk County | $83,879 | $103,724 | 23.7% | – | $1,503 | $2,270 | 33.8% | – |

| State/County | 2005 Total GDP (millions of 2020$) | 2020 Total GDP (millions of 2020$) | 2005–2020 Percent Change | Percentage of Analysis Area Total GDP in 2020 | 2005 Ocean Economy GDP (millions of 2020$) | 2020 Ocean Economy GDP (millions of 2020$) | 2005–2020 Percent Change | 2020 Ocean Economy GDP as a Percentage of 2020 Total GDP |
|---|---|---|---|---|---|---|---|---|
| **Rhode Island** | $57,697 | $60,771 | 5.3% | 1.4% | $2,369 | $2,474 | 4.2% | 3.8% |
| Providence County | $5,899 | $6,432 | 9.0% | – | $691 | $691 | 0.0% | – |
| Washington County | $34,132 | $35,809 | 4.9% | – | $686 | $648 | -5.9% | – |
| Newport County | $6,445 | $7,083 | 9.9% | – | $552 | $744 | 25.8% | – |
| **Virginia** | $465,574 | $556,993 | 19.6% | 13.1% | $8,680 | $8,847 | 1.9% | 13.7% |
| Norfolk City | $24,483 | $19,430 | -20.6% | – | $1,424 | $1,171 | -21.5% | – |
| **All States in the Geographic Analysis Area** | **$3,463,206** | **$4,250,958** | **22.7%** | **100%** | **$55,105** | **$64,488** | **17.0%** | **100%** |

Sources: National Ocean Economics Program (2022); U.S. Bureau of Economic Analysis (2022).

Note: A detailed list of economic sectors and industries that the National Ocean Economics Program defines as the ocean economy is available at https://www.oceaneconomics.org/Market/sectors.asp.

Table 3.11-4 summarizes the employment characteristics of counties and states with a potentially affected port, including the size of the labor force, the number of persons employed, and the unemployment rate in 2020. The size of the labor force in each county generally tracks the county's population size, with the largest labor force present in urban areas. Among counties, Kings County, New York, had the largest labor force in 2020, with 1.21 million participants, whereas Dukes County, Massachusetts, had the smallest labor force, with 9,552 participants. Likely a result of the COVID-19 pandemic, the percentage of the labor force that was unemployed was high throughout the GAA in 2020, with unemployment rates ranging from 6.2% in Virginia to 9.9% in New York. Unemployment in Gloucester County, New Jersey, was very high at 17.2% in 2020. By comparison, in 2019, Virginia and New York had unemployment rates of 2.8% and 3.8%, respectively, and Gloucester's rate of unemployment was 4.8%.

**Table 3.11-4. Employment Characteristics of Potentially Affected States and Counties, 2020**

| State/County | Estimated Size of Labor Force | Estimated Number of Persons Employed | Percentage of Labor Force Unemployed |
|---|---|---|---|
| **Connecticut** | 1,897,782 | 1,749,954 | 7.8% |
| New London County | 133,743 | 121,093 | 9.5% |
| **Massachusetts** | 3,741,686 | 3,390,253 | 9.4% |
| Bristol County | 299,978 | 267,445 | 10.8% |
| Dukes County | 9,542 | 8,598 | 9.9% |
| Norfolk County | 390,023 | 355,614 | 8.8% |
| **Maryland** | 3,227,527 | 3,012,107 | 6.7% |
| Baltimore County | 452,245 | 421,646 | 6.8% |
| **New Jersey** | 4,642,948 | 4,203,279 | 9.5% |
| Gloucester County | 124,180 | 102,874 | 17.2% |
| **New York** | 9,575,041 | 8,631,278 | 9.9% |
| Kings County | 1,210,703 | 1,057,917 | 12.6% |
| Suffolk County | 778,961 | 715,866 | 8.1% |
| **Rhode Island** | 567,056 | 514,913 | 9.2% |
| Newport County | 44,473 | 40,912 | 8.0% |
| Providence County | 334,632 | 301,230 | 10.0% |
| Washington County | 69,088 | 63,803 | 7.6% |
| **Virginia** | 4,368,789 | 4,097,867 | 6.2% |
| Norfolk City | 111,753 | 102,070 | 8.7% |
| **States in GAA** | 28,020,829 | 25,599,651 | 8.6% |
| **Counties in GAA** | 3,959,321 | 3,559,068 | 10.1% |

Source: U.S. Bureau of Labor Statistics (2023).

### 3.11.2 Environmental Consequences

#### 3.11.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). From the perspective of potential Project impacts to demographic, employment, or economic conditions in the GAA, the key design parameters are total Project capacity, turbine size, and number of WTGs installed. If total Project capacity is larger and if similar-sized WTGs are used, then the number of WTGs must increase and the economic impacts during the construction phase would also increase. Similarly, if the number of WTGs is constant and the capacity of the individual turbines is larger (thus increasing the total capacity of the Project), then economic impacts during the construction phase would be greater. Economic impacts during the O&M phase are directly linked to total Project capacity. If total Project capacity increases, then total economic impacts during O&M would increase.

In addition, specified construction periods for individual Project components (inclusive of commissioning) affect the duration of economic impacts, while the selection of ports that support various Project activities and facilities will determine where economic impacts are likely to occur. Other factors that affect local economic impacts of the Project include the local and national Project Labor Agreements to which Revolution Wind has committed and the ability of local and U.S. industries to meet the manufacturing and component demands of the Project. These and other labor and construction practices for the Project are described in more detail in Appendix G and in Table F-1 in Appendix F.

See Appendix E1 for a summary of IPFs analyzed for demographics, employment, and economics across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E2-7 in Appendix E1.

Table 3.11-5 provides a summary of the generally beneficial employment, income, and value-added impacts of the alternatives along with the IPF findings carried forward for analysis in this section, which are generally considered adverse impacts. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component.

The Conclusion section within each alternative analysis discussion includes a rationale for the effects determinations. Because there are both beneficial and adverse impacts, BOEM is unable to make a single overall impact determination with respect to demographics, employment, and economics.

Where feasible, calculations for specific alternative impacts are provided in Appendix E4 to facilitate reader comparison across alternatives.

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**Table 3.11-5. Comparison of Evaluated Impact-Producing Factors under included Alternatives for Demographics, Employment, and Economics**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| Employment and economic activity generated by offshore wind energy | Under the No Action Alternative, BOEM estimates that 972 MW of offshore wind farm capacity would be installed and operational by 2024.<br>Notwithstanding the above, the number of jobs created during offshore wind energy project construction and O&M would be small relative to the total number of jobs in the GAA. Therefore, the beneficial direct employment impacts of construction and O&M of future offshore wind energy projects would be localized, temporary to long term and **minor**. Impacts during project decommissioning would be similar to impacts during construction. There would be no further impacts once decommissioning is complete.<br>Overall, offshore wind energy development is expected to have a short-term **negligible** to **minor** adverse impact on local supplies of labor and goods and services. Population increases from increased employment opportunities could reduce local housing availability and strain existing public infrastructure and services. Therefore, construction of offshore wind energy projects would have a short-term **negligible** to **minor** adverse impact on demographic-related variables such as housing availability and demand for public infrastructure and services. | Employment and economic activity impacts of the Proposed Action under the Large WTG Maximum Capacity Project configuration would be short term to long term **minor** beneficial. Construction would also have a short-term **negligible** adverse impact on local supplies of labor and goods and services and demographic-related variables such as housing availability and demand for public infrastructure and services for all design configurations analyzed under the Proposed Action.<br>Decommissioning of the Project's offshore facilities is estimated to take 2 years. Because labor and contracting would account for a substantial portion of decommissioning costs, a relatively high percentage of decommissioning expenditures are expected to accrue to local economies. Therefore, decommissioning would have a short-term **minor** beneficial impact.<br>Under the Proposed Action, BOEM estimates that annual average construction jobs from 2022 to 2030 would increase by 1.5% to 1.8% relative to the No Action Alternative, and that Project-related O&M jobs would increase by as much as 1.3% of all projected Atlantic Seaboard offshore wind O&M jobs in 2031. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the employment and economic activity from the Project would have long-term **minor** beneficial impacts for demographics, employment, and economics. | See Section 3.11.2.4 for analysis.<br>Under Alternative C, annual average offshore wind construction jobs from 2022 to 2030 would increase by 1.5% to 1.6%. Project-related O&M jobs would increase by as much as 1.3% of all Atlantic Seaboard offshore wind O&M jobs estimated for 2031.<br>Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the employment and economic activity from Alternative C would have long-term **minor** beneficial impacts for demographics, employment, and economics. | See Section 3.11.2.4 for analysis.<br>Under Alternative D, annual average offshore wind construction jobs from 2022 to 2030 would increase by 1.5% to 1.8%. Project-related O&M jobs would increase by as much as 1.3% of all Atlantic Seaboard offshore wind O&M jobs estimated for 2031.<br>Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the employment and economic activity from Alternative D would have long-term **minor** beneficial impacts for demographics, employment, and economics. | See Section 3.11.2.4 for analysis.<br>Under Alternative E, annual average offshore wind construction jobs from 2022 to 2030 would increase by 1.5% to 1.6%. Project-related O&M jobs would increase by as much as 1.3% of all Atlantic Seaboard offshore wind O&M jobs estimated for 2031.<br>Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the employment and economic activity from Alternative E would have long-term **minor** beneficial impacts for demographics, employment, and economics. | See Section 3.11.2.4 for analysis.<br>Under Alternative F, annual average offshore wind construction jobs from 2022 to 2030 would increase by 1.5% to 1.8%. Project-related O&M jobs would increase by as much as 1.2% of all Atlantic Seaboard offshore wind O&M jobs estimated for 2031.<br>Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the employment and economic activity from Alternative F would have long-term **minor** beneficial impacts for demographics, employment, and economics. | See Section 3.11.2.5 for analysis.<br>Under Alternative G, annual average offshore wind construction jobs from 2022 to 2030 would increase by 1.5%. Project-related O&M jobs would increase by as much as 1.2% of all Atlantic Seaboard offshore wind O&M jobs estimated for 2031.<br>Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the employment and economic activity from Alternative G would have long-term **minor** beneficial impacts for demographics, employment, and economics. |
| Light | **Offshore**: The view of nighttime lighting could have impacts on employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit (see Section 3.18). Impacts on businesses dependent on tourism would be localized short term **negligible** to **moderate** adverse during construction, O&M, and decommissioning based on the observed distance and individual responses by tourists to changes in the viewshed. | **Offshore:** The view of nighttime lighting during construction of offshore facilities could have impacts on employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit (see Section 3.18). Impacts on businesses dependent on tourism would be localized and short term **negligible** to **moderate** adverse, based on the observed distance and individual responses by tourists to changes in the viewshed for all design configurations analyzed under the Proposed Action. | **Offshore:** By omitting certain WTG positions or eliminating WTGs adjacent to or overlapping certain transit lanes, Alternatives C through F would reduce the impact of light to the tourism industry. However, the light impact rating for recreation and tourism would be similar to the Proposed Action (see Section 3.18): short term negligible to moderate adverse for construction and long term negligible adverse for O&M and decommissioning.<br>The lighting impact of Alternatives C through F on the tourism industry would not be markedly different from the Proposed Action (see Section 3.18). Therefore, cumulative impacts of light to demographic, employment, or economic conditions in the GAA would be similar to the Proposed Action: long term negligible to minor adverse if ADLS (or a similar system) is installed on WTGs. | | | | **Offshore**: By omitting certain WTG positions or eliminating WTGs adjacent to or overlapping certain transit lanes, Alternative G would reduce the impact of light to the tourism industry. However, the light impact rating for recreation and tourism would be similar to the Proposed Action |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | If ADLS (or a similar system) is installed on WTGs, impacts to demographic, employment, or economic conditions in the GAA would be reduced to **negligible** to **minor** adverse. | Revolution Wind has committed to implement ADLS as a measure to reduce light impacts (see Table F-1 in Appendix F) and visual impacts on recreation and tourism during O&M. These impacts, while long term, are expected to be negligible adverse.<br>Adverse impacts on businesses dependent on tourism would be localized and short term during construction and long term during operations, with negligible to moderate adverse impacts based on the observed distance and individual responses by tourists to changes in the viewshed. If ADLS (or a similar system) is installed on WTGs, impacts to demographic, employment, or economic conditions in the GAA would be reduced to negligible to minor adverse for all design configurations analyzed under the Proposed Action, as the amount of time WTGs would be visible at night would decrease (see Section 3.20). | | | | | (see Section 3.18): short term **negligible** to **moderate** adverse for construction and long term negligible adverse for O&M and decommissioning.<br>The lighting impact of Alternative G on the tourism industry would not be markedly different from the Proposed Action (see Section 3.18). Therefore, cumulative impacts of light to demographic, employment, or economic conditions in the GAA would be similar to those under the Proposed Action: long term negligible to minor adverse if ADLS (or a similar system) is installed on WTGs. |
| New cable emplacement/ maintenance | **Offshore**: The impacts of new cable emplacement/maintenance to demographic, employment, and economic conditions in the GAA would be similar to those discussed below under the presence of structures IPF. The potential impacts of both IPFs include a decrease in employment or economic activity due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9). The new cable emplacement and maintenance impact rating would be the same as the presence of structures impact rating: short term **minor** to **moderate** adverse. | **Offshore**: The impacts of new cable emplacement/maintenance to demographic, employment, and economic conditions in the GAA would be similar to those discussed below under the presence of structures IPF. The potential impacts of both IPFs include a decrease in employment or economic activity due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9). Therefore, the new cable emplacement and maintenance impact rating would be the same as the presence of structures impact rating: short term adverse during construction/decommissioning and long term adverse during operations, as well as **minor** to **moderate** adverse. | **Offshore**: If the number of IACs is reduced under Alternatives C through F, the adverse economic impact of new cable emplacement on demographics, employment, and economics would be diminished. However, the new cable emplacement and maintenance impact rating for demographics, employment, and economics would be similar to that for the Proposed Action (see Section 3.9): short term **minor** to **moderate** adverse. | | | | **Offshore**: If the number of IACs is reduced under Alternative G, the adverse economic impact of new cable emplacement on demographics, employment, and economics would be diminished. However, the new cable emplacement and maintenance impact rating for demographics, employment, and economics fishing would be similar to that for the Proposed Action (see Section 3.9): short term **minor** to **moderate** adverse. |
| Presence of structures | **Offshore**: Under the No Action Alternative, offshore wind energy development would result in the | **Offshore**: As described in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could | **Offshore**: By omitting certain WTG positions or eliminating WTGs adjacent to or overlapping certain transit lanes, Alternatives C through F would reduce the adverse economic impact of the presence of structures on demographics, employment, and economics. However, the presence of structures impact rating for | | | | **Offshore**: By omitting certain WTG positions or eliminating WTGs |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | installation of an estimated 13,469 miles of offshore export cables and IACs and 3,088 offshore foundations. An analysis of the impacts of offshore wind energy structures, including WTGs and offshore submarine cables, to commercial fisheries and for-hire recreational fishing that could result from future offshore wind energy development is provided in Section 3.9. To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. Adverse impacts to demographic, employment, or economic conditions in the GAA would be short term and **minor** to **moderate**. | experience adverse economic impacts during Project construction and O&M as a result of the installation and presence of structures, including WTGs and OSSs. However, Revolution Wind's communication plans with the fishing industry would help ensure that fishing industry sectors, including harvesting operations, seafood processors and distributors, and shoreside support services, could continue to operate with minimal disruption. Therefore, adverse impacts to employment and economic activity in the fishing industry would be short to long term **minor** to **moderate** adverse.<br>The Proposed Action in addition to other future offshore wind energy development would result in the installation of an estimated 13,716 miles of offshore export cables and IACs and 3,190 offshore foundations. Therefore, adverse economic impacts to commercial fisheries and for-hire recreational fishing would be short-term **minor** to **moderate** adverse during construction/decommissioning and long-term **minor** to **moderate** adverse during operations. | demographics, employment, and economics would be similar to the Proposed Action (see Section 3.9): short term to long term **minor** to **moderate** adverse. | | | | adjacent to or overlapping certain transit lanes, Alternative G would reduce the adverse economic impact of the presence of structures on demographics, employment, and economics. However, the presence of structures impact rating for demographics, employment, and economics would be similar to that for the Proposed Action (see Section 3.9): short term to long term **minor** to **moderate** adverse. |
| Port utilization | **Onshore**: Offshore wind energy projects would require vessels for staging and installation during construction. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) for existing port users. Therefore, adverse impacts to demographic, employment, or economic conditions in the GAA during offshore wind energy project construction are expected to be localized, short term, and **minor** to **moderate**. Construction activities associated with port improvements would support marine service industries and provide employment opportunities for shore-based and marine workers. Overall, construction of port improvements related to offshore wind energy development would have long-term, **minor** to **moderate** beneficial impacts. | **Onshore**: The Proposed Action would require vessels for staging and installation during construction. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) for existing port users. Adverse port utilization impacts during offshore wind energy Project construction are expected to be localized, short term **minor** to **moderate** adverse.<br>During Project O&M, port facilities would be required for vessels used for routine maintenance of offshore Project components. Given the relatively low number of vessels, the adverse impacts on the accessibility of port facilities would be long term **minor** adverse.<br>Offshore wind energy projects, including the Proposed Action, would require vessels for staging and installation during construction, routine maintenance during operations, and deinstallation during decommissioning. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port | **Onshore:** Construction of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts to demographic, employment, or economic conditions in the GAA would be the same as the Proposed Action: short term **minor** to **moderate** adverse for construction and decommissioning, long term **minor** adverse for O&M, and cumulatively long term minor to moderate adverse and beneficial. | | | | **Onshore:** Construction of onshore facilities under Alternative G would not be markedly different from the Proposed Action; therefore, impacts to demographic, employment, or economic conditions in the GAA would be the same as the Proposed Action: short term **minor** to **moderate** adverse for construction and decommissioning, long term **minor** adverse for O&M, and cumulatively long term **minor** to **moderate** adverse and beneficial. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | During offshore wind energy project O&M, port facilities would be required for vessels used for routine maintenance of offshore project components. However, in comparison to the construction phases of projects, O&M would likely require a more limited number of vessels. Therefore, impacts would be long term and **minor** adverse. Offshore wind energy projects could generate employment opportunities and economic activity at ports used to support O&M of projects through port upgrades and development as well as marine transportation. Overall, the port investment and usage generated by offshore wind energy development would have long-term **minor** to **moderate** beneficial impacts. | services (e.g., fueling and provisioning) for existing port users. Cumulative port utilization impacts are expected to be **minor** to **moderate** adverse, localized, and short term during construction and decommissioning and long term during operations. Any the port investment and usage generated by offshore wind energy development would also have long-term **minor** to **moderate** beneficial impacts to demographic, employment, or economic conditions in the GAA. | | | | | |
| Vessel traffic | **Offshore**: Vessel traffic related to offshore wind energy project construction and O&M could cause congestion and delays. In addition, the risk of collisions that result in costly vessel damage and loss could increase. These vessel traffic changes would represent a short-term **minor** to **moderate** adverse impact to demographic, employment, or economic conditions in the GAA. In comparison to the construction phases of projects, a more limited number of vessels would likely be required for routine maintenance during the operations phase. Therefore, the reduction of vessel traffic would represent a long-term **negligible** to **minor** adverse impact. | **Offshore**: Vessel traffic related to offshore wind energy Project construction could cause congestion and delays, thereby increasing vessel fuel costs (i.e., for vessels forced to wait for port traffic to pass) and decreasing productivity for commercial shipping businesses. In addition, the risk of collisions that result in costly vessel damage and loss could increase (see Section 3.16). These vessel traffic changes would represent a short-term **minor** to **moderate** adverse impact.<br>Project O&M would require a more limited number of vessels, and most of the vessels would be smaller in size (VHB 2023). Therefore, the adverse impacts of vessel traffic to demographic, employment, or economic conditions in the GAA would be long term **minor** adverse.<br>The cumulative impacts of vessel traffic to demographic, employment, or economic conditions in the GAA would be short term **minor** to **moderate** adverse during construction/ decommissioning and long term **negligible** to **minor** adverse during operations. | **Offshore**: Under Alternatives C through F, vessel traffic would be similar to the Proposed Action (see Section 3.16). Therefore, the impact to demographic, employment, or economic conditions in the GAA would be similar to the Proposed Action: short term **minor** to **moderate** adverse for construction and decommissioning, long term **minor** adverse for O&M, and cumulatively short term **minor** to **moderate** during construction and decommissioning and long term **minor** during operations. | | | | **Offshore**: Under Alternative G, vessel traffic would be similar to the Proposed Action (see Section 3.16). Therefore, the impact to demographic, employment, or economic conditions in the GAA would be similar to that for the Proposed Action: short term **minor** to **moderate** adverse for construction and decommissioning, long term **minor** adverse for O&M, and cumulatively short term **minor** to **moderate** during construction and decommissioning and long term **minor** during operations. |
| Vehicular traffic | **Onshore**: Activities associated with construction and O&M of the onshore and offshore facilities of offshore wind energy projects would result in temporary, localized traffic delays along impacted | **Onshore**: Some materials and equipment would arrive by land at varying frequencies throughout the construction period. This additional traffic could result in temporary, localized traffic delays that impact nearby businesses. Construction and | **Onshore**: Construction and operation of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts to demographic, employment, or economic conditions in the GAA would be the same as the Proposed Action: short term to long term **negligible** to **minor** adverse. | | | | **Onshore**: Construction and operation of onshore facilities under Alternative G would not be markedly different |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | roads (see Section 3.14). Adverse effects of the additional vehicular traffic to demographic, employment, or economic conditions in the GAA would be short term to long term **negligible** to **minor adverse**. | O&M of the onshore facilities of the Proposed Action could also result in temporary, localized traffic delays that impact nearby businesses (see Section 3.14). On this basis, the overall effects of vehicular traffic would be short term to long term and **negligible** to **minor** adverse. | | | | | from the Proposed Action; therefore, impacts to demographic, employment, or economic conditions in the GAA would be the same as the Proposed Action: short term to long term **negligible** to **minor** adverse. |

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### 3.11.2.2 Alternative A: Impacts of the No Action Alternative on Demographics, Employment, and Economics

#### 3.11.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for demographics, employment, and economics (see Section 3.11.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind projects within the GAA. These IPFs are described and analyzed in Appendix E1.

Other ongoing activities within the GAA, including non–offshore wind activities that contribute to impacts on demographics, employment, and economics within the GAA, include the following:

- Continued O&M of the BIWF project installed in state waters of Rhode Island with a capacity to generate 30 MW
- Continued O&M of the Coastal Virginia Offshore Wind project installed off the coast of Virginia with a generating capacity of 12 MW
- Ongoing construction of the Vineyard Wind 1 project off the coast of Massachusetts with a projected capacity of 800 MW and an expected completion date in 2023, with O&M activities continuing into the future
- Ongoing construction of the SFWF project off the coast of New York with a projected capacity of 132 MW and an expected completion in 2023, with O&M activities continuing into the future

Table 3.11-6 summarizes the number of estimated offshore wind jobs occurring within the GAA under the No Action Alternative. Construction jobs are projected for the years 2022 and 2023 when construction of the Vineyard Wind 1 and SFWF projects are expected to be completed. O&M jobs are listed beginning in the year of completion of project construction. The O&M jobs shown for 2022 are the estimated number of jobs resulting from continued operations of the BIWF and Coastal Virginia Offshore Wind projects. All estimates of jobs show direct jobs (jobs directly linked to project). Indirect jobs are jobs generated by purchases of labor and materials from independent suppliers to projects, whereas induced jobs are jobs within the GAA that are generated by the household spending of direct and indirect employees and company owners.

This analysis uses the Jobs and Economic Development Impacts Offshore Wind Model (JEDI-OWM) developed by National Renewable Energy Laboratory (NREL) (2017) to estimate the potential economic impacts of offshore wind energy development within the GAA.[35] The primary data inputs for the JEDI-

[35] The JEDI-OWM is an interactive spreadsheet model developed and maintained by the NREL (NREL 2017, 2021). JEDI-OWM (Release 1.05.2017) was used in Hamilton and Nubbe (2020) to generate estimates of the economic impacts of the Project, as reported in the COP. As described in Appendix G, the current version of JEDI-OWM (Release 2021-2) (NREL 2021)—which includes the ability to estimate project capital costs with three alternative WTG capacities (6 MW, 10 MW, and 15 MW)—was used as a data source for capital costs of various sizes of WTGs. These capital cost estimates were then input into JEDI-OWM (Release 1.05.2017) to generate estimates of remaining capital costs and operations and maintenance costs, as well as the economic impacts (direct, indirect, and induced) for employment, income, total output, and value-added. It should be noted that unlike the 2017 release, JEDI-OWM Release 2021-2 does not include estimates of local purchase coefficients that allow the JEDI-OWM to generate estimates of local economic impacts. Therefore JEDI-OWM Release 1.05.2017 was the primary model used for estimates of economic impacts.

OWM are based on generalized project design parameters described in Table E3-1 (parts 1–3) in Appendix E3.

**Table 3.11-6. Estimated Ongoing Jobs in the Geographic Analysis Area under the No Action Alternative for Construction (2022–2023) and Operations and Maintenance (2021–2030)**

| Job Category | Projected Construction Jobs in 2022 | Projected Construction Jobs in 2023 | Projected Operations and Maintenance Jobs in 2022 | Projected Operations and Maintenance Jobs in 2023 | Projected Operations and Maintenance Jobs 2024–2030 |
|---|---|---|---|---|---|
| Direct jobs | 792 | 792 | 4 | 4 | 59 |
| Indirect jobs | 1,324 | 1,324 | 19 | 19 | 333 |
| Induced jobs | 889 | 889 | 8 | 8 | 131 |
| **Total jobs** | **3,005** | **3,005** | **31** | **31** | **523** |

Source: Estimates were developed using the JEDI-OWM (NREL 2017, 2021).

Note: Jobs during the period shown include preconstruction jobs. All jobs are defined as full-time equivalents (FTEs), or 2,080-hour units of labor (one construction period job equates to one full-time job for 1 year).

#### 3.11.2.2.2 Cumulative Impacts

This section discusses potential demographics, employment, and economics impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E3.

Appendix E includes estimates of future offshore wind energy development along the U.S. east coast, including the number of WTGs and MW capacity that are projected to be installed and the timing of the construction period and projected years when operations would begin. Table E3-1 lists 33 separate offshore wind development projects that are in planning phases through 2030 in addition to the projects described in the previous section. Together, by 2030, these wind farms could add over 45 GW of renewable energy (excluding Revolution Wind) into the energy grid from Massachusetts to North Carolina using the same general geographic range of ports that has been specified in the COP for the Project.

#### 3.11.2.2.3 Construction and Installation

##### Employment and Economic Activity Impacts of Construction and Installation

This analysis uses the JEDI-OWM developed by NREL (2017) to estimate the potential economic impacts of offshore wind energy development within the GAA. The JEDI-OWM does not have the ability to fully distinguish between the economic impacts of offshore versus onshore activities and facilities related to offshore wind energy development. Therefore, the economic impacts of future offshore wind energy projects (without the Proposed Action) predicted by the model are presented separately from the description of the impacts of the projects' offshore and onshore activities and facilities. The primary data inputs for the JEDI-OWM are based on information in Table E-1 in Appendix E and Project design parameters described in Table E3-1 in Appendix E3.

Table 3.11-7 shows projected employment from existing and future offshore wind developments within the GAA for the years 2021–2030 under the No Action Alternative as described in Table E3-1 (parts 1–3) in Appendix E3, excluding Revolution Wind. Most of the direct construction-related jobs would be attributed to either the community hosting the regional headquarters of the Project developer or the fabrication and storage ports that would be used. In general, the specific locations of the regional fabrication and storage ports for specific projects have not been announced, with the exception of New Bedford being selected for the Vineyard Wind project. It can also be inferred that most of the engineering and construction of both onshore and offshore facilities are included in the direct jobs, whereas most of the component fabrication, storage, and transport are included in the indirect jobs. The induced jobs effect occurs almost entirely onshore because income generated from the direct and indirect jobs is spent throughout the local economy.

**Table 3.11-7. Estimated Jobs in the Geographic Analysis Area for Construction Activities of Ongoing Projects and Future Offshore Wind Farms (2023–2030)**

| Job Category | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|
| Direct jobs | 792 | 792 | 10,450 | 9,433 | 9,601 | 12,035 | 10,896 | 9,682 | 6,011 |
| Indirect jobs | 1,324 | 1,324 | 17,480 | 15,778 | 16,059 | 20,130 | 18,223 | 16,191 | 10,053 |
| Induced jobs | 889 | 889 | 11,732 | 10,590 | 10,779 | 13,513 | 12,233 | 10,869 | 6,749 |
| **Total jobs** | **3,005** | **3,005** | **39,662** | **35,801** | **36,439** | **45,678** | **41,352** | **36,742** | **22,813** |

Source: Estimates were developed using the JEDI-OWM (NREL 2017, 2021).

Note: Jobs during the period shown include preconstruction jobs. All jobs are defined as FTEs, or 2,080-hour units of labor (one construction period job equates to one full-time job for 1 year).

This future offshore wind energy development would create a demand for workers skilled in the professions and trades needed for the design, construction, and O&M of offshore wind energy facilities. From 2022 to 2030, it is conservatively estimated that an annual average of more than 29,000 jobs would be created as a result of the design and construction of offshore wind projects if direct, indirect, and induced jobs are included. Of these jobs, 26% are directly associated with offshore wind farm projects, 44% are indirectly associated with offshore wind farm projects through suppliers and contractors, and 30% are induced through the household spending from income generated by the direct and indirect jobs.

BVG Associates Limited (2017) analyzed the specific occupations required for offshore wind energy development in the United States. The occupations demanded included technician-level workers in 1) production roles, particularly high-value manufacturing positions; 2) installation and commissioning positions; 3) vessel and offshore equipment operation; and 4) commissioning and testing turbines, cables, and substations. Appendix G contains additional discussion and a figure (Figure G-DEM1) summarizing projected jobs by major occupational categories. The report notes that a particular value of offshore wind energy jobs is that many are created in industrialized coastal areas that have suffered from economic decline in recent years. Offshore wind could play an important part in reversing that situation. However, the number of jobs created during offshore wind energy project construction would be small relative to the total number of jobs in the GAA. Therefore, the beneficial direct employment impacts of construction of future offshore wind energy projects would be localized, temporary, and **minor**.

In communities with ports used for staging and fabrication, offshore wind energy development could temporarily compete with the local commercial fishing industry for marine workers. This competition could exacerbate current fishing industry labor shortages. Recent studies (e.g., Johnson and Mazur 2018) show that some commercial fisheries in the New England and Mid-Atlantic regions face workforce challenges, with a lack of young people entering the industry. In addition, the increased economic activity during the construction phase of offshore wind energy projects could temporarily increase competition for some onshore facilities and services, thereby resulting in higher prices for these facilities and services. With an increase in prices, some businesses in the commercial fishing industry and other marine sectors could seek facilities and services in ports not supporting offshore wind development. Overall, offshore wind energy development is expected to have a short-term **negligible** to **minor** adverse impact on local supplies of labor and goods and services.

The increased employment opportunities created during construction of offshore wind energy projects could result in population increases in those communities with ports used for staging and fabrication of projects. In turn, these population increases could reduce local housing availability and strain existing public infrastructure and services. However, although some non-local workers could need temporary housing depending on the ports selected, it is expected that most of the workers involved in the installation of the offshore wind energy facilities would be housed onboard vessels and would be expected to work for several weeks at sea before returning to shore. These conditions suggest that offshore construction crews would have little incentive to relocate to a port community. Therefore, construction of offshore wind energy projects would have a short-term **negligible** to **minor** adverse impact on demographic-related variables such as housing availability and demand for public infrastructure and services.

In addition to supporting the employment described above, BOEM expects construction of future offshore wind energy projects to affect demographics, employment, and economics through the following IPFs.

### Offshore Activities and Facilities

Light: The view of nighttime lighting during construction of offshore wind energy structures could have adverse impacts on employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit (see Section 3.18). Impacts on businesses dependent on tourism would be localized short term **negligible** to **moderate** adverse based on the observed distance and individual responses by tourists to changes in the viewshed.

New cable emplacement/maintenance: The impacts of new cable emplacement/maintenance to demographic, employment, and economic conditions in the GAA would be similar to those discussed below under the presence of structures IPF. The potential impacts of both IPFs include a decrease in employment or economic activity due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9). Therefore, the new cable emplacement and maintenance impact rating would be the same as the presence of structures impact rating: short term **minor** to **moderate** adverse.

Presence of structures: An analysis of the impacts of construction of offshore wind energy structures, including WTGs and offshore submarine cables, to commercial fisheries and for-hire recreational fishing that could result from future offshore wind energy development is provided in Section 3.9. To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. However, WTG spacing and orientation measures, offshore cable burial, financial compensation programs for fishing interests, and other mitigation measures implemented by offshore wind developers, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction related to offshore wind energy development, would help ensure that fishing businesses could continue to operate with limited disruption. Therefore, impacts to demographic, employment, or economic conditions in the GAA would be short term **minor** to **moderate** adverse.

Vessel traffic: Vessel traffic related to offshore wind energy project construction could cause congestion and delays, thereby increasing vessel fuel costs (i.e., for vessels forced to wait for port traffic to pass) and decreasing productivity for commercial shipping businesses. In addition, the risk of collisions that result in costly vessel damage and loss could increase. These vessel traffic changes would represent a short-term **minor** to **moderate** adverse impact to demographic, employment, or economic conditions in the GAA.

### Onshore Activities and Facilities

Port utilization: Offshore wind energy projects would require vessels for staging and installation during construction. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) for existing port users. However, state and local agencies would be responsible for minimizing the potential adverse impacts of additional port utilization by managing traffic to ensure continued access to port facilities (see Section 3.16). In addition, the use of multiple ports to support offshore wind energy project development would reduce the related congestion impacts in any one port. Therefore, impacts to demographic, employment, or economic conditions in the GAA during offshore wind energy project construction are expected to be localized and short term **minor** to **moderate** adverse.

Some ports could undertake upgrades to support offshore wind energy development. These types of upgrades are described in Appendix E. In addition, see Whitney et al. (2016) for a summary of the current status of U.S. ports, as well as some of the planned and implemented port expansions to further support offshore wind energy development. The construction activities associated with these port improvements would support marine service industries and provide employment opportunities for shore-based and marine workers. Overall, construction of port improvements related to offshore wind energy development would have long-term **minor** to **moderate** beneficial impacts to demographic, employment, or economic conditions in the GAA.

Vehicular traffic: Activities associated with construction of the onshore and offshore facilities of offshore wind energy projects would result in temporary, localized traffic delays along impacted roads (see Section 3.14). These traffic delays could temporarily restrict access to adjacent commercial properties. State and local agencies would be responsible for managing actions to help minimize and avoid traffic delays and other impacts on nearby businesses during construction. On this basis, the adverse effects of the additional vehicular traffic to demographic, employment, or economic conditions in the GAA would be short-term **negligible** to **minor**.

#### 3.11.2.2.4 Operations and Maintenance and Decommissioning

### Employment and Economic Activity Impacts of Operations and Maintenance and Decommissioning

As discussed above, the JEDI-OWM does not have the ability to distinguish between the employment impacts of offshore versus onshore activities, and therefore the results of the model are presented in advance of the offshore and onshore discussion.

Table 3.11-8 shows projected employment from currently operating offshore wind farms along with future offshore wind energy projects within the GAA, excluding Revolution Wind.[36] The table includes years out through 2031 because operations for several projects are not expected to begin until 2030; by then, it is projected that there will be over 21,500 direct, indirect, and induced jobs in O&M in the offshore wind industry (NREL 2017, 2021). Most of the direct O&M-related jobs generated by offshore wind projects would occur in the projects' port communities and in the communities hosting the regional headquarters of project developers. O&M jobs would include turbine technicians and water transportation workers (BVG Associates Limited 2017). The number of jobs created during O&M activities of offshore wind energy projects would be small relative to the total number of jobs in the GAA. Therefore, the beneficial direct employment impacts during the O&M phases of future offshore wind energy projects would be localized and long term **minor**. Impacts during project decommissioning would be similar to impacts during construction. There would be no further impacts once decommissioning is complete.

**Table 3.11-8. Estimated Jobs in the Geographic Analysis Area with Currently Active and Future Offshore Wind Farms (2023–2031)**

| Job Category | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|---|---|---|---|---|---|---|---|---|---|---|
| Direct jobs | 4 | 4 | 59 | 119 | 411 | 652 | 1,174 | 1,518 | 1,875 | 2,417 |
| Indirect jobs | 19 | 19 | 333 | 672 | 2,346 | 3,727 | 6,710 | 8,676 | 10,719 | 13,813 |
| Induced jobs | 8 | 8 | 131 | 263 | 914 | 1,451 | 2,609 | 3,372 | 4,166 | 5,368 |
| **Total jobs** | 31 | 31 | 523 | 1,054 | 3,671 | 5,830 | 10,493 | 13,566 | 16,760 | 21,598 |

Source: Estimates were developed using the JEDI-OWM (NREL 2017, 2021).

Note: All jobs are defined as FTEs, or 2,080-hour units of labor.

In addition to supporting the employment described above, BOEM expects O&M of future offshore wind energy projects to affect demographics, employment, and economics through the following IPFs.

### Offshore Activities and Facilities

Light: The view of nighttime aviation warning lighting required for offshore wind energy structures could have impacts on employment and economic activity in the tourism industry by affecting the decisions of tourists or visitors in selecting coastal locations to visit (see Section 3.18). Impacts on businesses dependent on tourism would be localized and short term **negligible** to **moderate** adverse, based on the observed distance and individual responses by tourists to changes in the viewshed. If ADLS (or a similar system) is installed on WTGs, impacts to demographic, employment, or economic conditions in the GAA

[36] Employment estimates have been developed for all future projects (excluding Revolution Wind) in the Atlantic OCS as described in Table E3-1 (parts 1–4) in Appendix E3.

would be reduced to **negligible** to **minor** adverse because the amount of time WTGs would be visible at night would decrease (see Section 3.20).

New cable emplacement/maintenance: The impacts of new cable emplacement and maintenance to demographic, employment, and economic conditions in the GAA would be the same as the No Action Alternative (see Section 3.11.2.2.3) and as the presence of structures impact rating: short term **minor** to **moderate** adverse.

Presence of structures: Under the No Action Alternative, offshore wind energy development would result in the installation of an estimated 10,620 miles of offshore export cables and IACs and 3,113 offshore foundations[37] (excluding Revolution Wind). An analysis of the impacts of offshore wind energy structures, including WTGs and offshore submarine cables, to commercial fisheries and for-hire recreational fishing that could result from future offshore wind energy development is provided in Section 3.9. To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. However, WTG spacing and orientation measures, offshore cable burial, financial compensation programs for fishing interests, and other mitigation measures implemented by offshore wind developers, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction related to offshore wind energy development, would help ensure that fishing businesses could continue to operate with limited disruption. Therefore, impacts to demographic, employment, or economic conditions in the GAA would be short term **minor** to **moderate** adverse.

Vessel traffic: Vessel traffic related to offshore wind energy project O&M would be similar to the construction phases of projects (see Section 3.11.2.2.3) except that a reduced number of vessels would be required for routine maintenance during the operations phase. Therefore, vessel traffic changes would represent a long-term **negligible** to **minor** adverse impact to demographic, employment, or economic conditions in the GAA.

### Onshore Activities and Facilities

Port utilization: During offshore wind energy project O&M, port facilities would be required for vessels used for routine maintenance of offshore project components. These vessels would require berthing and would add traffic to port facilities. However, in comparison to the construction phases of projects, O&M would likely require a reduced number of vessels. Given the relatively low number of vessels, the impacts of the changes in port facility accessibility to demographic, employment, or economic conditions in the GAA would be long term **minor** adverse.

Offshore wind energy projects could generate employment opportunities and economic activity at ports used to support O&M of projects through port upgrades and development as well as marine transportation. Additional shore-based and marine workers would be hired, resulting in a trained workforce for the offshore wind energy industry. Moreover, port improvements would support and enhance other port activities. Overall, the port investment and usage generated by offshore wind energy

[37] These estimates of cable miles are based on Appendix E3, Table E3-1 (parts 1–3).

development would have long-term **minor** to **moderate** beneficial impacts to demographic, employment, or economic conditions in the GAA.

Vehicular traffic: Actions associated with O&M of the onshore and offshore facilities of offshore wind energy projects could result in localized traffic delays along impacted roads (see Section 3.14). However, the increase in traffic caused by projects is expected to be minimal and is not expected to disrupt normal business activities in the GAA. On this basis, the effects of the additional vehicular traffic to demographic, employment, or economic conditions in the GAA would be long term **negligible** to **minor** adverse.

#### 3.11.2.2.5 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts associated with the Project would not occur. However, ongoing and future offshore wind activities and non–offshore wind activities would have continuing impacts on demographic, employment, and economic conditions in the GAA.

Considering all the IPFs together for offshore wind activities, BOEM anticipates that the overall impacts of future offshore wind energy development on demographic, employment, and economic conditions in the GAA would be short term during construction and long term during O&M and **moderate** adverse. This rating primarily reflects adverse impacts to employment and economic activity in commercial fisheries. Beneficial impacts of future offshore wind energy development would be short term during construction and long term during O&M; these beneficial impacts would be **minor**. This beneficial rating primarily reflects new job formation associated with offshore wind development.

Ongoing and future non–offshore wind activities as described in Appendix E would have long-term **major** adverse impacts on demographic, employment, and economic conditions in the GAA as a result of climate change and the associated risks of flooding, extreme heat, and storm damage. Ongoing and future non–offshore wind activities would also have long-term, **moderate** beneficial impacts on some local economies, driven primarily by the ongoing operation of existing marine industries in parts of the GAA, especially commercial fishing, recreation/tourism, and shipping.

BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing and reasonably foreseeable activities other than offshore wind would be long term **major** adverse as a result of climate change. These **major** adverse impacts from climate change are driven by cumulative activities and trends. Long-term **moderate** beneficial impacts would occur in some local economies, representing notable and measurable improvements as a result of ongoing economic development.

### 3.11.2.3 Alternative B: Impacts of the Proposed Action on Demographics, Employment, and Economics

#### 3.11.2.3.1 Construction and Installation

##### Employment and Economic Activity Impacts of Construction and Installation

The analysis in this section is based on the economic analysis of the impacts of construction and operations of the Project described in the COP, and on additional information provided in Appendix CC to the COP (Hamilton and Nubbe [2020]), which has been deemed confidential by Revolution Wind. The

COP and Appendix CC develop impact estimates for a single Project configuration with a total nameplate capacity of 712 MW that would use 89 8-MW WTGs, with jobs, labor income, and value-added apportioned between Rhode Island and Connecticut. Additional economic impacts are expected in other unspecified locations within the United States. In the assessment that follows, this configuration is referred to as the "Baseline Project." Additional information on the estimation of economic impacts during the construction and operation phases can be found in the Demographics, Employment, and Economics section of Appendix G.

Although the Proposed Action could be configured exactly as in the Baseline Project, the flexibility built into the PDE would allow many other design capacity options that could have a relatively wide range of impacts. To summarize the range of potential configurations, this assessment of the Proposed Action describes four separate Project design capacity options (Table 3.11-9).

**Table 3.11-9. Project Design Capacity Options**

| Option Name | Description |
|---|---|
| Baseline Project | Nameplate capacity of 712 MW and would use 89 8-MW WTGs* |
| Large WTG Baseline Project | Nameplate capacity of 720 MW and would use 60 12-MW WTGs |
| Large WTG Maximum Capacity Project | Capacity of 876 MW and would use 73 12-MW WTGs |
| Maximum Capacity Project | Capacity of 880 MW and would use 88 10-MW WTGs |

Note: It is also technically possible that the Project could use 100 8-MW WTGs for a total capacity of 800 MW, but because this design capacity option does not provide as great of a generating capacity as other design capacity options using larger WTGs and is projected to have considerably higher capital costs per MW of power generated than the other design capacity options, it is not carried forward for further assessment.

* As discussed in the Demographics, Employment, and Economics section in Appendix G, Revolution Wind has indicated that they would install at least one additional WTG beyond the minimum number of WTGs required to meet the PPA (Roll 2021). Based on this information, a 712-MW project using 89 8-MW WTGs is the smallest project they would build. If they opted to use 10-MW WTGs, they would install at least 72 WTGs for a 720-MW project, even though they could technically meet the PPA with 71 10-MW WTGs. Similarly, if they used 12-MW WTGs, they would install 60 WTGs with a total capacity of 720 MW.

Table 3.11-10 shows the estimated employment, earnings, output, and value-added impacts of each the four design configurations. Most of the direct construction-related jobs generated by the Proposed Action would occur in the communities where the ports used for staging and fabrication are located. Most of the direct jobs would occur during engineering and construction of onshore and offshore wind energy facilities, whereas most of the indirect jobs would occur during wind energy component fabrication, storage, and transport. The induced jobs would occur as income generated from the direct and indirect jobs is spent throughout the local economy. Under the Proposed Action, construction is expected to occur within a 2-year period, but preconstruction activities such as design/engineering and component manufacturing and fabrication could lengthen the period an additional year. Where possible, local workers would be hired to meet labor needs for construction (see the discussion in Appendix G, as well as the EPMs Demo-1 through Demo–6 listed in Table F-1 in Appendix F).

**Table 3.11-10. Estimated Jobs, Earnings, Output, and Value-Added in Rhode Island and Connecticut during Construction of the Proposed Action by Design Capacity Option**

| Design Capacity Option | Jobs | Earnings ($ millions) | Output ($ millions) | Value-Added ($ millions) |
|---|---|---|---|---|
| **Baseline Project (712-MW capacity with 89 8-MW WTGs)** | | | | |
| Direct impacts | 1,440 | $124.40 | $148.83 | $130.10 |
| Indirect impacts | 1,623 | $123.00 | $497.43 | $205.80 |
| Induced impacts | 793 | $51.10 | $137.63 | $81.10 |
| **Total impacts** | **3,856** | **$298.50** | **$783.90** | **$417.00** |
| **Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs)** | | | | |
| Direct impacts | 1,483 | $121.13 | $142.64 | $128.36 |
| Indirect impacts | 1,789 | $135.89 | $563.62 | $227.54 |
| Induced impacts | 827 | $53.11 | $142.83 | $84.31 |
| **Total impacts** | **4,100** | **$310.13** | **$849.08** | **$440.21** |
| **Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs)** | | | | |
| Direct impacts | 1,705 | $134.78 | $154.62 | $141.63 |
| Indirect impacts | 2,265 | $171.58 | $738.27 | $291.92 |
| Induced impacts | 1,006 | $64.52 | $173.36 | $102.36 |
| **Total impacts** | **4,976** | **$370.88** | **$1,066.25** | **$535.91** |
| **Maximum Capacity Project (880-MW capacity with 88 10-MW WTGs)** | | | | |
| Direct impacts | 1,706 | $135.89 | $157.60 | $142.23 |
| Indirect impacts | 2,134 | $161.84 | $690.11 | $275.84 |
| Induced impacts | 995 | $64.02 | $172.10 | $101.56 |
| **Total impacts** | **4,834** | **$361.75** | **$1,019.80** | **$519.63** |

Source: Baseline Project estimates are from Hamilton and Nubbe (2020). Estimates for the Large WTG Baseline Project, the Maximum Capacity Project, and the Large WTG Maximum Capacity Project were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates are for the entire construction period. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours). Earnings are estimated incomes earned from the jobs. Output is the estimated values of all goods and services sold during construction. Value-added is the estimated change in GDP resulting from the change in output.

As shown in Table 3.11-10, the Large WTG Maximum Capacity Project is the design configuration expected to have the greatest beneficial impacts in terms of employment, earnings, output, and value-added. It would generate an estimated 4,976 FTE jobs during the 3-year preconstruction/construction period, with most of these jobs occurring in Rhode Island and Connecticut.

If the estimated increase in employment resulting from the Large WTG Maximum Capacity Project was evenly spread over the 3-year construction period, the annual FTE jobs created would be approximately 1,659, or less than 0.1% of the total labor force in Rhode Island and Connecticut in 2020 (see Table 3.11-4). Therefore, the employment impacts of the Proposed Action under the Large WTG Maximum Capacity Project configuration would be short term **minor** beneficial.

Table 3.11-10 also shows that over the preconstruction/construction period, the Large WTG Maximum Capacity Project is expected to generate nearly $536 million in value-added production to the combined GDP of Rhode Island and Connecticut. If this impact is realized in a single year, the value-added amount would represent 0.16% of the annual GDP for Rhode Island and Connecticut combined (see Table 3.11-3). Therefore, the economic activity impacts of the Proposed Action under the Large WTG Maximum Capacity Project configuration would be short term **minor** beneficial.

Revolution Wind has stated that the Project would be constructed under local Project Labor Agreements, and that offshore construction would be governed by the National Offshore Wind Agreement (VHB 2023).

In communities with ports used for staging and fabrication, construction activities could temporarily compete with the local commercial fishing industry for marine workers. As described in Section 3.9.2.2.1, some commercial fisheries in the New England and Mid-Atlantic regions face workforce challenges, with a lack of young people entering the industry. The competition for marine workers during Project construction could also result in higher prices for certain local shoreside support services. With an increase in service prices, some businesses in the commercial fishing industry and other marine sectors could seek services in ports not supporting Project construction.

The increased employment opportunities created during construction could result in population increases in those communities with ports used for staging and fabrication. In turn, these population increases could reduce local housing availability and strain existing public infrastructure and services. However, although some non-local workers could need temporary housing depending on the ports selected, it is expected that most of the workers involved in the installation of offshore facilities would be housed onboard vessels and would be expected to work for several weeks at sea before returning to shore. These conditions suggest that offshore construction crews would have little incentive to relocate to a port community. In addition, local hiring practices by Revolution Wind contractors would mitigate population increases. Therefore, construction would have a short-term **negligible** adverse impact on demographic-related variables such as housing availability and demand for public infrastructure and services for all design configurations analyzed under the Proposed Action.

### Offshore Activities and Facilities

<u>Light</u>: During construction and installation, adverse impacts on businesses dependent on tourism would be the same as the No Action Alternative (see Section 3.11.2.2.3) (i.e., localized and short term **negligible** to **moderate** adverse) based on the observed distance and individual responses by tourists to changes in the viewshed for all design configurations analyzed under the Proposed Action.

<u>New cable emplacement/maintenance</u>: As described in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during construction of the offshore transmission cable and IACs. The impacts of new cable emplacement/maintenance to demographic, employment, and economic conditions in the GAA would be

the same as the No Action Alternative (see Section 3.11.2.2.3) and as the presence of structures impact rating: short term **minor** to **moderate** adverse for all design configurations analyzed under the Proposed Action.

Presence of structures: As described in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during construction of WTGs and OSSs. However, only a small number of commercial fishing vessels depend heavily on harvests in the Lease Area for their fishing revenue, and many fishing vessel operators have the ability to adjust transit and fishing locations to avoid conflicts with construction activities. In addition, Revolution Wind's communication plans with the fishing industry and its financial compensation program for damage to or loss of fishing gear, as described in Orsted U.S. Offshore Wind (2020), would help ensure that fishing industry sectors, including harvesting operations, seafood processors and distributors, and shoreside support services, could continue to operate with minimal disruption. Therefore, impacts to employment and economic activity in the fishing industry would be short term **minor** to **moderate** adverse for all design configurations analyzed under the Proposed Action.

Vessel traffic: Vessel traffic related to Project construction would be the same as the No Action Alternative (see Section 3.11.2.2.3) and would represent a short-term **minor** to **moderate** adverse impact to demographic, employment, or economic conditions in the GAA for all design configurations analyzed under the Proposed Action.

### Onshore Activities and Facilities

Port utilization: Port utilization activities during Project construction would be the same as the No Action Alternative (see Section 3.11.2.2.3). Therefore, port utilization impacts during offshore wind energy Project construction are expected to be localized and short term **minor** to **moderate** adverse for all design configurations analyzed under the Proposed Action.

Economic benefits could accrue to ports that undertake improvements to support the development of the Proposed Action. However, although selected ports could require upgrades to meet the construction needs of the Proposed Action (see Table 3.3.10-1 in VHB [2023]), no specific port improvements have been proposed as part of the Proposed Action.

Vehicular traffic: Most offshore components of the Proposed Action would be transported by sea. However, some materials and equipment would arrive by land at varying frequencies throughout the construction period. Vehicular traffic would include truck and automobile traffic over existing roads and highways proximate to the marshaling and/or logistics facilities in the ports(s) where Project staging, assembly, and fabrication occur. This additional traffic could result in temporary, localized traffic delays that impact nearby businesses. See Section 3.14 for additional details related to traffic impacts. However, the proposed ports currently experience fluxes in traffic volumes during normal operations, and Project-related traffic is expected to be well within these daily fluctuations in traffic. Moreover, maintenance and protection of traffic setups would be implemented to minimize impacts to traffic (see Table F-1 in Appendix F).

Construction of the onshore facilities of the Proposed Action could also result in temporary, localized traffic delays that impact nearby businesses (see Section 3.14). Revolution Wind will coordinate with local authorities during construction of onshore facilities to minimize local traffic impacts. In addition, the construction schedule would be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day (see Table F-1 in Appendix F). On this basis, the overall effects of vehicular traffic on demographics, employment, and economics during construction of offshore and onshore facilities would be short term **negligible** to **minor** adverse for all design configurations analyzed under the Proposed Action.

#### 3.11.2.3.2 Operations and Maintenance and Decommissioning

##### Employment and Economic Activity Impacts of Operations and Maintenance and Decommissioning

Table 3.11-11 shows estimated employment, earnings, output, and value-added impacts during O&M of the Proposed Action for the four design configurations described above. The JEDI-OWM assumes that impacts of O&M activities are directly proportional to nameplate capacity regardless of the number of WTGs. The O&M impacts presented in Table 3.11-11 would occur annually over the expected 35-year life of the Project. The Port of Davisville at Quonset Point, Port Jefferson, Port of Brooklyn, and Port of Montauk have been identified as possible ports supporting O&M of the Proposed Action (VHB 2023). Where possible, local workers would be hired to meet labor needs for O&M (see Table F-1 in Appendix F).

**Table 3.11-11. Estimated Jobs, Earnings, Output, and Value-Added during Operations and Maintenance of the Proposed Action by Design Capacity Option**

| Design Capacity Option | Total Jobs | Total Earnings ($ millions) | Total Output ($ millions) | Total Value-Added ($ millions) |
|---|---|---|---|---|
| Baseline Project (712-MW capacity with 89 8-MW WTGs) | 233 | $17.20 | $85.70 | $70.00 |
| Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs) | 236 | $17.39 | $86.66 | $70.79 |
| Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs) | 287 | $21.16 | $105.44 | $86.12 |
| Maximum Capacity Project (880-MW capacity with 88 10-MW WTGs) | 288 | $21.26 | $105.92 | $86.52 |

Source: Baseline Project estimates are from Hamilton and Nubbe (2020). Estimates for the Large WTG Baseline Project, the Maximum Capacity Project, and the Large WTG Maximum Capacity Project were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates would occur annually over the 35-year life of the Project. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours).

As shown in Table 3.11-11, the Large WTG Maximum Capacity Project is expected to generate a total of 287 FTE jobs annually. If this increase in employment completely occurred in Washington County, Rhode Island, it would represent 0.45% of the total employment in the county in 2020 (see Table 3.11-4). Similarly, if all of the O&M jobs are located in Suffolk County, New York, they would represent 0.04% of employed persons in the county in 2020 (see Table 3.11-4). Therefore, the employment impacts of the Proposed Action under the Large WTG Maximum Capacity Project configuration would be long term **minor** beneficial.

Decommissioning of the Project's offshore facilities is estimated to take 2 years to complete. BOEM estimates that decommissioning costs would be approximately half of the Project construction costs (AECOM 2017), with economic impacts (jobs and income) estimated to be approximately 50% of those shown in Table 3.11-11. Because labor and contracting would account for a substantial portion of decommissioning costs, a relatively high percentage of decommissioning expenditures are expected to accrue to local economies. Therefore, decommissioning would have a short-term **minor** beneficial impact to demographic, employment, or economic conditions in the GAA for all design configurations analyzed under the Proposed Action. There would be no further demographic, employment, and economic impacts once decommissioning is complete.

### Offshore Activities and Facilities

Light: To the extent that lighting for offshore Project facilities decreases tourist visitation rates, employment and economic activity in service industries that support tourism would be adversely affected. However, Revolution Wind has committed to implement ADLS as an EPM to reduce light impacts (see Table F-1 in Appendix F) and visual impacts on recreation and tourism during O&M. Therefore, the adverse impacts of light to demographic, employment, or economic conditions in the GAA are expected to be long term but **negligible** for all design configurations analyzed under the Proposed Action.

New cable emplacement/maintenance: The impacts of new cable emplacement and maintenance to demographic, employment, and economic conditions in the GAA would be the same as the No Action Alternative (see Section 3.11.2.2.3) and as the presence of structures impact rating: short term **minor** to **moderate** adverse for all design configurations analyzed under the Proposed Action.

Presence of structures: As described in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during O&M as a result of the presence of WTGs and OSSs. However, only a small number of commercial fishing vessels depend heavily on harvests in the Lease Area for their fishing revenue, and many fishing vessel operators have the ability to adjust transit and fishing locations to avoid conflicts with Project offshore facilities and activities. In addition, WTG spacing and orientation measures and offshore cable burial, together with Revolution Wind's communication plans with the fishing industry and its financial compensation program for damage to or loss of fishing gear (Orsted U.S. Offshore Wind 2020), would help ensure that fishing industry sectors, including harvesting operations, seafood processors and distributors, and shoreside support services, could continue to operate with minimal disruption. Therefore, adverse impacts to employment and economic activity in the fishing industry would be long term **minor** to **moderate** for all design configurations analyzed under the Proposed Action.

Vessel traffic: In comparison to the construction phase, Project O&M would require a reduced number of vessels, and most of the vessels would be smaller in size (VHB 2023). Although the number of vessel transits would increase during O&M relative to construction, O&M vessel traffic would not have the same influx of a large number of vessels during a compressed time period seen during construction (see Section 3.16). Therefore, the impacts of vessel traffic to demographic, employment, or economic conditions in the GAA would be long term **minor** adverse for all design configurations analyzed under the Proposed Action.

### Onshore Activities and Facilities

Port utilization: During Project O&M, port facilities would be required for vessels used for routine maintenance of offshore Project components. These vessels would require berthing and would add traffic to port facilities. However, in comparison to the construction phase, Project O&M would require a reduced number of vessels (VHB 2023) (see Section 3.16). Given the relatively low number of vessels, the impacts on the accessibility of port facilities would be long term **minor** adverse for all design configurations analyzed under the Proposed Action.

Vehicular traffic: Vehicular traffic impacts associated with O&M of the onshore and offshore facilities of the Proposed Action would be the same as the No Action Alternative (see Section 3.11.1.1.2) and would be long term **negligible** to **minor** adverse for all design configurations analyzed under the Proposed Action.

## 3.11.2.3.3 Cumulative Impacts

### Employment and Economic Activity Impacts of Combined Offshore Wind Energy Projects

BOEM currently estimates that nearly 46 GW of offshore wind farm capacity on the Atlantic Seaboard would be installed and operational by the end of 2030, including Revolution Wind. This offshore wind energy development would create a demand for workers skilled in the professions and trades needed for the design, construction, and O&M of offshore wind energy facilities. Construction activities related to future offshore wind energy projects are expected to generate an average of 29,389 FTE job-years from 2022 to 2030, including direct, indirect, and induced jobs. If the Maximum Capacity Project is installed (with a total of 4,976 FTE jobs) under the Proposed Action, it would add an additional 1.9% to the average. By 2031, O&M activities related to future offshore wind projects are expected to support nearly 21,598 annual FTE jobs if direct, indirect, and induced jobs are included, with the Maximum Capacity Project under the Proposed Action accounting for approximately 1.1% of those O&M jobs. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have long-term **minor** beneficial impacts for demographics, employment, and economics.

### Offshore Activities and Facilities

Light: The view of nighttime lighting during construction and operations of offshore wind energy structures, including the Proposed Action, could have impacts on employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit (see Section 3.18). Adverse impacts on businesses dependent on tourism would be localized and short term during construction and long term during operations, with **negligible** to **moderate** adverse impacts based on the observed distance and individual responses by tourists to changes in the viewshed. If ADLS (or a similar system) is installed on WTGs (as it would be for the Project), impacts to demographic, employment, or economic conditions in the GAA would be reduced to **negligible** to **minor** adverse for all design configurations analyzed under the Proposed Action because the amount of time WTGs would be visible at night would decrease (see Section 3.20).

New cable emplacement/maintenance: The impacts of new cable emplacement and maintenance to demographic, employment, and economic conditions in the GAA would be the same as the No Action Alternative (see Section 3.11.2.2.3) and as the presence of structures impact rating: short term adverse during construction/decommissioning and long term during operations, and **minor** to **moderate** adverse for all design configurations analyzed under the Proposed Action.

Presence of structures: The Proposed Action in addition to other current and future offshore wind energy development would result in the installation of an estimated 13,716 miles of offshore export cables and IACs and 3,190 offshore foundations.[38] The Proposed Action would account for 1.8% of the additional offshore cables and IAC and 3% of the additional offshore foundations. An analysis of the impacts of offshore wind energy structures, including WTGs and offshore submarine cables, to commercial fisheries and for-hire recreational fishing that could result from future offshore wind energy development is provided in Section 3.9. To the extent that the impacts of future offshore wind activities, including the Proposed Action, result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. However, WTG spacing and orientation measures, offshore cable burial, financial compensation programs for fishing interests, and other mitigation measures implemented by offshore wind developers, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction related to offshore wind energy development, would help ensure that fishing businesses could continue to operate with minimal disruption. Therefore, economic impacts to commercial fisheries and for-hire recreational fishing would be short term **minor** to **moderate** adverse during construction/decommissioning and long term **minor** to **moderate** adverse during operations for all design configurations analyzed under the Proposed Action.

Vessel traffic: Vessel traffic related to construction and installation, O&M, and decommissioning of offshore wind energy projects, including the Proposed Action, could cause congestion and delays, thereby increasing vessel fuel costs (i.e., for vessels forced to wait for port traffic to pass) and decreasing productivity for commercial shipping businesses (see Section 3.16). In addition, the risk of collisions that result in costly vessel damage and loss could increase. However, in comparison to the construction phases of projects, a reduced number of vessels would likely be required for routine maintenance during the operations phase. Therefore, the impacts of vessel traffic to demographic, employment, or economic conditions in the GAA for all design configurations analyzed under the Proposed Action would be short term **minor** to **moderate** adverse during construction/decommissioning and long term and **negligible** to **minor** adverse during operations.

### Onshore Activities and Facilities

Port utilization: Offshore wind energy projects, including the Proposed Action, would involve port utilization activities as described under the No Action Alternative (see Section 3.11.2.2.3). Therefore, port utilization impacts for all design configurations analyzed under the Proposed Action are expected to be localized, and short term **minor** to **moderate** adverse during construction and decommissioning and long term **minor** adverse during operations.

Offshore wind energy projects could generate employment opportunities and economic activity at ports used to support O&M of projects through port upgrades and development, as well as marine transportation. Additional shore-based and marine workers would be hired, resulting in a trained workforce for the offshore wind energy industry. Moreover, port improvements would support and

[38] Based on planned future Atlantic OCS wind projects as described in Table E3-1 (parts 2–4) in Appendix E3.

enhance other port activities. Although selected ports could require upgrades to meet the construction needs of the Proposed Action, no specific port improvements have been proposed as part of the Proposed Action. Therefore, the economic benefits of the Proposed Action are uncertain. Overall, however, the port investment and usage generated by offshore wind energy development would have long-term **minor** to **moderate** beneficial impacts to demographic, employment, or economic conditions in the GAA.

<u>Vehicular traffic</u>: Actions associated with construction and installation, O&M, and decommissioning of the onshore and offshore facilities of offshore wind energy projects, including the Proposed Action, could result in localized traffic delays along impacted roads (see Section 3.14). These traffic delays could temporarily restrict access to adjacent commercial properties. State and local agencies would be responsible for managing actions to help minimize and avoid traffic delays and other impacts on nearby businesses. On this basis, the effects of the additional vehicular traffic to demographic, employment, or economic conditions in the GAA would be short term **negligible** to **minor** adverse during construction and decommissioning, and long term **negligible** to **minor** adverse during operations for all design configurations analyzed under the Proposed Action.

#### 3.11.2.3.4 Conclusions

Although employment and economic activity related to Project construction would have **minor** beneficial impacts, many of the other IPFs are likely to have **negligible** to **moderate** adverse impacts. Therefore, BOEM is unable to make a single overall impact determination with respect to demographics, employment, and economics conditions.

As a result of the employment and economic activity supported by Project construction, O&M, and decommissioning, BOEM expects the Proposed Action to have an overall long-term **minor** beneficial impact on demographic, employment, and economic conditions in the GAA for all design configurations analyzed under the Proposed Action.

Considering all the IPFs together, BOEM anticipates that the overall adverse impacts of future offshore wind energy development, including the Proposed Action, on demographic, employment, and economic conditions in the GAA would be short term during construction, long term during O&M, and **moderate**. This rating primarily reflects adverse impacts to employment and economic activity in commercial fisheries.

Ongoing and future non–offshore wind energy activities would have long-term **major** adverse impacts on demographic, employment, and economic conditions in the GAA as a result of climate change and the associated risks of flooding, extreme heat, and storm damage. Ongoing and future non–offshore wind energy activities would also have long-term **moderate** beneficial impacts on some local economies, driven primarily by the ongoing operations of existing marine industries in parts of the GAA, especially recreation/tourism, and shipping.

BOEM anticipates that the adverse impacts associated with future offshore wind activities in the GAA combined with ongoing and reasonably foreseeable activities other than offshore wind would be long term **major** as a result of climate change. These major adverse impacts from climate change are driven by cumulative activities and trends and not by emissions from the Project. Long-term **moderate** beneficial impacts would occur in some local economies, representing notable and measurable improvements in employment and income as a result of ongoing economic development.

#### 3.11.2.4 Alternatives C, D, E, and F

Table 3.11-5 provides a summary of IPF findings for these alternatives.

##### 3.11.2.4.1 Construction and Installation

**Employment and Economic Activity Impacts of Construction and Installation**

Tables 3-11.12 through 3.11-15 show estimated total employment, total earnings, total output, and total value-added impacts during construction under Alternatives C through F for the range of feasible design configurations. As with the Proposed Action, the exact locations of these economic impacts cannot be determined because the final set of ports has not been specified.

The higher-end projections of employment and economic activity during construction under Alternative C are smaller than the higher-end projections under the Proposed Action. However, the lower-end and higher-end estimates of the economic impacts of Alternative D across design configurations are not markedly different from those for the Proposed Action. Feasible projects under Alternative E and F also result in similar levels of economic impacts as are expected under the Proposed Action. Therefore, the impacts of Alternatives C through F to demographic, employment, or economic conditions in the GAA would be similar to the Proposed Action: short term **minor** beneficial for all design configurations analyzed.

**Table 3.11-12. Estimated Jobs, Earnings, Output, and Value-Added in Rhode Island and Connecticut during Construction under Alternative C by Design Capacity Option**

| Design Capacity Option | Alternative for which the Design Capacity Option is Applicable | Total Jobs | Total Earnings ($ millions) | Total Output ($ millions) | Total Value-Added ($ millions) |
|---|---|---|---|---|---|
| Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs) | C1 and C2 | 4,100 | $310.13 | $849.08 | $440.21 |
| 780-MW Project with 65 12-MW WTGs | C1 | 4,330 | $325.90 | $899.10 | $463.10 |
| 768-MW Project with 64 12-MW WTGs | C2 | 4,231 | $317.44 | $882.97 | $452.15 |

Source: Estimates were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates are for the entire construction period. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours). Earnings are estimated incomes earned from the jobs. Output is the estimated values of all goods and services sold during construction. Value-added is the estimated change in GDP resulting from the change in output.

The assessment of Alternative C builds of the Project configurations described for the Proposed Action in Section 3.11.2.2.1. If no more than 65 WTGs are allowed under Alternative C1, the Large WTG Baseline Project (720 MW with 60 12-MW WTGs) from the Proposed Action could be installed while still meeting the PPA under Alternative C1. However, none of the other three design configurations described in the Proposed Action could be installed. The largest design configuration possible under Alternative C1 would be a 780-MW project with 65 12-MW WTGs. The largest design configuration possible under Alternative C2 would be a 768-MW project with 64 12-MW WTGs.

**Table 3.11-13. Estimated Jobs, Earnings, Output, and Value-Added in Rhode Island and Connecticut during Construction under the Alternative D by Design Capacity Option**

| Design Capacity Option | Alternatives to which the Design Capacity Option is Applicable | Total Jobs | Total Earnings ($ millions) | Total Output ($ millions) | Total Value-Added ($ millions) |
|---|---|---|---|---|---|
| Baseline Project (712-MW capacity with 89 8-MW WTGs) | D1, D2, or D3 | 3,856 | $298.50 | $783.90 | $417.00 |
| Midsize WTG Baseline Project (720-MW capacity with 72 10-MW WTGs) | D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3 | 3,918 | $297.25 | $801.90 | $419.82 |
| Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs) | D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3 | 4,100 | $310.13 | $849.08 | $440.21 |
| Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs) | D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3 | 4,976 | $370.88 | $1,066.25 | $535.91 |
| Maximum Capacity Project (880-MW capacity with 88 10-MW WTGs) | D1, D2, or D3 | 4,834 | $361.75 | $1,019.80 | $519.63 |

Source: Baseline Project estimates are from Hamilton and Nubbe (2020). Estimates for the other listed projects were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates are for the entire construction period. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours). Earnings are estimated incomes earned from the jobs. Output is the estimated values of all goods and services sold during construction. Value-added is the estimated change in GDP resulting from the change in output.

If Alternative D1+D2, Alternative D1+D3, or Alternative D2+D3 are selected, then the Midsize WTG Baseline Project (720-MW project with 72 10-MW WTGs) or the Large WTG Baseline Project (introduced in Section 3.11.2.2.1) could be installed if Revolution Wind's goal is to minimally meet the current PPA requirements. If Revolution Wind wishes to maximize its total capacity, then the Large WTG Maximum Capacity Project described in Section 3.11.2.2.1 would be feasible.

If Alternative D1+D2+D3 is selected, then no more than 80 WTGs could be installed. In this case, the Midsize WTG Baseline Project (720-MW project with 72 10-MW WTGs) or the Large WTG Baseline Project could be installed to meet the minimum PPA, whereas the Large WTG Maximum Capacity Project would be feasible if Revolution Wind maximizes total Project capacity.

**Table 3.11-14. Estimated Jobs, Earnings, Output, and Value-Added in Rhode Island and Connecticut during Construction under the Alternative E by Design Capacity Option**

| Design Capacity Option | Alternatives to which the Design Capacity Option is Applicable | Total Jobs | Total Earnings ($ millions) | Total Output ($ millions) | Total Value-Added ($ millions) |
|---|---|---|---|---|---|
| Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs) | E1 and E2 | 4,100 | $310.13 | $849.08 | $440.21 |
| Midsize WTG Baseline Project (720-MW capacity with 72 10-MW WTGs) | E2 | 3,918 | $297.25 | $801.90 | $419.82 |
| 64-WTG Maximum Capacity Project (768-MW capacity with 64 12-MW WTGs) | E1 and E2 | 4,231 | $317.44 | $882.97 | $452.15 |
| Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs) | E2 | 4,976 | $370.88 | $1,066.25 | $535.91 |

Source: Estimates were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates are for the entire construction period. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours). Earnings are estimated incomes earned from the jobs. Output is the estimated values of all goods and services sold during construction. Value-added is the estimated change in GDP resulting from the change in output.

Under Alternative E1, there are only five feasible configurations, all of which would use 12-MW WTGs. The 704-MW PPA can be met with the Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs), which was introduced with the Proposed Action. The largest capacity project that could be built is a 64-WTG Maximum Capacity Project (768 MW with 64 12-MW WTGs), which was also discussed with respect to Alternative C2 in Section 3.11.2.3.1. It would also be possible to build three smaller projects using 61, 62, or 63 WTGs each with a 12-MW capacity.

It is clear that all of the design capacity options available for Alternative E1 are also feasible under Alternative E2. Alternative E2 allows up to eight more WTGs, which would allow the Large WTG Maximum Capacity Project (876-MW project capacity with 73 12-MW WTGs), which was initially introduced in Section 3.11.2.2.1 with the Proposed Action. Also feasible under Alternative E1 are two project configurations that use 10-MW WTGs: a 72-WTG project that meets the PPA with a total capacity of 720 MW and a 730-MW project that uses one additional 10-MW WTG.

**Table 3.11-15. Estimated Jobs, Earnings, Output, and Value-Added in Rhode Island and Connecticut during Construction under the Alternative F by Design Capacity Option**

| Design Capacity Option | Alternatives to which the Design Capacity Option is Applicable | Total Jobs | Total Earnings ($ millions) | Total Output ($ millions) | Total Value-Added ($ millions) |
|---|---|---|---|---|---|
| Very Large WTG Baseline Project (728-MW capacity with 52 14-MW WTGs) | Feasible under all alternatives | 4,295 | $320.62 | $916.04 | $461.31 |
| Very Large WTG Maximum Capacity Project (868-MW capacity with 62 14-MW WTGs) | Feasible under all alternatives | 5,212 | $384.88 | $1,140.90 | $562.30 |

Source: Estimates were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates are for the entire construction period. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours). Earnings are estimated incomes earned from the jobs. Output is the estimated values of all goods and services sold during construction. Value-added is the estimated change in GDP resulting from the change in output.

Under Alternative F, the largest allowable WTGs would increase from 12 to 14 MW. Therefore, based on information from Roll (2021), the minimum capacity that would be installed to meet the 704-MW PPA would have a total nameplate capacity of 728 MW and would use 52 14-MW WTGs. The largest project that could be installed (within the PDE maximum Project capacity of 880 MW) would be an 868-MW project that uses 62 14-MW WTGs.

Both of these Project configurations would be feasible under the Proposed Action and any of the other alternatives that constrain the number of WTGs that would be allowed (Alternatives C–E).

#### 3.11.2.4.2 Operations and Maintenance and Decommissioning

##### Employment and Economic Activity Impacts of Operations and Maintenance and Decommissioning

Tables 3.11-16 through 3.11-19 show estimated employment, earnings, output, and value-added impacts during O&M under Alternatives C through F for the design configurations that are feasible. The tables show total economic impacts, including direct, indirect, and induced impacts.

The higher-end projections of employment and economic activity during O&M under Alternative C are smaller than the higher-end projections under the Proposed Action. The lower-end and higher-end estimates of the economic impacts of Alternative D and across design configurations and Alternative F are not markedly different from those for the Proposed Action. Likewise, all of the design configurations under Alternative E fall within the range of design configurations for the Proposed Action. Therefore, the impacts of Alternatives C through F to demographic, employment, or economic conditions in the GAA would be similar to the Proposed Action: short term **minor** beneficial for all design configurations analyzed.

Decommissioning under Alternatives C through F would likely have a smaller impact than the Proposed Action, with economic impacts (jobs and income) estimated to be approximately 50% of those shown in Tables 3.11-12 through 3.11-15. These impacts would not differ markedly from the Proposed Action. Decommissioning would have a short-term **minor** beneficial impact to demographic, employment, or economic conditions in the GAA. There would be no further demographic, employment, and economic impacts once decommissioning is complete.

**Table 3.11-16. Estimated Jobs, Earnings, Output, and Value-Added during Operations and Maintenance under Alternative C by Design Capacity Option**

| Design Capacity Option | Alternative for which the Design Capacity Option is Applicable | Total Jobs | Total Earnings ($ millions) | Total Output ($ millions) | Total Value-Added ($ millions) |
|---|---|---|---|---|---|
| Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs) | C1 and C2 | 236 | $17.39 | $86.66 | $70.79 |
| 780-MW Project with 65 12-MW WTGs | C1 | 255 | $18.84 | $93.88 | $76.69 |
| 768-MW Project with 64 12-MW WTGs | C2 | 251 | $18.55 | $92.44 | $75.51 |

Source: Estimates were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates would occur annually over the 35-year life of the Project. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours).

**Table 3.11-17. Estimated Jobs, Earnings, Output, and Value-Added during Operations and Maintenance under the Alternative D by Design Capacity Option**

| Design Capacity Option | Alternatives to which the Design Capacity Option is Applicable | Total Jobs | Total Earnings ($ millions) | Total Output ($ millions) | Total Value-Added ($ millions) |
|---|---|---|---|---|---|
| Baseline Project (712-MW capacity with 89 8-MW WTGs) | D1, D2, or D3; | 233 | $17.20 | $85.70 | $70.00 |
| Midsize WTG Baseline Project (720-MW capacity with 72 10-MW WTGs) | D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3 | 236 | $17.39 | $86.66 | $70.79 |
| Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs) | D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3 | 236 | $17.39 | $86.66 | $70.79 |
| Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs) | D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3 | 287 | $21.16 | $105.44 | $86.12 |
| Maximum Capacity Project (880-MW capacity with 88 10-MW WTGs) | D1, D2, or D3 | 288 | $21.26 | $105.92 | $86.52 |

Source: Baseline Project estimates are from Hamilton and Nubbe (2020). Estimates for the other listed projects were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates would occur annually over the 35-year life of the Project. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours).

**Table 3.11-18. Estimated Jobs, Earnings, Output, and Value-Added during Operations and Maintenance under the Alternative E by Design Capacity Option**

| Design Capacity Option | Alternatives to which the Design Capacity Option is Applicable | Total Jobs | Total Earnings ($ millions) | Total Output ($ millions) | Total Value-Added ($ millions) |
|---|---|---|---|---|---|
| Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs) | E1 and E2 | 236 | $17.39 | $86.66 | $70.79 |
| Midsize WTG Baseline Project (720-MW capacity with 72 10-MW WTGs) | E2 | 236 | $17.39 | $86.66 | $70.79 |
| 64-WTG Maximum Capacity Project (768-MW capacity with 64 12-MW WTGs) | E1 and E2 | 251 | $18.55 | $92.44 | $75.51 |
| Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs) | E2 | 287 | $21.16 | $105.44 | $86.12 |

Source: Estimates were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates would occur annually over the 35-year life of the Project. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours).

**Table 3.11-19. Estimated Jobs, Earnings, Output, and Value-Added during Operations and Maintenance under the Alternative F by Design Capacity Option**

| Design Capacity Option | Alternatives to which the Design Capacity Option is Applicable | Total Jobs | Total Earnings ($ millions) | Total Output ($ millions) | Total Value-Added ($ millions) |
|---|---|---|---|---|---|
| Very Large WTG Baseline Project (728-MW capacity with 52 14-MW WTGs) | Feasible under all alternatives | 238 | $17.59 | $87.63 | $71.57 |
| Very Large WTG Maximum Capacity Project (868-MW capacity with 62 14-MW WTGs) | Feasible under all alternatives | 284 | $20.97 | $104.48 | $85.34 |

Source: Estimates were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates would occur annually over the 35-year life of the Project. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours).

### 3.11.2.4.3 Cumulative Impacts

#### Employment and Economic Activity Impacts of Combined Offshore Wind Energy Projects

Under Alternatives C through F, BOEM estimates that nearly 46 GW of offshore wind farm capacity could be installed and operational by the end of 2030. This offshore wind energy development would create a demand for workers skilled in the professions and trades needed for the design, construction, and O&M of offshore wind energy facilities. Construction activities related to future offshore wind energy projects are expected to generate an average of 29,800 FTE job-years from 2022 through 2030, including direct, indirect, and induced jobs. By 2031, there would be an annual average of 21,850 O&M jobs with the Project under these alternatives.

If the highest feasible capacity configurations under Alternative C1 or Alternative C2 are installed, the Project would account for approximately 1.6% of all offshore wind construction job-years from 2022 to 2030 and 1.1% to 1.2% of O&M jobs in 2031.

Under Alternative D, Project construction jobs are expected to range from 1.4% to 1.8% of the annual average of all offshore wind construction jobs from 2022 to 2030, and Project O&M jobs are expected to range from 1.1% to 1.3% of O&M activities related to future offshore wind projects in 2031.

Under Alternative E, Project construction jobs are expected to range from 1.5% to 1.6% of the annual average of all offshore wind construction jobs from 2022 to 2030, and Project O&M jobs are expected to range from 1.1% to 1.3% of O&M activities related to future offshore wind projects in 2031.

Under Alternative F, Project construction jobs are expected to range from 1.6% to 1.9% of all offshore wind energy construction jobs from 2022 to 2030, and Project O&M jobs are expected to range from 1.1% to 1.3% of O&M activities related to future offshore wind projects in 2031.

Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have long-term **minor** beneficial impacts from construction and O&M jobs and economic activity.

#### 3.11.2.4.4 Conclusions

When compared to the maximum case under the Proposed Action, Alternatives C through F under all layout options could reduce the number of WTGs, which would have an associated reduction in job and income losses due to disruption of commercial fisheries or for-hire recreational fishing and a reduction in adverse visual impacts on the tourism industry. However, BOEM expects that the overall level of impacts to demographic, employment, and economic conditions in the GAA resulting from Alternatives C through F alone would be similar to the Proposed Action: long-term **minor** beneficial for all Project design configurations analyzed as a result of the employment and economic activity supported by Project construction and installation, O&M, and decommissioning.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM expects that Alternatives C through F’s impacts to demographic, employment, and economic conditions in the GAA would be similar to the Proposed Action. Therefore, the overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be the same as the Proposed Action: long term **major** adverse as a result of climate change. These major adverse impacts from climate change are driven by cumulative activities and trends and not by emissions from the Project. Beneficial impacts would be long term **moderate**, representing notable and measurable improvements in some local economies in the GAA.

### 3.11.2.5 Alternative G: Impacts of the Preferred Alternative on Demographics, Employment, and Economics

Under Alternative G, there is only one design configuration among the modeled scenarios that 1) falls within the constraints of the alternative (i.e., no more than 65 installed WTGs); 2) complies with the PDE (i.e., uses WTGs of 8- to 12-MW capacity); and 3) complies with information supplied by Revolution Wind (Roll 2021)—specifically that all WTGs used must have the same capacity, and that the Project, as built, would use at least one additional WTG beyond the number needed to meet the 704-MW total capacity required by the PPA. If 12-MW WTGs are used, then 59 WTGs is the minimum number of WTGs to meet the PPA (59 WTGs × 12 MW = 708 MW). Adding one additional WTG beyond the PPA minimum would boost the total to 60 WTGs. This configuration is consistent with the Large WTG Baseline Project described and assessed under Alternatives B, C, D, and E. Although the use of 11-MW WTGs was not specifically modeled due to the limitations of the model variables, the economic impacts of using 11-MW WTGs would likely be close to the impacts of the Large WTG Baseline Project. This is because using 11-MW WTGs would only entail a slight decrease in the WTG size and a slight increase in the number of WTGs, and the effects of these slight changes on economic impact levels would largely offset each other.

#### 3.11.2.5.1 Construction and Installation

#### Employment and Economic Activity Impacts of Construction and Installation

Table 3.11-20 shows the estimated total employment, total earnings, total output, and total value-added impacts during construction under Alternative G. As with the Proposed Action, the exact locations of these economic impacts cannot be determined because the final set of ports has not been specified. Therefore, the impacts of Alternative G to demographic, employment, or economic conditions in the GAA would be similar to the Proposed Action: short term **minor** beneficial for all design configurations analyzed.

**Table 3.11-20. Estimated Jobs, Earnings, Output, and Value-Added in Rhode Island and Connecticut during Construction Alternative G**

| Design Capacity Option | Total Jobs | Total Earnings ($ millions) | Total Output ($ millions) | Total Value-Added ($ millions) |
|---|---|---|---|---|
| Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs) | 4,100 | $310.13 | $849.08 | $440.21 |

Source: Estimates were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates are for the entire construction period. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours). Earnings are estimated incomes earned from the jobs. Output is the estimated value of all goods and services sold during construction. Value-added is the estimated change in GDP resulting from the change in output.

The assessment of Alternative G builds of the Project configurations described for the Proposed Action in Section 3.11.2.2.1.

### 3.11.2.5.2 Operations and Maintenance and Decommissioning

#### Employment and Economic Activity Impacts of Operations and Maintenance and Decommissioning

Table 3.11-21 shows estimated employment, earnings, output, and value-added impacts during O&M under Alternative G for the single design configuration that is feasible. Projections of employment and economic activity during O&M are smaller than the higher-end projections under the Proposed Action and consistent with the lower-end estimates of economic impacts. Therefore, the impacts under O&M of Alternative G to demographic, employment, or economic conditions in the GAA would be similar to the Proposed Action: short term **minor** beneficial for all design configurations analyzed.

Decommissioning under Alternative G would likely have a smaller impact than the Proposed Action, with economic impacts (jobs and income) estimated to be approximately 50% of those shown in Table 3.11-20. These impacts would not differ markedly from the Proposed Action. Decommissioning would have a short-term **minor** beneficial impact to demographic, employment, or economic conditions in the GAA. There would be no further demographic, employment, and economic impacts once decommissioning is complete.

**Table 3.11-21. Estimated Jobs, Earnings, Output, and Value-Added during Operations and Maintenance under Alternative G**

| Design Capacity Option | Total Jobs | Total Earnings ($ millions) | Total Output ($ millions) | Total Value-Added ($ millions) |
|---|---|---|---|---|
| **Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs)** | **236** | **$17.39** | **$86.66** | **$70.79** |

Source: Estimates were developed using information and models in Hamilton and Nubbe (2020) and in NREL (2017, 2021).
Note: Employment, earnings, output, and value-added estimates would occur annually over the 35-year life of the Project. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours).

### 3.11.2.5.3 Cumulative Impacts

#### Employment and Economic Activity Impacts of Combined Offshore Wind Energy Projects

Under Alternative G, BOEM estimates that nearly 46 GW of offshore wind farm capacity could be installed and operational by the end of 2030. This offshore wind energy development would create a demand for workers skilled in the professions and trades needed for the design, construction, and O&M of offshore wind energy facilities. Construction activities related to future offshore wind energy projects are expected to generate an average of 29,800 FTE job-years from 2022 to 2030, including direct, indirect, and induced jobs. Annual jobs related to O&M (including direct, indirect and induced jobs) are expected to reach 21,850 in 2031 after all of the planned projects are presumed to be operational.

If Alternative G is installed as described above, the Project would account for approximately 1.5% of the construction related job-years from 2022 to 2030. Alternative G is expected to generate a total of 236 O&M jobs annually once the Project begins operations or 1.1% of all O&M jobs in the offshore wind energy sector in 2031.

Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have long-term **minor** beneficial impacts for demographics, employment, and economics.

#### 3.11.2.5.4 Conclusions

When compared to the maximum case under the Proposed Action, Alternative G would reduce the number of WTGs, which would have an associated reduction in job and income losses due to disruption of commercial fisheries or for-hire recreational fishing, and a reduction in adverse visual impacts on the tourism industry. However, BOEM expects that the overall level of impacts to demographic, employment, and economic conditions in the GAA would be similar to the Proposed Action: long term **minor** beneficial as a result of the employment and economic activity supported by Project construction and installation, O&M, and decommissioning.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM expects that Alternative G's impacts to demographic, employment, and economic conditions in the GAA would be similar to the Proposed Action. Therefore, the overall impacts of Alternative G when combined with past, present, and reasonably foreseeable activities would be the same as under the Proposed Action: long term **major** adverse as a result of climate change. These major adverse impacts from climate change are driven by cumulative activities and trends and not by emissions from the Project. Beneficial impacts would be long term **moderate**, representing notable and measurable improvements in some local economies in the GAA.

### 3.11.2.6 Mitigation

There are no potential additional mitigation measures for demographics, employment, and economics identified in Table F-2 or F-3 of Appendix F.

# 3.12 Environmental Justice

## 3.12.1 Description of the Affected Environment for Environmental Justice

Geographic analysis area: Following guidance in BOEM (2022), the GAA is large enough to identify any environmental justice communities potentially impacted by the Proposed Action within the following parameters. The GAA includes all counties adjacent to the Lease Area, as well as any area where Project offshore infrastructure may be visible. Counties adjacent to onshore Project infrastructure or ports used to support Project construction, O&M, and decommissioning activities in the Lease Area and along the RWEC are included in the GAA. In addition, the GAA includes counties adjacent to major ports that support commercial fisheries potentially affected by the Project. A map of the GAA is shown in Figure 3.12-1.

In identifying minority and low-income populations in the GAA, this analysis also considered geographically dispersed/transient sets of individuals who may experience common conditions of environmental exposure or effect (see guidance in CEQ [1997]). Environmental justice populations in the GAA that are geographically dispersed and/or transient include low-income and minority workers employed in potentially affected commercial fisheries (see Section 3.9) and service industries that support tourism (see Sections 3.11 and 3.18).

In a recent survey of commercial fishing crewmembers in the northeastern United States, approximately 13% of survey participants identified their race as Black, Asian, American Indian/Alaska Native, or Native Hawaiian/Pacific Islander, and 7% identified as Hispanic or Latino (Silva et al. 2021). Approximately 9% of participants reported annual incomes of less than $30,000. Because of increasing real estate values and tax burdens in many coastal communities in the northeastern United States (Jimenez 2021), many crewmembers, especially those with low incomes, reside in communities far from the ports where fishing vessels are based. According to survey results, the median distance crewmembers reported traveling from their homes to their primary ports was approximately 15 miles (Silva et al. 2021). Many crewmembers that work in the lucrative scallop fishery primarily based in New Bedford, Massachusetts, live in states such as Maine, New Jersey, and Virginia. Over the past several years many U.S. seafood processors have relied on the H-2B visa program to fill lower-wage jobs (National Guestworker Alliance 2016; New American Economy 2017; Strauss 2017). This visa program allows employers to bring low-skilled foreign workers into the United States to fill temporary and seasonal jobs in sectors other than agriculture (Zavodny and Jacoby 2010). It is likely that the majority of these foreign workers hired by seafood processors belong to minority groups given that Mexico, Jamaica, Guatemala, and South Africa are among the primary home countries of H-2B visa workers (Batalova et al. 2021).

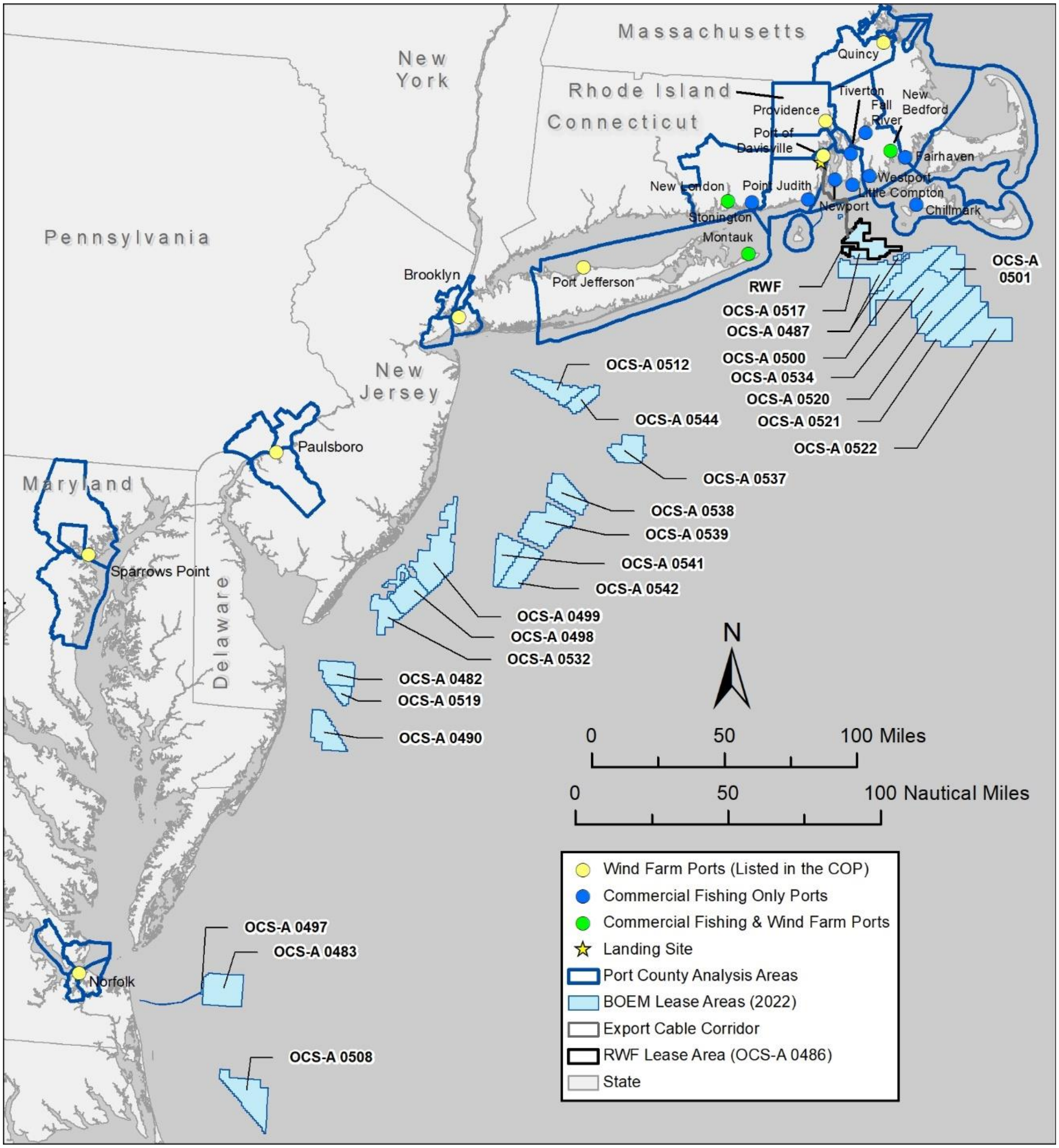


**Figure 3.12-1. Geographic analysis area for environmental justice.**

With respect to low-income and minority workers employed in service industries that support tourism, a large portion of the tourism workforce in the northeastern United States also consists of workers with H-2B visas (Gellerman 2017; Levin 2021; Terry 2018). Many other entry-level tourism jobs are filled by foreign workers with J-1 visas who are participating in the Summer Work Travel program. This program provides international students with an opportunity to work in the United States during their summer vacation from college or university (Forman 2022; Terry 2018). Tourism workers with H-2B or J-1 visas emigrate to the United States during the tourist season and return to their home countries after the season ends. It is likely that many of these individuals are also members of low-income populations since employees in the tourism-related leisure and hospitality industry have the lowest earnings in the U.S. economy (Dogru et al. 2019).

Another environmental justice community that is geographically dispersed consists of members of Native American tribes for whom there are resources of cultural significance in the GAA. Federally recognized tribal nations in the GAA include the Mashpee Wampanoag Tribe, Shinnecock Indian Nation, Mashantucket (Western) Pequot Tribal Nation, Wampanoag Tribe of Gay Head (Aquinnah), Mohegan Tribe of Indians of Connecticut, Narragansett Indian Tribe, Delaware Tribe of Indians, and Delaware Nation (see Appendix A). A substantial number of Native American people reside within or close to their traditional tribal areas. However, it is likely that tribal members are spread throughout the United States.

Affected environment: Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) requires that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, Native American tribes, and indigenous peoples" (EPA 2019).[39]

Table 3.12-1 describes environmental justice characteristics of the counties and cities/towns in the GAA. The table includes counties that contain or are adjacent to ports that may be used for Project construction, O&M, and decommissioning; contain major ports and commercial fisheries that could be affected by the Project; or contain the proposed Project landing site and onshore transmission cable. In addition, the table includes counties that contain cities/towns within the proposed visual study area as described in COP Appendix U1 (EDR 2021). The percentage of minority and low-income populations in each county and city/town were determined using the EPA's EJScreen tool, an environmental justice screening and mapping tool (EPA 2021b). Within that online tool, minority status determination is based on identifying individuals who are non-white or who are white but have Hispanic ethnicity. Low-income status determination is based on identifying individuals for whom the ratio of household income to the poverty level in the previous 12 months was less than two. Cities and counties in which more than half the population consists of minority groups include Baltimore City, Philadelphia, Hudson, New York, Kings, Suffolk, Hampton City, Portsmouth City, Newport News City, and Norfolk City. Counties in which more than one-third of the population is in the low-income group include Baltimore City, Philadelphia, Hudson, New York, Portsmouth City, Newport News City, and Norfolk City. Figures G-EJ1 though G-EJ6 show minority population percentages by block group for all counties in the GAA. Figures G-EJ7 through G-EJ12 show low-income population percentages by block groups in the same areas. Please also note that the shading in Table 3.12-1 is intentional and indicates groups of counites and/or cities and towns that are "adjacent to" counties that contain a wind farm port.

[39] The term *indigenous peoples* includes state-recognized tribes; indigenous and tribal community-based organizations; individual members of federally recognized tribes, including those living on a different reservation or living outside Indian country; individual members of state-recognized tribes; Native Hawaiians; Native Pacific Islanders; and individual Native Americans (EPA 2021a).

**Table 3.12-1. Environmental Justice Characteristics of Counties and Cities/Towns in the Geographic Analysis Area**

| County, City/Town, State | Contains or is Adjacent to Staging Port | Contains Major Commercial Fishing Port | Within Visual Study Area | Port or Landing Site | Minority Percentage* | Low-Income Percentage† | City/Town Population Composition Rating‡ | City/Town Poverty Rating§ | City/Town Personal Disruption Rating¶ | City/Town Housing Disruption Rating** | City/Town Retiree Migration Rating†† | City/Town Urban Sprawl Rating‡‡ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New London County, CT | X | X | X | | 24.1% | 22.2% | | | | | | |
| New London, CT | X | X | | Port of New London | 55.9% | 41.5% | Medium–High | High | High | Low | Low | Low |
| Stonington, CT | | X | X | Stonington | 9.1% | 15.8% | Medium–High | High | High | Low | Medium | Low |
| Bristol County, MA | X | X | X | | 18.1% | 25.4% | | | | | | |
| Fairhaven, MA | X | X | X | Fairhaven | 9.9% | 20.6% | Low | Low | Low | Medium | Medium | Medium |
| New Bedford, MA | X | X | X | New Bedford Marine Commerce Terminal | 38.0% | 42.4% | Medium–High | High | Medium–High | Medium | Low | Medium–High |
| Westport, MA | | X | X | Westport | 2.7% | 16.2% | Low | Low | Low | Low | Low | High |
| Norfolk County, MA | X | | | | 26.0% | 14.0% | | | | | | |
| Quincy, MA | X | | | Cashman Shipyard | 42.0% | 24.0% | Medium–High | Medium | Low | Medium–High | Low | Medium–High |
| Suffolk County, MA | X | | | | 55.0% | 32.0% | | | | | | |
| Plymouth County MA | X | | X | | 18.7% | 17.8% | | | | | | |
| Dukes County, MA | | X | X | | 13.9% | 23.6% | | | | | | |
| Chilmark, MA | | X | X | Chilmark/ Menemsha | 10.0% | 20.4% | Low | Low | Low | Medium | Medium–High | High |
| Anne Arundel County, MD | X | | | | 31.0% | 14.7% | | | | | | |
| Baltimore City, MD | X | | | | 72.5% | 40.1% | Medium–High | High | Medium–High | Medium–High | Low | Medium–High |
| Baltimore County, MD | X | | | | 41.9% | 21.9% | | | | | | |
| Edgemere, MD | X | | | Sparrows Point | 12.7% | 19.9% | Low | Low | Low | Medium–High | Medium–High | Medium |
| Delaware County, PA | X | | | | 32.6% | 22.6% | | | | | | |
| Philadelphia County, PA | X | | | | 65.4% | 44.4% | | | | | | |
| Gloucester County, NJ | X | | | | 21.2% | 17.1% | | | | | | |
| Paulsboro, NJ# | X | | | Paulsboro Marine Terminal | 33.5% | 37.1% | Medium | High | Medium–High | Low | Low | Low |
| Suffolk County, NY | X | X | X | | 31.9% | 17.1% | | | | | | |
| Montauk, NY | X | X | X | Port of Montauk | 17.9% | 9.5% | Low | Low | Low | High | High | Medium–High |
| Brookhaven, NY | X | | | Port Jefferson | 27.6% | 16.7% | Low | Low | Low | Medium | Low | Medium–High |
| Richmond County, NY | X | | | | 38.3% | 24.0% | | | | | | |

| County, City/Town, State | Contains or is Adjacent to Staging Port | Contains Major Commercial Fishing Port | Within Visual Study Area | Port or Landing Site | Minority Percentage* | Low-Income Percentage[†] | City/Town Population Composition Rating[‡] | City/Town Poverty Rating[§] | City/Town Personal Disruption Rating[¶] | City/Town Housing Disruption Rating[**] | City/Town Retiree Migration Rating[††] | City/Town Urban Sprawl Rating[‡‡] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hudson County NJ | X | | | | 71.1% | 34.1% | | | | | | |
| New York County, NY | X | | | | 53.1% | 29.5% | | | | | | |
| Kings County, NY | X | | | | 63.8% | 40.1% | | | | | | |
| Brooklyn, NY[#] | X | | | Port of Brooklyn | 63.8% | 40.1% | High | High | Medium–High | High | Low | High |
| Providence County, RI | X | | X | | 38.5% | 32.6% | | | | | | |
| Providence, RI | X | | X | Port of Providence[†] | 66.5% | 46.1% | High | High | High | Medium | Low | Medium |
| Washington County, RI | X | X | X | | 8.9% | 18.1% | | | | | | |
| Narragansett, RI | | X | X | Point Judith | 6.9% | 25.6% | Low | Low | Low | Medium–High | Medium | Low |
| North Kingstown, RI | X | | X | Port of Davisville at Quonset Point | 8.5% | 15.6% | Low | Low | Low | Low | Low | Low |
| Kent County, RI | X | | X | | 11.0% | 20.6% | | | | | | |
| Newport County, RI | | X | X | | 14.2% | 18.8% | | | | | | |
| Newport, RI | | X | X | Newport | 23.1% | 25.8% | Low | Med | Low | High | Low | Medium |
| Little Compton, RI | | X | X | Little Compton | 5.3% | 14.3% | Low | Low | Low | Medium–High | Medium–High | Medium |
| Tiverton, RI | | X | X | Tiverton | 5.3% | 17.2% | Low | Low | Low | Low | Medium | Low |
| Hampton City, VA | X | | | | 61.4% | 31.5% | | | | | | |
| Portsmouth City, VA | X | | | | 62.0% | 37.1% | | | | | | |
| Newport News City, VA | X | | | | 56.6% | 34.0% | | | | | | |
| Norfolk City, VA | X | | | | 56.5% | 35.6% | | | | | | |
| Norfolk, VA | X | | | Port of Norfolk/ Norfolk Intl. Terminal | 56.5% | 35.6% | Medium | Medium–High | Medium–High | Medium | Low | Low |
| Barnstable County, MA | | | X | | 10.3% | 20.1% | | | | | | |
| Nantucket County, MA | | | X | | 14.9% | 15.4% | | | | | | |
| Bristol County, RI | | | X | | 7.7% | 17.6% | | | | | | |

Sources: NMFS (2020); EPA (2021b).

Notes: CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, PA = Pennsylvania, RI = Rhode Island, VA = Virginia.

Groups of shaded and non-shaded rows represent separate county groups that include the counties in which affected port(s) are located, together with adjacent counties, if any. The last three rows show counties that are within the visual study area but do not contain affected ports.

Minority and low-income percentages are based on 2014–2018 American Community Survey 5-year summary file data obtained from EPA's EJScreen; population composition, poverty, and personal disruption ratings are for 2018.

* Minority percent calculated as 100 percent minus "White alone, non-Hispanic or Latino" percent.

† Low-income percent is "persons in poverty" percent.

‡ Population composition corresponds to the demographic makeup of a community, including the percentage of minorities, the percent of young children and female-headed households, and the ability to speak English. A high rating indicates a more vulnerable population. For additional information see Jepson and Colburn (2013).

§ Poverty is expressed as those receiving assistance, families below the poverty line, and individuals older than 65 and younger than 18 in poverty. A high rating indicates a high rate of poverty and a more vulnerable population. For additional information see Jepson and Colburn (2013).

¶ Personal disruption captures unemployment status, educational attainment, poverty, and marital status. A high rating indicates less personal capacity to adapt to changes and thus a more vulnerable population. For additional information see Jepson and Colburn (2013).

** Housing disruption represents factors that indicate a fluctuating housing market where some displacement may occur due to rising home values and rents, including change in mortgage value. A high rank means more vulnerability for those in need of affordable housing and a population more vulnerable to gentrification. For additional information see Jepson and Colburn (2013).

†† Retiree migration characterizes communities with a higher concentration of retirees and elderly people in the population, including households with inhabitants over 65 years; populations receiving social security or retirement income; and level of participation in the work force. A high rank indicates a population more vulnerable to gentrification as retirees seek out the amenities of coastal living. For additional information see Jepson and Colburn (2013).

‡‡ Urban sprawl describes areas experiencing gentrification through increasing population density, proximity to urban centers, home values, and cost of living. A high rank indicates a population more vulnerable to gentrification. For additional information see Jepson and Colburn (2013).

# Data reported for the borough.

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In addition to showing the minority and low-income percentages in the GAA, Table 3.12-1 presents environmental justice indices provided by NMFS (2020) that describe the social vulnerability of coastal communities engaged in fishing activities in terms of existing local social conditions that are likely to determine how potentially disruptive events affect communities. Brooklyn and Providence have highly vulnerable populations based on demographic makeup; New London, Stonington, New Bedford, Paulsboro, Brooklyn, Baltimore City, and Providence have highly vulnerable populations based on poverty level; and New London, Stonington, and Providence have highly vulnerable populations based on personal capacity to adapt to changes. A low population composition and poverty rating for the communities listed in Table 3.12-1 does not necessarily mean that the fishing industries in those communities do not have a high proportion of minority and low-income individuals. As discussed above, a large number of workers in the commercial fishing industry in the GAA, especially those with low incomes, reside in communities distant from the ports where fishing vessels are based and where fish are landed and processed.

Table 3.12-1 also shows social indicators related to gentrification pressure, including housing disruption, retiree migration, and urban spawl. Coastal development that leads to gentrification of coastal communities may create space-use conflicts and reduce access to coastal areas and working waterfronts that communities rely on for recreation, employment, and commercial or subsistence fishing. Housing disruption caused by rising home values and rents can displace affordable housing, with disproportionate effects for low-income populations. On the other hand, gentrification can also lead to increased tourism and recreational boating and fishing, which provide employment opportunities for members of environmental justice populations in recreation and tourism. The gentrification indices in Table 3.12-1 show medium–high to high levels of housing disruption in Edgemere, Montauk, Brooklyn, Narragansett, Newport, Quincy, and Little Compton; medium–high to high levels of retiree migration in Edgemere, Montauk, Chilmark, and Little Compton; and medium–high to high levels of urban sprawl in Westport, Brookhaven, Montauk, Chilmark, New Bedford, Quincy, and Brooklyn. Following EPA (1999) and EPA (2016a) guidelines, this analysis also identified potential environmental justice areas of concern (i.e., geographical areas that contain relatively high concentrations or “pockets” of minority and/or low-income populations) within cities/towns that contain ports that may be used for Project construction staging or contain the proposed Project landing site and onshore transmission cable. These areas were described at the level of the census block group, which represents the smallest census geographic unit for which both race/ethnicity and income data are readily available. Minority and low-income populations in block groups were identified using the EPA’s EJScreen tool (EPA 2021b). In accordance with thresholds defined in CEQ (1997), a block group was determined to be a potential environmental justice area of concern if 1) the minority population exceeds 50%, or 2) the minority or low-income population percentage is meaningfully greater than the minority or low-income population percentage in a reference population. The reference population for this analysis is the county in which the block group is located. Using an approach outlined by Hartell (2007) and consistent with guidance in EPA (2016a), the decision threshold when there is a “meaningfully greater” percentage of minority or low-income individuals than in the reference population was based on the following equation:

*(minority or low-income population in block group/total population in block group)*
*divided by*
*(minority or low-income population in county/total population in county)*

If the equation results in a number greater than 1, a greater proportion of minority or low-income individuals resides in the block group than in the county as a whole. This decision threshold is conservative (i.e., any percentage in a given block group that is greater than the percentage in the reference area qualifies as being meaningfully greater).

Based on the above definition, Table 3.12-2 and Table 3.12-3 show the block groups in the cities/towns that contain the Project landing site or ports that may support Project construction, O&M, or decommissioning activities that are potential environmental justice areas of concern. Of the estimated 6,112 total block groups in affected counties, approximately 46% were determined to be potential environmental justice areas of concern because of the concentrations of minority populations, whereas approximately 43% had concentrations of low-income populations. Cities/towns that contain possible staging ports where more than half of the block groups are potential environmental justice areas of concern include New London, New Bedford, Paulsboro, Brooklyn, Providence, Quincy, and Norfolk. A concentration of minority and low-income populations also occur in a three-census block area to the northwest of the Sparrows Point port facility. Figures G-EJ13 through G-EJ18 in Appendix G show the distribution of block groups of potential environmental justice concern in the potentially affected counties. Tables G-EJ1 through G-EJ28 in Appendix G list the multi-digit identifier of each block group of potential environmental justice concern based on minority population, low-income population, or both. The block group identifiers are organized by county and sub-county name (city, town, or census designated place).

The landfall work area at Quonset Point in North Kingstown, Rhode Island, has been developed for industrial use. The onshore transmission cable route connecting the point of RWEC landfall with the OnSS and ICF would be approximately 1.0 mile long and would begin in the industrial area, follow the existing roadway ROW, and end in an undeveloped area adjacent to the existing Davisville Substation (see Figure 2.1-2). The closest residences to the construction and installation of the onshore transmission cable, ICF, and OnSS are the residences on the south side of Camp Avenue and east side of Mill Creek Drive, which are within a few hundred feet of the construction area. The block group in which all the onshore Project infrastructure would be located is a potential environmental justice area of concern based on both minority population and low-income population criteria. However, the portion of this block group that is immediately adjacent to the landfall envelope area, OnSS, and ICF is limited to industrial, utility, and undeveloped land uses (see Section 3.14). The block group in which most of the closest residences to the proposed onshore Project infrastructure is located is not a potential environmental justice area of concern based on either minority population or low-income population criteria.

**Table 3.12-2. Census Block Groups in Counties and Cities/Towns that Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority Populations**

| County, City/Town, State | Staging Port or Landing Site | Population | Number of Block Groups | Percentage of Block Groups of Potential Environmental Justice Concern Due to Minority Population (%) | Total Population of Block Groups of Potential Environmental Justice Concern Due to Minority Population | Minority Percentage of Population in Block Groups of Potential Environmental Justice Concern (%) |
|---|---|---|---|---|---|---|
| New London County, CT | | 268,881 | 188 | 33.0% | 95,319 | 47.3% |
| New London, CT | Port of New London | 27,032 | 20 | 80.0% | 20,688 | 67.3% |
| Bristol County, MA | | 558,905 | 390 | 41.0% | 207,111 | 35.5% |
| New Bedford, MA | New Bedford Marine Commerce Terminal | 95,117 | 87 | 74.7% | 70,058 | 47.6% |
| Norfolk County, MA | | 698,249 | 474 | 40.1% | 286,676 | 41.1% |
| Quincy, MA | Cashman Shipyard | 94,121 | 72 | 76.4% | 76,931 | 81.7% |
| Baltimore County, MD | | 827,625 | 529 | 36.7% | 359,380 | 71.2% |
| Edgemere, MD | Sparrows Point | 7,661 | 8 | 0.0% | 0 | 0 |
| Census Tract 4213 in Dundalk, MD | Sparrows Point (adjacent area)* | 3,281 | 3 | 100% | 3,281 | 78.1% |
| Gloucester County, NJ | | 290,852 | 191 | 34.6% | 122,217 | 35.3% |
| Paulsboro, NJ | Paulsboro Marine Terminal | 5,937 | 7 | 71.4% | 4,624 | 41.4% |
| Suffolk County, NY | | 1,487,901 | 999 | 31.7% | 547,678 | 59.8% |
| Montauk, NY | Port of Montauk | 3,268 | 5 | 40.0% | 1,470 | 35.0% |
| Brookhaven, NY | Port Jefferson | 485,363 | 301 | 29.9% | 162,691 | 47.2% |
| Kings County, NY | | 2,600,747 | 2,085 | 61.1% | 1,696,907 | 83.7% |

| County, City/Town, State | Staging Port or Landing Site | Population | Number of Block Groups | Percentage of Block Groups of Potential Environmental Justice Concern Due to Minority Population (%) | Total Population of Block Groups of Potential Environmental Justice Concern Due to Minority Population | Minority Percentage of Population in Block Groups of Potential Environmental Justice Concern (%) |
|---|---|---|---|---|---|---|
| Brooklyn, NY | Port of Brooklyn | 2,600,747 | 2,085 | 61.1% | 1,696,907 | 83.7% |
| Providence County, RI | | 634,533 | 499 | 41.1% | 260,963 | 70.4% |
| Providence, RI | Port of Providence | 179,435 | 154 | 79.2% | 144,665 | 76.5% |
| Washington County, RI | | 126,242 | 94 | 27.7% | 46,393 | 16.9% |
| North Kingstown, RI | Port of Davisville at Quonset Point | 26,207 | 20 | 30.0% | 6,890 | 19.4% |
| Norfolk City, VA | | 245,592 | 189 | 55.0% | 136,196 | 75.9% |
| Norfolk, VA | Port of Norfolk/ Norfolk Intl. Terminal | 245,592 | 189 | 55.0% | 136,196 | 75.9% |

Source: EPA (2021b).

Notes: Table includes 2014–2018 American Community Survey 5-year summary file data obtained from the EPA's EJScreen tool.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, PA = Pennsylvania, RI = Rhode Island, VA = Virginia.

* Includes three block groups in Dundalk to the northwest of Sparrows Point (24/005/4213/1, 24/005/4213/2, and 24/005/4213/3).

**Table 3.12-3. Census Block Groups in Counties and Cities/Towns that Are Potential Environmental Justice Areas of Concern Due to Concentrations of Low-Income Populations**

| County, City/Town, State | Staging Port or Landing Site | Population | Number of Block Groups | Percentage of Block Groups of Potential Environmental Justice Concern Due to Low-Income Population (%) | Total Population of Block Groups of Potential Environmental Justice Concern Due to Low-Income Population | Low-Income Percentage of Population in Block Groups of Potential Environmental Justice Concern (%) |
|---|---|---|---|---|---|---|
| New London County, CT | | 268,881 | 188 | 37.2% | 99,712 | 39.0% |
| New London, CT | Port of New London | 27,032 | 20 | 75.0% | 20,893 | 49.9% |
| Bristol County, MA | | 558,905 | 390 | 47.9% | 226,236 | 44.5% |
| New Bedford, MA | New Bedford Marine Commerce Terminal | 95,117 | 87 | 81.6% | 76,655 | 48.7% |
| Norfolk County, MA | | 698,249 | 474 | 41.6% | 282,434 | 40.4% |
| Quincy, MA | Cashman Shipyard | 94,121 | 72 | 76.4% | 77,517 | 82.4% |
| Baltimore County, MD | | 827,625 | 529 | 39.7% | 345,838 | 35.9% |
| Edgemere, MD | Sparrows Point | 7,661 | 8 | 25.0% | 1,615 | 27.0% |
| Census Tract 4213 in Dundalk, MD | Sparrows Point (adjacent area)* | 3,281 | 3 | 100% | 3,281 | 56.2% |
| Gloucester County, NJ | | 290,852 | 191 | 48.7% | 122,283 | 29.1% |
| Paulsboro, NJ | Paulsboro Marine Terminal | 5,937 | 7 | 85.7% | 5,279 | 40.5% |
| Suffolk County, NY | | 1,487,901 | 999 | 41.3% | 630,645 | 28.2% |
| Montauk, NY | Port of Montauk | 3,268 | 5 | 0.0% | 0 | 0.0% |
| Brookhaven, NY | Port Jefferson | 485,363 | 301 | 45.2% | 211,525 | 26.3% |

| County, City/Town, State | Staging Port or Landing Site | Population | Number of Block Groups | Percentage of Block Groups of Potential Environmental Justice Concern Due to Low-Income Population (%) | Total Population of Block Groups of Potential Environmental Justice Concern Due to Low-Income Population | Low-Income Percentage of Population in Block Groups of Potential Environmental Justice Concern (%) |
|---|---|---|---|---|---|---|
| Kings County, NY | | 2,600,747 | 2,085 | 42.8% | 1,237,027 | 57.6% |
| Brooklyn, NY | Port of Brooklyn | 2,600,747 | 2,085 | 42.8% | 1,237,027 | 57.6% |
| Providence County, RI | | 634,533 | 499 | 45.7% | 286,540 | 51.7% |
| Providence, RI | Port of Providence | 179,435 | 154 | 73.4% | 136,695 | 54.2% |
| Washington County, RI | | 126,242 | 94 | 45.7% | 61,309 | 26.9% |
| North Kingstown, RI | Port of Davisville at Quonset Point | 26,207 | 20 | 45.0% | 8,810 | 31.6% |
| Norfolk City, VA | | 245,592 | 189 | 52.9% | 145,767 | 45.5% |
| Norfolk, VA | Port of Norfolk/ Norfolk Intl. Terminal | 245,592 | 189 | 52.9% | 145,767 | 45.5% |

Source: EPA (2021b)

Notes: Table includes 2014–2018 American Community Survey 5-year summary file data obtained from the EPA's EJScreen tool.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, PA = Pennsylvania, RI = Rhode Island, VA = Virginia.

* Includes three block groups in Dundalk to the northwest of Sparrows Point (24/005/4213/1, 24/005/4213/2, and 24/005/4213/3).

Guidance provided by the CEQ (1997) indicates that potential impacts on the social or cultural practices of Native American tribes as a result of impacts to the natural or physical environment should be assessed as potential environmental justice impacts. The connection of Native American tribes to marine fisheries within or in proximity to the RI/MA WEAs has been established in academic literature (Chaves 2014; Trigger 1978). During government-to-government consultations with BOEM, representatives from federally recognized tribes expressed concerns about a variety of potential impacts to culturally significant environmental and physical resources (see Appendix A).

BOEM acknowledges Mashpee Wampanoag Tribe's reverence for the NARW and has given careful consideration to the potential impacts to NARWs throughout development of the EIS, focused within EIS Section 3.15, Marine Mammals. BOEM is also consulting with NMFS under the ESA and would require compliance with all mitigation and reporting measures in the NMFS biological opinion if the COP were approved or approved with modification.

Executive Order 13175 commits federal agencies to engage in government-to-government consultation with tribes. A description of the government-to-government consultations that BOEM conducted with federally recognized tribes is provided in Appendix A.

### 3.12.2 Environmental Consequences

#### 3.12.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following proposed PDE parameters (see Appendix D) would influence the magnitude of the impacts on the economic welfare and health and safety of environmental justice populations:

- Overall size of the Project and number of WTGs constructed
- The Project layout including the type, height, and placement of the WTGs and OSS, and the design and visibility of lighting on the structures
- The port(s) selected to support construction, installation, and decommissioning and the port(s) selected to support O&M
- The time of year during which onshore and nearshore construction occurs

These Project design parameters would influence the magnitude of adverse impacts to environmental justice populations primarily through economic and public health and safety impacts associated with increases in air emissions, noise, and traffic; decreases in water quality; job and income losses due to the disruption of commercial fisheries, for-hire recreational fishing, or the tourism industry; adverse impacts to subsistence fishing activities; visual impacts on resources culturally important to Native American tribes; and damage to submerged ancient landforms that have cultural significance to Native American tribes. However, EPMs implemented during construction, O&M, and decommissioning would decrease the potential for impacts to environmental justice populations (see Table F-1 in Appendix F). These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for environmental justice across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E2-11 in Appendix E1.

Table 3.12-4 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component.

The Conclusion section within each action alternative analysis discussion includes rationale for the effects determinations. Under all of the active alternatives, the overall impact to environmental justice populations from any alternative would be **minor** to **moderate** adverse and **minor** beneficial as EPMs would reduce adverse impacts substantially during the life of the proposed Project, including decommissioning; the affected activity or community would have to adjust somewhat to account for disruptions due to notable and measurable adverse impacts of the Project; or once the impacting agent is gone, the affected activity or community, including traditional cultural practices, is expected to return to a condition with no measurable impacts, when remedial or mitigating action is taken. For IPFs with potential for disproportionately high and adverse impacts on communities with environmental justice concerns, BOEM discloses whether the impacts could be disproportionately high and adverse without EPMs, and whether they would remain so with EPMs. Determination of whether impacts could be disproportionately high and adverse is informed by analysis of other resources analyzed in the Final EIS, along with consideration for unique vulnerabilities and cultural concerns of environmental justice populations. The factors that may contribute to certain populations experiencing disproportionate impacts are discussed in Section 3.12.1, Description of the Affected Environment. Discussion of the impacts and their potential to be disproportionately high and adverse is provided in Table 3.12-4 and in Sections 3.12.2.2 through 3.12.2.3.

Where feasible, calculations for specific alternative impacts are provided in Appendix E4 to facilitate reader comparison across alternatives.

**Table 3.12-4. Alternative Comparison Summary for Environmental Justice**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| Accidental releases and discharges | **Onshore**: Offshore wind energy development would comply with all regulatory requirements for water quality protection. Therefore, environmental justice populations in the GAA are expected to experience **negligible** adverse impacts. | **Onshore**: EPMs implemented would avoid or reduce potential spill impacts on water quality. Moreover, there are no waterbodies in the path of the onshore transmission cable or on the OnSS or ICF parcels that could be contaminated by an accidental release and discharge resulting from equipment failure or mismanagement during construction. Therefore, impacts to the health and safety of environmental justice populations associated with changes in water quality would be short term **negligible** adverse.<br>To the extent that decreases in water quality occur as a result of ongoing and future onshore activities, environmental justice populations could experience adverse environmental and health effects. However, onshore and offshore development, including the Proposed Action, would comply with all regulatory requirements for water quality protection. Therefore, when combined with past, present, and other reasonably foreseeable projects, the Project would have short-term **negligible** to **minor** adverse impacts. | **Onshore**: Construction, O&M, and decommissioning of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts on the health and safety of environmental justice populations would be similar to the Proposed Action: short term **negligible** to **minor** adverse. | | | | **Onshore**: Construction, O&M, and decommissioning of onshore facilities under Alternative G would not be markedly different from the Proposed Action; therefore, impacts on the health and safety of environmental justice populations would be similar to the Proposed Action: short term **negligible** to **minor** adverse. |
| Air emissions | **Offshore**: During construction, impacts from future wind development activities on air quality would be temporary and **minor** to **moderate** and could result in short-term disproportionately high and adverse health and safety impacts to environmental justice populations, especially if multiple offshore wind projects simultaneously use the same port for construction staging. During operations, offshore wind energy projects would reduce the need for fossil fuel–combusting power generation, which would have a net beneficial impact on air quality. Therefore, the overall air quality impacts of offshore wind energy development on the health and safety of environmental justice populations would be **minor** to **moderate** beneficial. | **Offshore**: During Project construction, the air emissions near mustering ports would be temporary and **minor** adverse. Therefore, the air quality impacts on the health and safety of environmental justice populations near the ports would be short term **minor** adverse. During operations, the Projects would reduce the need for fossil fuel–combusting power generation, which would have a net beneficial impact on air quality. Therefore, the overall air quality impacts of the Project on the health and safety of environmental justice populations would be long term **minor** beneficial.<br>Despite the potential for increased air emissions during construction of the Project and other new offshore wind energy projects, over the long term, the reduction in the need for fossil fuel–combusting power generation would have a net beneficial impact on air quality in the GAA. Therefore, the air quality improvements from offshore wind energy development would have a long-term **minor** to **moderate** beneficial impact. | **Offshore**: Under Alternatives C through F, the air emissions impact level due to a change in air pollutant emissions would be similar to the Proposed Action. Therefore, the air emissions impact to the health and safety of environmental justice populations would be similar to the Proposed Action: short term **minor** adverse during construction and decommissioning and long term **minor** to **moderate** beneficial during operations. | | | | **Offshore**: Under Alternative G, the air emissions impact level due to a change in air pollutant emissions would be similar to the Proposed Action. Therefore, the air emissions impact to the health and safety of environmental justice populations would be similar to the Proposed Action: short term **minor** adverse during construction and decommissioning and long term **minor** to **moderate** beneficial during operations. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | **Onshore**: State and local agencies would be responsible for managing actions to help minimize and avoid air quality impacts of offshore wind energy projects on neighborhoods during onshore construction. Therefore, the onshore activities are expected to have short-term **minor** adverse impacts on the health and safety of environmental justice populations. | **Onshore**: The potential impacts from construction and diesel-generating equipment would be reduced through EPMs related to fuel-efficient engines and dust control plans. Therefore, impacts to the health and safety of environmental justice populations near the landing site and onshore transmission cable route associated with changes in air quality during Project construction would be short term **minor** adverse.<br>Impacts to air quality from Project onshore facilities' O&M emissions would be **negligible** adverse.<br>State and local agencies would be responsible for minimizing and avoiding air quality impacts of ongoing and future onshore activities on nearby neighborhoods, including those neighborhoods in which environmental justice populations reside. Therefore, the overall cumulative air quality impacts on the health and safety of environmental justice populations are expected to be long term **minor** to **moderate** adverse. | **Onshore**: Construction and installation, O&M, and decommissioning of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts would be similar to the Proposed Action: short term **negligible** to **minor** adverse on the health and safety of environmental justice populations near affected ports, short term **minor** adverse on the health and safety of environmental justice populations near the proposed landing sites and onshore transmission cable route, long term **negligible** adverse during Project O&M, and long term **negligible** adverse during decommissioning.<br>Cumulative impacts to the health and safety of environmental justice populations would be similar to the Proposed Action: long term **minor** to **moderate** adverse. | | | | **Onshore**: Construction and installation, O&M, and decommissioning of onshore facilities under Alternative G would not be markedly different from the Proposed Action; therefore, impacts would be similar to the Proposed Action: short term **negligible** to **minor** adverse on the health and safety of environmental justice populations near affected ports, short term **minor** adverse on the health and safety of environmental justice populations near the proposed landing sites and onshore transmission cable route, long term **negligible** adverse during Project O&M, and long term **negligible** adverse during decommissioning.<br>Cumulative impacts to the health and safety of environmental justice populations would be similar to the Proposed Action: long term **minor** to **moderate** adverse. |
| Climate change | **Offshore**: Future offshore wind energy project GHG emissions during construction would be short term **negligible** adverse as compared to aggregate global emissions. During O&M, these projects would contribute to a broader combination of actions to reduce future impacts on the health and safety of environmental justice populations from climate change trends over the long term. However, given the global scale of GHG emissions, the reduction in GHG emissions resulting from the Project would have a long-term **negligible** beneficial impact on the health and safety of environmental justice populations. | **Offshore**: Project GHG emissions during construction would be short term **negligible** adverse. During operations, the Project would contribute to a broader combination of actions to reduce future impacts on the health and safety of environmental justice populations from climate change trends over the long term. However, given the global scale of GHG emissions, the reduction in GHG emissions resulting from offshore wind energy development would have a long-term **negligible** beneficial impact on the health and safety of environmental justice populations<br>The Proposed Action, together with other future offshore wind energy projects, could beneficially contribute to a broader combination of actions to reduce future impacts from climate change trends over the long term. However, the overall cumulative impact of climate change trends on the health and safety of environmental justice populations is expected to be long term **major** adverse. | **Offshore**: The climate change trends impact level of Alternatives C through F due to a change in GHG emissions would be similar to the Proposed Action. Therefore, the climate change trends impact to the health and safety of environmental justice populations would be similar to the Proposed Action: long term **negligible** beneficial.<br>Likewise, the cumulative impacts of climate change trends on the health and safety of environmental justice populations would be similar to the Proposed Action: long term **major** adverse. | | | | **Offshore**: The climate change trends impact level of Alternative G due to a change in GHG emissions would be similar to the Proposed Action. Therefore, the climate change trends impact to the health and safety of environmental justice populations would be similar to the Proposed Action: long term **negligible** beneficial.<br>Likewise, the cumulative impacts of climate change trends on the health and safety of environmental justice populations would be similar to the Proposed Action: long term **major** adverse. |
| Light | **Offshore**: Visual impacts on recreation and tourism would be short term during construction and long term during O&M, with negligible to moderate adverse impacts, based on the observed | **Offshore**: Visual impacts on recreation and tourism would be short term with **negligible** to **moderate** adverse impacts during construction, based on the observed distance and individual responses by recreationists and visitors to changes in the | **Offshore**: If certain WTG positions are omitted under Alternatives C through F, the adverse impacts of light on tourism-related service industries that are a source of employment for low-income workers would be reduced. In addition, the adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the impact | | | | **Offshore**: If certain WTG positions are omitted under Alternative G, the adverse impacts of light on tourism-related service industries that are a source of employment for low-income workers would be reduced. In addition, the adverse |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | distance and individual responses by recreationists and visitors to changes in the viewshed. Therefore, economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be short term to long term **minor** to **moderate** adverse during construction and O&M. If ADLS (or a similar system) is installed on WTGs in offshore wind energy projects, impacts to environmental justice populations would be reduced to **negligible** to **minor** adverse.<br><br>Lighting on WTGs could also affect cultural resources, including views of the night sky and ocean that are important to Native American tribes. ADLS would reduce the impacts on cultural resources but adverse impacts on Native American tribes would continue. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects of offshore wind energy development, and the resolution of these adverse effects.<br><br>Given that adverse lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and long term, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **minor** to **moderate** adverse. | viewshed. Therefore, economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be short term **negligible** to **moderate** adverse during construction. Revolution Wind has committed to implement ADLS as a measure to reduce light impacts. Therefore, economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be long term **negligible** adverse during O&M.<br><br>Lighting on WTGs could also affect cultural resources, including views of night sky and the ocean that are important to Native American tribes. ADLS would reduce the impacts on Native American tribes associated with WTG lighting but adverse impacts would continue. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.<br><br>Because adverse lighting impacts on species targeted by commercial and for-hire recreational fisheries are expected to be localized and long term, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **negligible** to **minor** adverse.<br><br>Cumulatively, aviation hazard lighting from the WTGs associated with the No Action Alternative and Proposed Action could be visible from coastal locations. The use of ADLS would reduce impacts to tourism, thereby reducing the economic impact of lighting on members of environmental justice populations employed in tourism-related service industries to long term **negligible** adverse.<br><br>The Proposed Action when combined with ongoing and reasonably foreseeable activities could have adverse light impacts on viewshed resources important to Native American tribes. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects of offshore wind energy development, and the resolution of these adverse effects. | level for members of environmental justice populations employed in tourism-related service industries would still be similar to the Proposed Action: short term **negligible** to **moderate** adverse during construction and decommissioning and long term **negligible** adverse during operations. The impact level for members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would also be similar to the Proposed Action: short term **negligible** to **minor** adverse during construction and decommissioning and long term **negligible** to **minor** adverse during operations.<br><br>In addition, omission of certain WTG positions would reduce the adverse impacts of lighting to viewsheds important to Native American tribes. In particular, Alternative E is primarily focused on setbacks of WTGs from Martha's Vineyard and would effectively increase distances of Project lights to viewshed resources important to Native American tribes at Aquinnah. However, the light impact level under Alternatives C through F would be similar to the Proposed Action.<br><br>The light Impact of Alternatives C through F would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in tourism-related service industries would be similar to the Proposed Action: long term **negligible** adverse. The cumulative impacts to Native American tribes from the combined lighting impacts of ongoing and planned actions on cultural resources would be similar to the Proposed Action. The cumulative economic impacts to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to the Proposed Action: long term **minor** to **moderate** adverse. | | | | impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the impact level for members of environmental justice populations employed in tourism-related service industries would still be similar to the Proposed Action: short term **negligible** to **moderate** adverse during construction and decommissioning and long term **negligible** adverse during operations. The impact level for members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would also be similar to the Proposed Action: short term **negligible** to **minor** adverse during construction and decommissioning and long term **negligible** to **minor** adverse during operations.<br><br>In addition, omission of certain WTG positions would reduce the adverse impacts of lighting to viewsheds important to Native American tribes in particular. However, the light impact level under Alternative G would be similar to the Proposed Action.<br><br>The light impact of Alternative G would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in tourism-related service industries would be similar to the Proposed Action: long term **negligible** adverse. The cumulative impacts to Native American tribes from the combined lighting impacts of ongoing and planned actions on cultural resources would be similar to the Proposed Action. The cumulative economic impacts to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to the Proposed Action: long term **minor** to **moderate** adverse. |

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| | | The cumulative adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term **minor** to **moderate** adverse. | | | | | |
| New cable emplacement/ maintenance | **Offshore**: The cable emplacement impacts on submerged marine cultural resources from offshore wind energy development could have long-term adverse disproportionate impacts on Native American tribes that trace their ancestry to these resources. If an ancient, submerged landform is disturbed during offshore cable emplacement, the impact on the cultural resource would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. The impact on Native American tribes would be long term **negligible** to **minor** adverse if offshore wind energy project construction and installation, O&M, and decommissioning can avoid these cultural resources.<br>The economic impacts of new cable emplacement and maintenance to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to those discussed under the presence of structures IPF: long term **negligible** to **major** adverse depending on the fishery and fishing operation. | **Offshore**: If submerged ancient landforms are disturbed during offshore cable emplacement, the impact on the cultural resource would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. If Project construction is able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse. Revolution Wind could conduct O&M activities on equipment in areas that previously experienced disturbance during construction, thereby reducing impacts to submerged marine cultural resources to long term but **negligible** adverse. Impacts during Project decommissioning would be similar to impacts during construction: long term **negligible** to **minor** adverse if Project decommissioning is able to avoid cultural resources.<br>The economic impacts of new cable emplacement and maintenance to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to those discussed below under the presence of structures IPF: short term **negligible** to **moderate** adverse during construction and decommissioning and long term **negligible** to **moderate** adverse during operations.<br>The cable emplacement impacts on submerged marine cultural resources from ongoing and future offshore activities, including the Project, could have long-term **major** adverse disproportionate impacts on Native American tribes if these cultural resources are disturbed. If the Proposed Action, together with ongoing and reasonably foreseeable activities, are able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse.<br>The cumulative adverse economic effects of new cable emplacement and maintenance to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **moderate** to **major** | **Offshore**: If the length of IACs is reduced under Alternatives C through F, the adverse impacts of new cable emplacement and maintenance on submerged ancient landforms important to Native American tribes could be reduced. However, the new cable emplacement and maintenance impact level for cultural resources would still be similar to the Proposed Action: long term **negligible** to **minor** adverse if construction and decommissioning are able to avoid cultural resources and long term **major** adverse if construction and decommissioning disturb cultural resources. Impacts during Project O&M would be long term but **negligible** adverse.<br>In addition, reducing the length of IACs would lessen adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations. However, the new cable emplacement and maintenance impact level for commercial fisheries and for-hire recreational fishing would still be similar to the Proposed Action: short term **moderate** adverse for construction and decommissioning and long term **moderate** adverse during operations.<br>The impact of Alternatives C through F would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in commercial and for-hire recreational fisheries would be similar to the Proposed Action: long term **moderate** to **major** adverse depending on the fishery and fishing operation. The cumulative impacts to Native American tribes that trace their ancestry to submerged marine cultural resources would be similar to the Proposed Action: long term **major** adverse if these cultural resources are disturbed, and long term **negligible** to **minor** adverse if disturbance of these cultural resources is avoided. | | | | **Offshore**: If the length of IACs is reduced under Alternative G, the adverse impacts of new cable emplacement and maintenance on submerged ancient landforms important to Native American tribes could be reduced. However, the new cable emplacement and maintenance impact level for cultural resources would still be similar to the Proposed Action: long term **negligible** to **minor** adverse if construction and decommissioning are able to avoid cultural resources and long term **major** adverse if construction and decommissioning disturb cultural resources. Impacts during Project O&M would be long term but **negligible** adverse.<br>In addition, reducing the length of IACs would lessen adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations. However, the new cable emplacement and maintenance impact level for commercial fisheries and for-hire recreational fishing would still be similar to the Proposed Action: short term **moderate** adverse for construction and decommissioning and long term **moderate** adverse during operations.<br>The impact of Alternative G would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in commercial and for-hire recreational fisheries would be similar to the Proposed Action: long term **moderate** to **major** adverse depending on the fishery and fishing operation. The cumulative impacts to Native American tribes that trace their ancestry to submerged marine cultural resources would be similar to the Proposed Action: long term **major** adverse if these cultural resources are disturbed, and long term **negligible** to **minor** adverse if disturbance of these cultural resources is avoided. |

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|---|---|---|---|---|---|---|---|
| | | adverse depending on the fishery and fishing operation. | | | | | |
| | **Onshore**: Activities associated with construction of the onshore components of future offshore wind energy projects, such as emplacement of onshore cables and new building construction, could physically disturb archaeological sites that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. If archaeological sites that have cultural significance to tribes are disturbed during onshore construction, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. The adverse impact on Native American tribes would be long term **negligible** to **minor** if offshore wind energy project construction and installation, O&M, and decommissioning are able to avoid these cultural resources. | **Onshore**: Activities associated with construction of the onshore components of the Project, such as emplacement of onshore cables and new building construction, could physically disturb archaeological sites that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. If archaeological sites that have cultural significance to tribes are disturbed during onshore construction, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. If Project construction is able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse.<br>The construction of the onshore Project components would result in modification to the existing viewshed because the OnSS and ICF infrastructure could be visible. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures has the potential to adversely affect environmental justice populations. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.<br>If archaeological sites that have cultural significance to tribes are disturbed during onshore construction of the Proposed Action and reasonably foreseeable projects, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. If construction of the Proposed Action and reasonably foreseeable projects is able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse. | **Onshore**: Construction and installation, O&M, and decommissioning of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts on environmental justice populations would be similar to the Proposed Action: long term **major** adverse if construction is unable to avoid cultural resources, and long term **negligible** to **minor** adverse if construction is able to avoid cultural resources.<br>Likewise; cumulative impacts to environmental justice populations would be similar to the Proposed Action: long term **major** adverse if construction of the Proposed Action and reasonably foreseeable projects are unable to avoid cultural resources, and long term **negligible** to **minor** adverse if construction of the Proposed Action and reasonably foreseeable projects are able to avoid cultural resources. | | | | **Onshore**: Construction and installation, O&M, and decommissioning of onshore facilities under Alternative G would not be markedly different from the Proposed Action; therefore, impacts on environmental justice populations would be similar to the Proposed Action: long term **major** adverse if construction is unable to avoid cultural resources, and long term **negligible** to **minor** adverse if construction is able to avoid cultural resources.<br>Likewise; cumulative impacts to environmental justice populations would be similar to the Proposed Action: long term **major** adverse if construction of the Proposed Action and reasonably foreseeable projects are unable to avoid cultural resources, and long term **negligible** to **minor** adverse if construction of the Proposed Action and reasonably foreseeable projects are able to avoid cultural resources. |
| Noise | **Offshore**: Underwater noise from construction, O&M, and decommissioning activities related to offshore wind energy development could result in a decrease in the catch of some target species. Given that target | **Offshore**: Underwater noise from construction activities related to the Project could result in revenue reductions for commercial fishing and marine recreational businesses by decreasing the catch of some target species. Given that target species are expected to return to an area after the | **Offshore**: If certain WTG positions are omitted under Alternatives C through F, the adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the noise impact level for commercial fisheries, for-hire recreational fishing, and recreational fishing would still be similar to the Proposed Action: short term **moderate** adverse during construction, and long term **moderate** adverse during O&M. | | | | **Offshore**: If certain WTG positions are omitted under Alternative G, the adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the noise impact level for |

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|---|---|---|---|---|---|---|---|
| | species are expected to return to an area after the noise ends, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **moderate**. | noise ends, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term **moderate** during construction, and long term **moderate** during O&M.<br>The adverse economic effects of noise from ongoing and future offshore activities, including the Proposed Action, to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **moderate**. | Cumulatively, the impact to members of environmental justice populations employed in commercial and for-hire recreational fisheries or participating in recreational and subsistence fisheries would also be similar to that for the Proposed Action: long term **moderate** adverse. | | | | commercial fisheries, for-hire recreational fishing, and recreational fishing would still be similar to the Proposed Action: short term **moderate** adverse during construction, and long term **moderate** adverse during O&M. Cumulatively, the impact to members of environmental justice populations employed in commercial and for-hire recreational fisheries or participating in recreational and subsistence fisheries would also be similar to that for the Proposed Action: long term **moderate** adverse. |
| | **Onshore**: Environmental justice populations near onshore facilities or ports used for construction staging could experience noise impacts. State and local agencies would be responsible for managing actions to help minimize and avoid noise impacts on nearby neighborhoods during construction. Therefore, offshore wind energy construction is expected to have short-term **minor** adverse noise impacts on environmental justice populations. | **Onshore**: Environmental justice populations near ports supporting Project construction or near the proposed landing site and onshore transmission cable route could experience noise impacts. Noise impacts to environmental justice populations near ports would be short term **negligible** to **minor** adverse and impacts during Project construction activities at the proposed landing site and along the onshore transmission cable route would be short term **minor** adverse.<br>impacts to land uses from Project onshore facilities' O&M noise would be **negligible** adverse. Impacts during decommissioning would be similar to the impacts during construction and installation. Therefore, impacts to environmental justice populations would be long term **negligible** adverse during Project O&M, and short term **negligible** to **minor** adverse during decommissioning.<br>The Proposed Action could increase exposure to noise pollution by environmental justice populations beyond conditions under the No Action Alternative. This would be a noticeable but minor adverse incremental impact and would cease when construction is complete. Therefore, when combined with past, present, and other reasonably foreseeable projects, the Project would have short-term **minor** adverse noise impacts on environmental justice populations. | **Onshore**: Construction and installation, O&M, and decommissioning of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts would be similar to the Proposed Action: short term to long term **negligible** to **minor** adverse on environmental justice populations near affected ports and near the proposed landing sites and onshore transmission cable route.<br>Likewise, cumulative impacts to environmental justice populations would be similar to the Proposed Action: short term **minor** adverse. | | | | **Onshore**: Construction and installation, O&M, and decommissioning of onshore facilities under Alternative G would not be markedly different from the Proposed Action; therefore, impacts would be similar to the Proposed Action: short term to long term **negligible** to **minor** adverse on environmental justice populations near affected ports and near the proposed landing sites and onshore transmission cable route.<br>Likewise, cumulative impacts to environmental justice populations would be similar to the Proposed Action: short term **minor** adverse. |
| Presence of structures | **Offshore**: To the extent that the impacts of offshore structures result in declines in the economic performance of commercial fishing activities in which members of environmental justice populations are engaged, these | **Offshore**: To the extent that the impacts of offshore structures result in declines in the economic performance of commercial fishing activities in which members of environmental justice populations are engaged, these populations could be disproportionately adversely affected. However, | **Offshore**: If certain WTG positions are omitted under Alternatives C through F, the adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the impact level from the presence of structures would be similar to the Proposed Action: short term to long term **negligible** to **moderate** adverse. | | | | **Offshore**: If certain WTG positions are omitted under Alternative G, the adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the impact level from the |

<table>
<tr><th>Impact-Producing Factor</th><th>No Action Alternative</th><th>Alternative B (Proposed Action) up to 100 WTGs</th><th>Alternative C (Habitat Alternative) 64–65 WTGs</th><th>Alternative D (Transit Alternative) 78 to 93 WTGs</th><th>Alternative E (Viewshed Alternative) 64–81 WTGs</th><th>Alternative F (Higher Capacity Turbine Alternative) 56 WTGs</th><th>Alternative G (Preferred Alternative) 65 WTGs</th></tr>
<tr><td></td><td>populations could be disproportionately adversely affected. Impacts to environmental justice populations would be long term negligible to major adverse depending on the fishery and fishing operation. If BOEM’s recommendations related to project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects, adverse impacts on environmental justice population engaged in fisheries due to the presence of structures could be reduced.<br><br>Offshore construction of WTG and OSS foundations could damage submerged ancient landforms that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. If an ancient submerged landform is disturbed during offshore construction, the impact on the cultural resource would be permanent, resulting in a long-term major adverse impact on the affected Native American tribes. The adverse impact on Native American tribes would be long term negligible to minor if offshore wind energy project construction and installation, O&M, and decommissioning can avoid these cultural resources.<br><br>The construction and presence of the offshore components could also result in modification to the existing viewshed during the daytime because a range of WTG structures would be visible on the horizon. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures has the potential to adversely affect environmental justice populations. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic</td><td>adverse impacts to commercial and for-hire recreational fisheries would be reduced with EPMs. Therefore, the economic impacts of new cable emplacement and maintenance to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term negligible to moderate adverse during construction and decommissioning and long term negligible to moderate adverse during operations.<br><br>Members of environmental justice populations for whom subsistence fisheries are an important food source are not expected to lose access to fishing areas on the shoreline or close to shore during construction of the offshore RWEC and the Project’s offshore components. Therefore, potential impacts to environmental justice populations from reduced subsistence fishing opportunities caused by dredging are considered long term but negligible adverse. Impacts to these individuals during Project O&M would be long term but negligible to minor adverse. Potential impacts from reduced subsistence fishing opportunities caused by dredging are expected to be long term but negligible adverse during Project O&M.<br><br>The construction and presence of the offshore Project components would result in modification to the existing viewshed during the daytime because a range of RWF WTG structures would be visible on the horizon. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures has the potential to adversely affect environmental justice populations. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.<br><br>The presence of structures impacts on submerged marine cultural resources from ongoing and future offshore activities, including the Project, could have long-term major adverse disproportionate impacts on Native American tribes if these cultural resources are disturbed. If the Proposed Action, together with ongoing and reasonably foreseeable activities, are able to avoid these cultural resources, the impact on Native American tribes would be long term negligible to minor adverse.</td><td colspan="4">In addition, the omission of certain WTG positions could reduce impacts to submerged ancient landforms important to Native American tribes. However, the impact level from the presence of structures would be similar to the Proposed Action: long term negligible to minor adverse if construction and decommissioning are able to avoid cultural resources; long term major adverse if construction and decommissioning are unable to avoid cultural resources.<br><br>Under Alternatives C through F, fewer WTG structures would be visible on the horizon from various shoreside historic properties of importance to Native American tribes. In particular, Alternative E is primarily focused on setbacks of WTGs from Martha’s Vineyard and would effectively increase distances of Project WTG structures to viewshed resources important to Native American tribes at Aquinnah. However, the impact on environmental justice populations under Alternatives C through F would be similar to the Proposed Action.<br><br>The impact level from the presence of structures of Alternatives C through F would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in commercial and for-hire recreational fisheries would be similar to the Proposed Action: long term moderate to major adverse depending on the fishery and fishing operation. The cumulative impacts on Native American tribes that trace their ancestry to submerged marine cultural resources would be similar to the Proposed Action: long term major adverse if construction of the Proposed Action and reasonably foreseeable projects are unable to avoid cultural resources, and long term negligible to minor adverse if construction of the Proposed Action and reasonably foreseeable projects are able to avoid cultural resources.</td><td>presence of structures would be similar to the Proposed Action: short term to long term negligible to moderate adverse.<br><br>In addition, the omission of certain WTG positions could reduce impacts to submerged ancient landforms important to Native American tribes. However, the impact level from the presence of structures would be similar to the Proposed Action: long term negligible to minor adverse if construction and decommissioning are able to avoid cultural resources and long term major adverse if construction and decommissioning are unable to avoid cultural resources.<br><br>Under Alternative G, fewer WTG structures would be visible on the horizon from various shoreside historic properties of importance to Native American tribes. However, the impact on environmental justice populations under Alternative G would be similar to the Proposed Action.<br><br>The impact level from the presence of structures under Alternative G would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in commercial and for-hire recreational fisheries would be similar to the Proposed Action: long term moderate to major adverse depending on the fishery and fishing operation. The cumulative impacts on Native American tribes that trace their ancestry to submerged marine cultural resources would be similar to the Proposed Action: long term major adverse if construction of the Proposed Action and reasonably foreseeable projects are unable to avoid cultural resources, and long term negligible to minor adverse if construction of the Proposed Action and reasonably foreseeable projects are able to avoid cultural resources.</td></tr>
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| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | properties, the adverse effects, and the resolution of adverse effects. | The cumulative economic impact to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing resulting from the presence of structures would be long term **moderate** to **major** adverse depending on the fishery and fishing operation. | | | | | |
| Vessel traffic | **Offshore**: Vessel traffic from construction, O&M, and decommissioning activities related to offshore wind energy development could result in revenue reductions for commercial fishing businesses that operate in the areas offshore from the GAA. Given that the potential for vessel congestion and gear conflict is expected to be long term, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries would be long term **minor** to **moderate**. | **Offshore**: Vessel traffic from offshore activities related to Project construction, O&M, and decommissioning activities could result in revenue reductions for commercial fishing businesses that operate in the areas offshore from the GAA. Given that the potential for vessel congestion and gear conflict is expected to be long term, the economic effects to members of environmental justice populations engaged in commercial fisheries would be long term **minor** to **moderate** adverse**.**<br>Vessel traffic from ongoing and future offshore activities, including the Proposed Action, is expected to continue. Therefore, the cumulative economic impacts to members of environmental justice populations engaged in commercial fisheries would be long term **minor** to **moderate** adverse. | **Offshore**: If certain WTG positions are omitted under Alternatives C through F, the adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the vessel traffic impact level would still be similar to the Proposed Action: long term **minor** to **moderate** adverse.<br>The vessel traffic impact of Alternatives C through F would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in commercial fisheries would be similar to the Proposed Action: long term **minor** to **moderate** adverse. | | | | **Offshore**: If certain WTG positions are omitted under Alternative G, the adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the vessel traffic impact level would still be similar to the Proposed Action: long term **minor** to **moderate** adverse.<br>The vessel traffic impact of Alternative G would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in commercial fisheries would be similar to the Proposed Action: long term **minor** to **moderate** adverse. |
| Vehicular traffic | **Onshore**: During construction of onshore facilities of future offshore wind energy development projects, neighboring or adjacent land to reasonably foreseeable projects could temporarily be disturbed by project–related vehicular traffic. State and local agencies would be responsible for managing actions to help minimize and avoid vehicular traffic impacts on nearby neighborhoods during construction. Therefore, environmental justice populations near onshore facilities or ports used for construction staging are expected to experience short-term **minor** adverse impacts during project construction and decommissioning activities and long-term **negligible** adverse impacts during project operations. | **Onshore**: Environmental justice populations near ports supporting Project construction or the proposed landing site and onshore transmission cable route could experience traffic impacts. Access to neighborhoods would be maintained, and activity and development from the Project would not occur at levels above those typically experienced or expected at these facilities and would not hinder other nearby land use. Therefore, impacts to environmental justice populations associated with vehicular traffic at ports during Project construction and decommissioning would be short term **minor** adverse. Construction of onshore facilities would temporarily disturb neighboring land uses through intermittent delays in travel along affected roads. State and local agencies would be responsible for managing actions to help minimize and avoid vehicular traffic impacts on nearby neighborhoods during construction. Therefore, impacts to the health and safety of environmental justice populations associated with vehicular traffic during Project construction and decommissioning activities at the proposed landing site and along the onshore | **Onshore**: Construction and installation and decommissioning of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts would be similar to the Proposed Action: short term **minor** adverse on environmental justice populations near affected ports and near the proposed landing sites and onshore transmission cable route. O&M of onshore facilities under Alternatives C through F would be long term **negligible** adverse.<br>Likewise, cumulative impacts to the health and safety of environmental justice populations would be similar to the Proposed Action: short term **minor** adverse. | | | | **Onshore**: Construction and installation and decommissioning of onshore facilities under Alternative G would not be markedly different from the Proposed Action; therefore, impacts would be similar to the Proposed Action: short term **minor** adverse on environmental justice populations near affected ports and near the proposed landing sites and onshore transmission cable route. Impacts from O&M of onshore facilities under Alternative G would be long term **negligible** adverse. Cumulative impacts to the health and safety of environmental justice populations would be similar to the Proposed Action: short term **minor** adverse. |

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| | | transmission cable route would also be short term **minor** adverse.<br>Traffic impacts to the health and safety of environmental justice populations near onshore facilities or ports used for construction staging during Project O&M would be **negligible** adverse.<br>Traffic impacts to the health and safety of environmental justice populations associated with the Project, when combined with the impacts of past, present, and reasonably foreseeable future activities, would be short term **minor** adverse. | | | | | |

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### 3.12.2.2 Alternative A: Impacts of the No Action Alternative on Environmental Justice

#### 3.12.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for environmental justice (see Section 3.12.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1

#### 3.12.2.2.2 Cumulative Impacts

This section discloses potential environmental justice impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

#### Offshore Activities and Facilities

Air emissions: The largest emissions of regulated air pollutants would occur during construction of future offshore wind energy projects. Project air emissions from vessels, helicopters, generators, and fuel-burning equipment used during construction could have temporary **minor** to **moderate** adverse impacts on air quality, depending on the extent and duration of emissions (see Section 3.4). A large portion of the emissions would not be generated near populated areas but would be generated along the vessel transit routes and at the offshore work areas.

Members of environmental justice populations tend to be more burdened with adverse health conditions that can increase susceptibility to the harmful health effects of exposure to air environmental pollution (American Lung Association 2020). Consequently, the adverse impacts to air quality during project construction could result in short-term disproportionately high and adverse health and safety impacts to environmental justice populations near ports used for construction staging. The impacts would be greater if multiple offshore wind projects simultaneously use the same port for construction staging. If construction staging is distributed among several ports, the air emissions would not be concentrated near certain ports, and impacts on proximal environmental justice populations would be less.

During operations, offshore wind energy projects would reduce the need for fossil fuel–combusting power generation, which would have a net beneficial impact on air quality. The reduction in air emissions could produce measurable benefits in terms of lower health costs and loss of life (see Section 3.4). The susceptibility of environmental justice populations to the harmful health effects of air pollution includes exposure to fine particulate matter air pollution from fossil fuel–combusting power generation stations (EPA 2016b; Thind et al. 2019). Given that environmental justice populations tend to be more burdened with adverse health conditions that can increase susceptibility to the harmful effects of air pollution, the beneficial health impacts of reducing air pollution that accrues to these populations could be greater than those experienced by non-environmental justice populations who also reside in the affected area. Therefore, the air quality improvements from offshore wind energy development would have a long-term **minor** to **moderate** beneficial impact on the health and safety of environmental justice populations through a reduction or avoidance of air emissions and concomitant reduction or avoidance of adverse health impacts.

Climate change: Factors that make environmental justice populations particularly vulnerable to the adverse health, safety, and economic impacts of climate change–related events such as heatwaves, heavy flooding, and droughts include where they live, language barriers, their health, and their limited financial resources to cope with these effects (Cho 2020; EPA 2017). Future offshore wind energy project GHG emissions during construction would be short term **negligible** adverse as compared to aggregate global emissions. During O&M, these projects could beneficially contribute to a broader combination of actions to reduce future impacts from climate change trends over the long term (see Section 3.4). However, given the global scale of GHG emissions, the reduction in GHG emissions resulting from offshore wind energy development would have a long-term **negligible** beneficial impact on the health and safety of environmental justice populations.

Light: The view of nighttime aviation warning lighting required for offshore wind structures could have localized impacts on economic activity by affecting the decisions of tourists or visitors in selecting coastal locations to visit (see Section 3.18). To the extent that lighting for offshore wind structures has an adverse economic impact on tourism, environmental justice populations could be disproportionately affected. As described in Section 3.12.1, many of the workers in the service industries that support tourism are members of minority and/or low-income groups. The adverse economic effects of job losses for these workers could be especially severe because they have fewer financial resources to cope with the losses.

Visual impacts on recreation and tourism would be short term during construction and long term during O&M, with negligible to moderate adverse impacts, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed (see Section 3.18). Therefore, economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be short term **minor** to **moderate** adverse during construction and long term **minor** to **moderate** adverse during O&M. If ADLS (or a similar system) is installed on WTGs in other offshore wind energy projects, impacts to environmental justice populations would be reduced to **negligible** to **minor** adverse, as the amount of time WTGs would be visible at night would decrease (see Section 3.20).

Lighting on WTGs could also affect cultural resources (see Section 3.10), including views of the night sky and ocean that are important to Native American tribes. ADLS would reduce the impacts on Native American tribes associated with WTG lighting, but adverse impacts would continue. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

Light from construction, O&M, and decommissioning activities related to offshore wind energy development could result in revenue reductions for commercial fishing and for-hire recreational fishing businesses by decreasing the catch of some target species (see Section 3.9). Certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, would be more vulnerable to job or income losses should Project construction disrupt fishing activities. As described in Section 3.12.1, many of these workers are members of minority and/or low-income groups. Given that adverse lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term (see Section 3.9), the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term **minor** to **moderate**.

New cable emplacement/maintenance: As described in Section 3.10, cable emplacement resulting from future offshore wind energy development in the GAA could damage submerged ancient landforms that have cultural significance to Native American tribes as part of ancient and ongoing tribal practices. Disturbance and destruction of even a portion of an identified submerged landform could reduce or diminish the value of these resources as potential repositories of archaeological knowledge and cultural significance to tribes. BOEM and relevant State Historic Preservation Offices would require offshore wind energy projects to avoid known resources through the creation of avoidance buffers at ancient submerged landform features identified through geotechnical investigations. These measures would avoid or reduce impacts to marine cultural resources. However, in some cases, the number, extent, and dispersed character of these resources could make avoidance impossible. If an ancient, submerged landform is disturbed during offshore cable emplacement, the impact on the cultural resource would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. The impact on Native American tribes would be long term **negligible** to **minor** adverse if offshore wind energy project construction and installation, O&M, and decommissioning can avoid these cultural resources.

The economic impacts of new cable emplacement and maintenance to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to those discussed below under the presence of structures IPF. The potential impacts of both IPFs include loss of employment or income due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9). Therefore, the new cable emplacement/maintenance impact level would be the same as the impact level from the presence of structures: long term **negligible** to **major** adverse depending on the fishery and fishing operation.

Noise: Underwater noise from construction, O&M, and decommissioning activities related to offshore wind energy development could result in revenue reductions for commercial fishing and marine recreational businesses by decreasing the catch of some target species (see Section 3.9). As described in Section 3.12.1, these businesses are a source of employment and income for minority and/or low-income workers. Given that target species are expected to return to an area after the noise ends (see Section 3.9), the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **moderate**.

The localized adverse noise impacts of future offshore wind activities on fishing could affect low-income residents who substantially rely on recreational fisheries as a food source. Similarly, future offshore wind activities could have adverse impacts on the subsistence fisheries of Native American tribes in the GAA. However, typical recreational fishing locations in the area are close to shore (within 1 mile of the coast) (see Section 3.18). In addition, historically, much of the fishing by the region's Native American tribes was concentrated in the nearshore marine and estuarine environment (Bennett 1955). Recent BOEM consultation with Native American tribes in Lease Areas adjacent to the Project indicate that tribal subsistence fisheries continue to occur predominately in inshore areas (BOEM 2020). Consequently, future offshore wind energy projects are expected to have a long-term **negligible** to **minor** adverse impact on the recreational and subsistence fishing activities of environmental justice populations.

Presence of structures: An analysis of the impacts of installation of offshore wind energy structures, including WTGs and offshore submarine cables, to commercial fisheries and for-hire recreational fishing that could result from future offshore wind energy development is provided in Section 3.9. To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial fisheries and for-hire recreational fisheries, members of environmental justice populations could be disproportionately affected. As described in Section 3.12.1, these fisheries are a source of employment and income for minority and/or low-income workers. As described in Section 3.9, for those fishing vessels that 1) derive a large percentage of their total revenue from areas where offshore wind facilities would be located, 2) choose to avoid these areas once the facilities become operational, and 3) are unable to find suitable alternative fishing locations, the adverse impacts of the presence of structures would be long term **major**. However, the number of such fishing businesses is expected to be small. WTG spacing and orientation measures, offshore cable burial, financial compensation programs for fishing interests, and other EPMs and BOEM-required mitigation measures implemented by offshore wind developers, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction, O&M, and decommissioning activities related to offshore wind energy development, would help ensure that most of the commercial fishing and for-hire recreational fishing businesses could continue to operate with minimal disruption (see Section 3.9). Therefore, the adverse economic impacts to low-income and minority workers employed in fishing industry sectors, including harvesting, processing, and shoreside support services, would be long term **negligible** to **major** depending on the fishery and fishing operation.

As described in Section 3.10, offshore construction of WTG and OSS foundations could damage submerged ancient landforms that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. Disturbance and destruction of even a portion of an identified submerged landform could reduce or diminish the value of these resources as potential repositories of archaeological knowledge and cultural significance to tribes. BOEM and relevant State Historic Preservation Offices would require offshore wind energy projects to avoid known resources through the creation of avoidance buffers at ancient, submerged landform features identified through geotechnical investigations. These measures would avoid or reduce impacts to marine cultural resources. However, in some cases, the number, extent, and dispersed character of these resources could make avoidance impossible. If an ancient submerged landform is disturbed during offshore construction, the impact on the cultural resource would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. The adverse impact on Native American tribes would be long term **negligible** to **minor** if offshore wind energy project construction and installation, O&M, and decommissioning can avoid these cultural resources.

The construction of the offshore components of offshore wind energy projects would modify the existing viewshed during the daytime because a number of WTG structures would be visible on the horizon (see Section 3.20). The presence of these structures could affect cultural resources (see Section 3.10), including views of the ocean from various shoreside historic properties of importance to Native American tribes. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures could disproportionately adversely affect environmental justice populations. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

<u>Vessel traffic</u>: Vessel traffic from construction, O&M, and decommissioning activities related to offshore wind energy development could result in revenue reductions for commercial fishing businesses that operate in the areas offshore from the GAA (see Section 3.9). To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial fisheries and for-hire recreational fisheries, members of environmental justice populations could be disproportionately

affected. As described in Section 3.12.1, these fisheries are a source of employment and income for minority and/or low-income workers. Given that the potential for vessel congestion and gear conflict is expected to be long term, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries would be long term **minor** to **moderate**.

### Onshore Activities and Facilities

Accidental releases and discharges: Onshore facilities of future offshore wind activities could affect water quality via accidental spills. See Section 3.21 and Section 3.14 for additional details. Potential impacts to water quality from equipment failure or mismanagement would only be anticipated if there are open bodies of water on or directly adjacent to future onshore facilities. Therefore, environmental justice populations in the GAA are expected to experience **negligible** adverse water quality impacts as a result of future offshore wind activities.

Air emissions: During construction of onshore facilities of future offshore wind energy projects, neighboring or adjacent land to reasonably foreseeable projects could temporarily be disturbed by project–related emissions and dust (see Section 3.14 and Section 3.4). State and local agencies would be responsible for managing actions to help minimize and avoid air quality impacts on nearby neighborhoods during construction. Therefore, the onshore activities associated with offshore wind energy construction are expected to have short-term **minor** to **moderate** adverse air quality impacts on the health and safety of environmental justice populations.

New cable emplacement/maintenance and presence of structures: As described in Section 3.10, activities associated with construction of the onshore components of future offshore wind energy projects, such as emplacement of onshore cables and new building construction, could physically disturb archaeological sites that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. Although BOEM would be able to add terrestrial cultural resources identification requirements and mitigation measures for cables and structures associated with future offshore wind energy projects outside the current terrestrial APE, the potential for permanent, **minor** to **major** adverse impacts on buried cultural resources remains. If archaeological sites that have cultural significance to tribes are disturbed during onshore construction, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. The adverse impact on Native American tribes would be long term **negligible** to **minor** if offshore wind energy project construction and installation, O&M, and decommissioning are able to avoid these cultural resources.

Noise: During construction of onshore facilities of future offshore wind energy development projects, neighboring or adjacent land to onshore construction areas and mustering port(s) of reasonably foreseeable projects could temporarily be disturbed by project-related noise (see Section 3.14). Onshore construction noise would temporarily inconvenience visitors, workers, and residents near sites where onshore cables, onshore substations, or port improvements are installed to support offshore wind.

Impacts would depend on the location of onshore construction in relation to businesses or environmental justice communities. Impacts on environmental justice communities could be short term and intermittent, similar to other onshore utility construction activity. State and local agencies would be responsible for managing actions to help minimize and avoid noise impacts on nearby neighborhoods during construction. Noise generated by offshore wind energy project staging operations at ports could impact the health and safety of environmental justice populations if the port is located near such populations. The noise impacts from increased port utilization would be short term and variable, would be limited to the construction period, and would increase if a port is used for multiple offshore wind projects during the same time period. However, construction sounds specifically related to offshore wind energy project activities at port facilities are expected to be similar to operational sounds associated with routine activities at these ports. In addition, noise impacts would be reduced if intervening buildings, roads, or topography lessen the intensity of noise in nearby residential neighborhoods, or if noise reduction mitigations are used for motorized vehicles and equipment. Therefore, offshore wind energy construction is expected to have short-term **minor** adverse noise impacts on the health and safety of environmental justice populations.

<u>Vehicular traffic</u>: During construction of onshore facilities of future offshore wind energy development projects, neighboring or adjacent land to onshore construction areas and mustering port(s) of reasonably foreseeable projects could temporarily be disturbed by project–related vehicular traffic. See Section 3.14 for additional details. Environmental justice populations near onshore facilities could experience traffic impacts. State and local agencies would be responsible for managing actions to help minimize and avoid vehicular traffic impacts on nearby neighborhoods during construction. Environmental justice populations near ports used for construction staging could also experience traffic impacts. Project-related deliveries would result in trucks loading and unloading materials/equipment as well as vehicle movements to complete assembly, fabrication, and staging of project components and equipment. However, the projected traffic increase at ports is expected to be well within the daily fluctuation of ongoing port-related traffic. In addition, maintenance and protection of traffic setups may be implemented for offshore wind energy projects to minimize impacts to traffic. Therefore, offshore wind energy construction is expected to have short-term **minor** adverse vehicular traffic impacts on the health and safety of environmental justice populations during project construction and decommissioning activities and long-term **negligible** adverse impacts during project operations.

##### 3.12.2.2.3 Conclusions

As discussed in Section 3.11, construction and installation, O&M, and decommissioning of offshore wind energy projects would support new employment and economic activity in the manufacturing sector and marine construction and transportation sectors. Some members of environmental justice populations are expected to experience these employment and income benefits, but the benefits would be no greater for environmental justice populations than those experienced by non-environmental justice populations residing in the GAA.

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on the health and safety of environmental justice populations associated with the Project would not occur.

Considering all the IPFs together, BOEM anticipates that the impacts to environmental justice populations associated with future offshore wind activities in the GAA would be short term during construction and long term during O&M, and **negligible** to **major** adverse. These ratings primarily reflect economic and public health and safety impacts to environmental justice populations due to increases in air emissions, noise, and traffic; decreases in water quality; job and income losses due to the disruption of commercial fisheries, for-hire recreational fishing, or the tourism industry; adverse impacts to subsistence fishing activities; visual impacts on resources culturally important to Native American tribes; and damage to submerged ancient landforms that have cultural significance to Native American tribes. Adverse impacts could be reduced or avoided with mitigation measures. In particular, the impact to Native American tribes due to future offshore wind activities in proximity to landforms and archaeological sites would change from long term **major** adverse to long term **negligible** to **minor** adverse if activities can avoid damage to these cultural resources. Long-term **negligible** to **moderate** beneficial effects to the health and safety of environmental justice populations could result from reductions in air pollution and GHG emissions if offshore wind replaces the need for fossil fuel–combusting power generation.

BOEM anticipates that future offshore wind activities in the GAA, combined with ongoing activities and reasonably foreseeable activities other than offshore wind, would result in an overall long-term **major** adverse impact to environmental justice populations due to climate change trends and disturbance of landforms and archaeological sites of cultural significance to Native American tribes. The impact to Native American tribes due to ongoing and future activities potentially affecting landforms and archaeological sites would be long term **negligible** to **minor** adverse if activities can avoid damage to these cultural resources.

#### 3.12.2.3 Alternative B: Impacts of the Proposed Action on Environmental Justice

As discussed in Section 3.11, construction and installation, O&M, and decommissioning of the Proposed Action and all action alternatives considered in this EIS would support new employment and economic activity in the manufacturing sector and marine construction and transportation sectors. As a result, some members of environmental justice populations residing in the GAA are expected to experience employment and income benefits. Construction of the Project would be governed by the National Offshore Wind Agreement, which is a project labor agreement that would apply to domestic construction activities associated with the Project (VHB 2023). In addition, Revolution Wind is committing $1,000,000 to community-based programming, including $500,000 to the Community College of Rhode Island to help build their Global Wind Organization training center, and $500,000 to Building Futures Rhode Island to enable both new entrants to union construction careers (through pre-apprenticeship). An additional $700,000 will be dedicated to other local programming that creates access to these careers for disadvantaged communities (see Table F-1 in Appendix F).

In addition to supporting the employment described above, BOEM expects construction and installation, O&M, and decommissioning of the Project to affect environmental justice populations through the IPFs listed in the following section.

##### 3.12.2.3.1 Construction and Installation

###### Offshore Activities and Facilities

<u>Air emissions</u>: As described in Section 3.4, during construction, Project air emissions from vessels, helicopters, generators, and fuel-burning equipment could have temporary, direct impacts on New London, Gloucester, Baltimore, Providence, Washington, Bristol, Norfolk, and Norfolk City Counties' air quality. However, potential emissions would be reduced by implementing proposed EPMs (see Table F-1 in Appendix F). Moreover, if the Project cannot demonstrate compliance with the NAAQS, a permit would not be issued and the Project would not proceed. Therefore, the adverse impacts to air quality near populated areas in the GAA during construction are expected to be short term **minor**, and the adverse impacts on the health and safety of environmental justice populations near mustering ports are expected to

be short term **minor** (Figures G-28 through G-33 in Appendix G show potential environmental justice areas of concern near ports).

Light: The Proposed Action would require nighttime construction vessel lighting similar to what is described in the No Action Alternative (see Section 3.12.1.1). To the extent that offshore lighting during Project construction has an adverse economic impact on tourism, environmental justice populations could be disproportionately affected because service industries that support tourism are a source of employment for low-income workers. Visual impacts on recreation and tourism would be short term with **negligible** to **moderate** adverse impacts, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed (see Section 3.18). Therefore, adverse economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be short term **negligible** to **moderate**.

Light from offshore activities related to Project construction could affect cultural resources (see Section 3.10), including views of the night sky and ocean that are important to Native American tribes. Given the cultural significance of viewshed resources to Native American tribes, this lighting has the potential to disproportionately adversely affect environmental justice populations. Revolution Wind has committed to implement ADLS as a measure to reduce light impacts (see Table F-1 in Appendix F). As a result, the adverse impacts of light from offshore activities on views important to Native American tribes would be reduced but not eliminated. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

The adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing during construction of the Project would be the same as described in the No Action Alternative (see Section 3.12.1.1): short term **minor** to **moderate**.

New cable emplacement/maintenance: Offshore cable emplacement during Project construction would be the same as described in the No Action Alternative (see Section 3.12.1.1) and could damage submerged ancient landforms. If these landforms are disturbed during construction of the Proposed Action, a long-term **moderate** to **major** adverse impact on the affected Native American tribes would result. If Project construction is able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse.

As noted in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during construction of the RWEC and IAC. The economic impacts of new cable emplacement to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to those discussed below under the presence of structures IPF. The potential impacts of both IPFs include loss of employment or income due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9), and during construction, these adverse economic impacts are expected to be short term **negligible** to **moderate**.

The closest shore-based fishing access site listed in the Marine Recreational Information Program website at NMFS (2022) to the cable landfall location is Compass Rose Beach near Quonset Point. Compass Rose Beach is approximately 2,600 feet east of the southeast corner of the landfall envelope. Given the distance from the cable landfall location and the use of HDD to reduce disturbance, impacts on any members of environmental justice populations residing in the area who fish for personal use or subsistence near the cable landfall would be short term negligible to minor. Therefore, the new cable emplacement and maintenance impact level would be the same as the impact level from the presence of structures: short term **minor** to **moderate** adverse.

Noise: The localized adverse noise impacts of offshore Project construction activities would be as described in Section 3.12.1.1. Consequently, noise generated by offshore activities during Project construction is expected to have a short-term **moderate** adverse impact on members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing.

Presence of structures: As noted in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during Project construction as a result of the installation of WTGs and OSSs. Certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, would be more vulnerable to job or income losses should Project construction disrupt fishing activities. Section 3.12.1 notes that many of these workers are members of minority and/or low-income groups. As described in Section 3.9, for those fishing vessels that 1) derive a large percentage of their total revenue from areas where offshore wind facilities would be located, 2) choose to avoid these areas once the facilities become operational, and 3) are unable to find suitable alternative fishing locations, the adverse impacts of the presence of structures would be long term **major**. However, the number of such fishing businesses is expected to be small. Revolution Wind's communication plans with the fishing industry and its financial compensation program for damage to or loss of fishing gear (Orsted U.S. Offshore Wind 2020) (see Table F-1 in Appendix F), together with the ability of many fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction activities, would help ensure that fishing businesses could continue to operate with minimal disruption (see Section 3.9). Therefore, adverse economic impacts to low-income and minority workers employed in fishing industry sectors, including harvesting, processing, and shoreside support services, would be short term **negligible** to **moderate**.

Members of environmental justice populations for whom subsistence fisheries are an important food source are not expected to lose access to fishing areas on the shoreline or close to shore during Project construction. As described in Section 3.18, construction staging areas would be located such that public parking, beach access, and access to campsites would be maintained. Additionally, Revolution Wind would inform all mariners, including commercial and recreational fishermen and recreational boaters, of construction activities and vessel movements (see Table F-1 in Appendix F). If the O&M facility is located in the Port of Montauk, initial construction dredging would occur under a separate offshore wind energy project (the SFWF Project). The Marine Recreational Information Program website at NMFS (2022) lists several publicly accessible fishing sites in Montauk that may be used for subsistence fishing by members of environment justice populations residing in the area. However, dredging in the Port of Montauk would occur only within a previously dredged footprint (Roll 2021). Moreover, the impact of this dredging on invertebrate and fish populations would be **negligible** adverse (see Section 3.6.2 and Section 3.13). Therefore, potential impacts to environmental justice populations from reduced subsistence fishing opportunities caused by dredging are considered long term **negligible** adverse.

Construction of the offshore Project components would result in modification to the existing viewshed during the daytime because a range of RWF WTG structures would be visible on the horizon (see Section

3.20). The presence of these structures could affect cultural resources (see Section 3.10), including views of the ocean from various shoreside historic properties of importance to Native American tribes. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures has the potential to disproportionately adversely affect environmental justice populations. The visual impacts of the RWF WTGs would be moderated by their consistent structural appearances and color (see Sections 3.10 and 3.20). BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

Vessel traffic: Vessel traffic from Project construction would be the same as described in the No Action Alternative (see Section 3.12.1.1), and given that the potential for vessel congestion and gear conflict is expected to be short term (see Section 3.9), the adverse economic effects to members of environmental justice populations engaged in commercial fisheries would be short term **minor** to **moderate**.

### Onshore Activities and Facilities

Accidental releases and discharges: Potential fuel or oil spills could occur during Project construction in or near concentrations of environmental justice populations. However, Table F-1 in Appendix F includes EPMs to avoid or reduce potential spill impacts on water quality. Moreover, there are no waterbodies in the path of the onshore transmission cable or on the OnSS or ICF parcels that could be contaminated by an accidental release and discharge resulting from equipment failure or mismanagement during construction (see Section 3.21). Therefore, impacts to the health and safety of environmental justice populations associated with changes in water quality during Project construction would be short term **negligible** adverse.

Air emissions: Environmental justice populations near the proposed landing sites and onshore transmission cable route could experience air quality impacts. Construction of the chosen landing site and onshore transmission cable route would temporarily disturb neighboring land uses through temporary increases in construction dust and emissions from heavy equipment performing clearing, grading, excavation, the installation of foundations, and heavy lifting of substation components. As described in Section 3.12.1, the block group in which most of the closest residences to the proposed onshore Project infrastructure are located is not a potential environmental justice area of concern based on either minority or low-income population criteria. Potential adverse air quality impacts from construction and diesel-generating equipment would be reduced through EPMs related to fuel-efficient engines and dust control plans (see Section 3.14). Therefore, impacts to the health and safety of environmental justice populations near the landing site and onshore transmission cable route associated with changes in air quality during Project construction would be short term **minor** adverse.

New cable emplacement/maintenance and presence of structures: Onshore cable emplacement during Project construction would be the same as described in the No Action Alternative (see Section 3.12.1.1) and could physically disturb archaeological sites. If archaeological sites that have cultural significance to tribes are disturbed during construction, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. If Project construction is able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse.

The construction of the onshore Project components would result in modification to the existing viewshed because the OnSS and ICF infrastructure could be visible (see Section 3.20). The presence of these structures could affect cultural resources (see Section 3.10), including views from various shoreside historic properties of importance to Native American tribes. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures has the potential to disproportionately adversely affect environmental justice populations. However, the OnSS and ICF infrastructure would largely blend with the existing Quonset Point Naval Air Station, and the presence of existing intervening residential development and landscape vegetation along roadways and other viewing locations would further reduce the extent of visual impacts (see Section 3.10 and Section 3.20). BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

<u>Noise</u>: Environmental justice populations near mustering ports that support Project construction could experience noise impacts (Figures G-28 through G-33 in Appendix G show potential environmental justice areas of concern near ports). However, the ports under consideration for construction staging are industrial in character, designated by local zoning and land use plans for heavy industrial activity, and typically adjacent to other industrial or commercial land uses and major transportation corridors. Noise levels are not expected to exceed ambient noise conditions generated by ongoing port activities (see Section 3.14). Therefore, noise impacts to the health and safety of environmental justice populations near ports would be short term **negligible** to **minor** adverse.

Environmental justice populations near the proposed landing site and onshore transmission cable route could also experience noise impacts. The landfall work area at Quonset Point in North Kingstown, Rhode Island, has been developed for industrial use, and the noise from Project construction would not be out of context with a working industrial park (see Section 3.14). The block group in which most of the closest residences to the proposed onshore Project infrastructure are located is not a potential environmental justice area of concern based on either minority or low-income population criteria. Noise generated by Project construction and installation activities is expected to comply with the Town of North Kingstown noise code (see Section 3.14). Additionally, the onshore construction schedule would be designed to minimize impacts to the local community during the summer tourist season (see Table F-1 in Appendix F), thereby reducing the economic impact on members of environmental justice populations employed in service industries that support tourism. Therefore, impacts to the health and safety of environmental justice populations associated with noise during Project construction activities at the proposed landing site and along the onshore transmission cable route would be short term **minor** adverse.

<u>Vehicular traffic</u>: Environmental justice populations near mustering ports that support Project construction could experience traffic impacts (Figures G-28 through G-33 in Appendix G show potential environmental justice areas of concern near ports). Access to neighborhoods would be maintained, and activity and development from the Project would not occur at levels above those typically experienced or expected at these facilities and would not hinder other nearby land use (see Section 3.14). Moreover, maintenance and protection of traffic setups would be implemented to minimize impacts to traffic during Project construction (VHB 2023). Therefore, adverse impacts to the health and safety of environmental justice populations associated with vehicular traffic at ports during Project construction would be short term **minor**.

Environmental justice populations near the proposed landing site and onshore transmission cable route could also experience traffic impacts. Construction of these onshore facilities would temporarily disturb neighboring land uses through intermittent delays in travel along affected roads (see Section 3.14). The block group in which most of the closest residences to the proposed onshore Project infrastructure are located is not a potential environmental justice area of concern based on either minority or low-income population criteria. Revolution Wind would abide by local construction ordinances and would work with the Town of North Kingstown to develop a detailed plan that includes traffic and other control measures prior to beginning major construction. The traffic plan with North Kingstown would identify appropriate alternative routes that would accommodate projected traffic loading during construction activities (see Section 3.14). Additionally, the onshore construction schedule would be designed to minimize traffic impacts to the local community during the summer tourist season (see Table F-1 in Appendix F), thereby reducing the economic impact on members of environmental justice populations employed in service industries that support tourism. Therefore, impacts to the health and safety of environmental justice populations associated with vehicular traffic during Project construction activities at the proposed landing site and along the onshore transmission cable route would be short term **minor** to **moderate** adverse.

#### 3.12.2.3.2 Operations and Maintenance and Decommissioning

##### Offshore Activities and Facilities

<u>Air emissions</u>: During operations, the Project would have an overall long-term **minor** beneficial health impact on populations in the GAA, including environmental justice populations, by avoiding a portion of the air pollutant emissions generated by fossil fuel–combusting energy facilities (see Section 3.4). Given that environmental justice populations tend to be more burdened with adverse health conditions that can increase susceptibility to the harmful effects of air pollution, the beneficial health impacts of reducing air pollution that accrue to these populations could be greater than those experienced by non-environmental justice populations who also reside in the affected area. Impacts during Project decommissioning would be similar to impacts during construction: short term **minor** adverse. There would be no further impacts once decommissioning is complete.

<u>Climate change</u>: Given that environmental justice populations could be particularly vulnerable to the adverse impacts of climate change trends because of where they live, language barriers, their health, and their limited financial resources to cope with these effects, the beneficial impacts of reducing GHG emissions that accrue to these populations could be greater than those experienced by non-environmental justice populations who also reside in the affected area. During operations, the Project would contribute to a broader combination of actions to reduce future impacts from climate change trends over the long term (see Section 3.4). However, given the global scale of GHG emissions, the reduction in GHG emissions resulting from the Project would have a long-term **negligible** beneficial impact on the health and safety of environmental justice populations.

<u>Light</u>: The view of nighttime aviation warning lighting required for O&M of offshore Project facilities is the same as described in the No Action Alternative (see Section 3.12.1.1). However, Revolution Wind has committed to implement ADLS as a measure to reduce light impacts (see Table F-1 in Appendix F), and visual impacts on recreation and tourism during O&M, while long term, are expected to be **negligible** adverse (see Section 3.18). Therefore, adverse economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be long term **negligible**

adverse. Impacts during Project decommissioning would be similar to impacts during construction: short term **negligible** to **moderate** adverse. There would be no further impacts once decommissioning is complete.

Lighting on WTGs could also affect cultural resources (see Section 3.10) during O&M, including views of the night sky and the ocean that are important to Native American tribes. ADLS would reduce the impacts on Native American tribes associated with WTG lighting, but adverse impacts would continue. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects. Impacts during Project decommissioning would be similar to impacts during construction. There would be no further impacts once decommissioning is complete.

Light from O&M activities related to the Project could result in revenue reductions for commercial fishing and for-hire recreational fishing businesses by decreasing the catch of some target species as described in the No Action Alternative (see Section 3.12.1.1). Given that adverse lighting impacts on target species' catch in commercial and for-hire recreational fisheries are expected to be localized and long term, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **minor** to **moderate**. Impacts during Project decommissioning would be similar to impacts during construction: short term **minor** to **moderate** adverse. There would be no further impacts once decommissioning is complete.

<u>New cable emplacement/maintenance</u>: As described in Section 3.10, Project O&M activities in the Lease Area and along the offshore RWEC could impact unknown submerged marine cultural resources of importance to Native American tribes. However, Revolution Wind could conduct O&M activities on equipment in areas that previously experienced disturbance during construction, thereby reducing impacts to submerged marine cultural resources to long term **negligible** adverse. Therefore, adverse impacts to Native American tribes due to potential disturbance of these cultural resources are expected to be long term **negligible**. Impacts during Project decommissioning would be similar to impacts during construction: long term **negligible** to **minor** adverse if Project decommissioning is able to avoid these cultural resources. There would be no further impacts once decommissioning is complete.

As noted in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during maintenance of the RWEC and IAC. The adverse impacts of cable maintenance to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to those discussed below under the presence of structures IPF. The potential impacts of both IPFs include loss of employment or income due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9), and during O&M, these adverse economic impacts are expected to be long term **negligible** to **moderate**. Impacts during Project decommissioning would be similar to impacts during construction: short term **moderate** adverse. There would be no further impacts once decommissioning is complete.

<u>Noise</u>: The localized adverse noise impacts of offshore Project O&M activities would be as described in Section 3.12.1.1. Consequently, noise generated by offshore activities during Project O&M is expected to have a long-term **moderate** adverse impact on members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing.

Presence of structures: As noted in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during Project O&M as a result of the presence of WTGs and OSSs. Certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, could be more vulnerable to job or income losses should Project O&M disrupt fishing activities. Section 3.12.1 notes that many of these workers are members of minority and/or low-income populations. As described in Section 3.9, for those fishing vessels that 1) derive a large percentage of their total revenue from areas where offshore wind facilities would be located, 2) choose to avoid these areas once the facilities become operational, and 3) are unable to find suitable alternative fishing locations, the adverse impacts of the presence of structures would be long term **major**. However, the number of such fishing businesses is expected to be small. Revolution Wind's communication plans with the fishing industry and its financial compensation program for damage to or loss of fishing gear (Orsted U.S. Offshore Wind 2020), together with the ability of many fishing vessel operators to adjust transit and fishing locations to avoid conflicts with operation activities, would help ensure that fishing businesses could continue to operate with minimal disruption (see Section 3.9). Therefore, the adverse economic impacts to low-income and minority workers employed in fishing industry sectors, including harvesting, processing, and shoreside support services, would be long term **negligible** to **moderate** during Project O&M. Impacts during Project decommissioning would be similar to impacts during construction: short term **negligible** to **moderate** adverse. There would be no further impacts once decommissioning is complete.

As described in Section 3.12.1.1, members of environmental justice populations for whom subsistence fisheries are an important food source generally fish close to shore and are not likely to travel and fish within the Lease Area. Therefore, impacts to these individuals during Project O&M would be long term **negligible** to **minor** adverse. If the O&M facility is located in the Port of Montauk, then maintenance dredging would occur, but only within a previously dredged footprint. The impact of this dredging on invertebrate and fish populations would be long term **negligible** adverse (see Section 3.6 and Section 3.13). Therefore, potential impacts to environmental justice populations from reduced subsistence fishing opportunities caused by dredging are expected to be long term **negligible** adverse.

As discussed above, during the daytime, the range of RWF WTG structures would be visible on the horizon from various shoreside historic properties of importance to Native American tribes. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

Vessel traffic: Vessel traffic from offshore activities related to Project O&M could result in revenue reductions for commercial fishing businesses that operate in the areas offshore from the GAA (see Section 3.9). To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial fisheries and for-hire recreational fisheries, members of environmental justice populations could be disproportionately affected. As described in Section 3.12.1, these fisheries are a source of employment and income for minority and/or low-income workers. Given that the potential for vessel congestion and gear conflict is expected to be long term, the economic effects to members of environmental justice populations engaged in commercial fisheries would be long term **minor** to **moderate** adverse. Impacts during Project decommissioning would be similar to impacts during construction: short term **minor** to **moderate** adverse. There would be no further impacts once decommissioning is complete.

### Onshore Activities and Facilities

Accidental releases and discharges: As described in Section 3.21, Project O&M and decommissioning would include the same permit requirements and controls as described for construction activities and would lead to the same **negligible** adverse impacts to water quality. Therefore, adverse water quality impacts to the health and safety of environmental justice populations would be short term **negligible** adverse during Project O&M and short term **negligible** adverse during decommissioning. There would be no further impacts once decommissioning is complete.

Air emissions: As described in Section 3.4, impacts to air quality from Project onshore facilities' O&M emissions would be **negligible** to **minor** adverse. Impacts during decommissioning would be similar to the impacts during construction and installation. Therefore, impacts to the health and safety of environmental justice populations would be long term **negligible** to **minor** adverse during Project O&M and short term **minor** adverse during decommissioning. There would be no further impacts once decommissioning is complete.

Noise: As described in Section 3.14, impacts to land uses from Project onshore facilities' O&M noise would be **negligible** adverse. Impacts during decommissioning would be similar to the impacts during construction and installation. Therefore, impacts to the health and safety of environmental justice populations would be long term **negligible** adverse during Project O&M and short term **negligible** to **minor** adverse during decommissioning. There would be no further impacts once decommissioning is complete.

Vehicular traffic: As described in Section 3.14, traffic impacts to land uses during Project O&M would be **negligible** adverse. Impacts during decommissioning would be similar to the impacts during construction and installation. Therefore, impacts to the health and safety of environmental justice populations would be long term **negligible** adverse during Project O&M and short term **minor** adverse during decommissioning. There would be no further impacts once decommissioning is complete.

#### 3.12.2.3.3 Cumulative Impacts

### Offshore Activities and Facilities

Air emissions: Despite the potential for increased air emissions during construction of the Project and other new offshore wind energy projects, over the long term the reduction in the need for fossil fuel–combusting power generation would have a net beneficial impact on air quality in the GAA (see Section 3.4). Members of environmental justice populations tend to be more burdened with adverse health conditions that can increase susceptibility to the harmful health effects of exposure to environmental pollution, including the fine particulate matter air pollution from fossil fuel–combusting power plants). Therefore, the air quality improvements from offshore wind energy development would have a long-term **minor** to **moderate** beneficial cumulative impact on the health and safety of environmental justice populations.

Climate change: The frequency and intensity of climate-related events such as heat waves and heavy flooding are becoming more frequent and more intense across most land regions, and this trend is expected to continue (IPCC 2021). Factors that make environmental justice populations particularly vulnerable to the adverse health, safety, and economic impacts of climate change–related events such as heat waves, heavy flooding, and droughts include where they live, language barriers, their health, and their limited financial resources to cope with these effects. Therefore, the adverse impacts to the health and safety of environmental justice populations of GHG emissions from ongoing and future offshore activities and facilities could be greater than those experienced by non-environmental justice populations who also reside in the affected area. The Proposed Action, together with other future offshore wind energy projects, could beneficially contribute to a broader combination of actions to reduce future impacts from climate change trends over the long term. However, given the global scale of GHG emissions, environmental justice populations in the affected area are expected to experience adverse cumulative impacts from climate change trends that are long term **major**.

<u>Light</u>: Aviation hazard lighting from 876 WTGs associated with the No Action Alternative and Proposed Action within the recreation and tourism GAA could be visible from coastal locations. The view of this lighting could have localized impacts on economic activity by affecting the decisions of tourists or visitors in selecting coastal locations to visit (see Section 3.18). To the extent that the lighting has an adverse economic impact on tourism, environmental justice populations could be disproportionately affected because service industries that support tourism are a source of employment for low-income workers. The use of ADLS would reduce impacts to tourism, thereby reducing the cumulative economic impact of lighting to environmental justice populations to long term **negligible** adverse.

Cumulatively, the Proposed Action when combined with ongoing and reasonably foreseeable activities could have adverse impacts on viewshed resources (see Section 3.10), including views of the night sky and ocean that are important to Native American tribes. ADLS would reduce the impacts on Native American tribes associated with WTG lighting but adverse impacts would continue. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects of offshore wind energy development, and the resolution of these adverse effects.

Ongoing and future offshore activities, including the Proposed Action, that introduce artificial lighting could result in revenue reductions for commercial fishing and for-hire recreational fishing businesses by decreasing the catch of some target species. Certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, would be more vulnerable to job or income losses should Project construction disrupt fishing activities. As described in Section 3.12.1, many of these workers are members of minority and/or low-income groups. Given that adverse lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term (see Section 3.9), the cumulative economic impacts to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **minor** to **moderate** adverse.

<u>New cable emplacement/maintenance</u>: The cable emplacement impacts on submerged marine cultural resources from ongoing and future offshore activities, including the Project, could have disproportionate adverse impacts on Native American tribes that trace their ancestry to these resources. The Project and other proposed offshore wind energy projects are expected to implement plans to avoid and minimize impacts on submerged marine cultural resources. However, ancient submerged landforms could extend beyond the maximum work area or Lease Area for an undertaking; for this reason, it may not be practicable to avoid these features through Project redesign. Disturbance and destruction of even a portion of an identified submerged landform could reduce or diminish the value of the resource as a potential repository of archaeological knowledge and cultural significance to tribes. Therefore, the Proposed Action

when combined with ongoing and reasonably foreseeable activities could result in long-term **major** adverse cumulative impacts to affected Native American tribes.

To the extent that Project impacts, together with the impacts of ongoing and other future offshore activities, result in declines in the economic performance of commercial and for-hire recreational fisheries, members of environmental justice populations could be disproportionately affected. Certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, would be more vulnerable to job or income losses should Project construction disrupt fishing activities. As described in Section 3.12.1, many of these workers are members of minority and/or low-income groups. Therefore, the Proposed Action when combined with ongoing and reasonably foreseeable activities could result in long-term **moderate** to **major** adverse impacts depending on the fishery and fishing operation. Financial compensation policies implemented by offshore wind developers, together with the ability of some fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction and installation, O&M, and decommissioning activities related to offshore wind energy development, would help ensure that fishing businesses could continue to operate with minimal disruption.

<u>Noise</u>: Ongoing and future offshore activities, including the Proposed Action, that increase underwater noise could result in revenue reductions for commercial fishing and marine recreational businesses by decreasing the catch of some target species. As described in Section 3.12.1, these businesses are a source of employment and income for minority and/or low-income workers. Given that target species are expected to return to an area after the noise ends, the cumulative economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **moderate** adverse.

The localized adverse noise impacts of ongoing and future offshore activities on fishing could affect low-income residents who substantially rely on recreational fisheries as a food source. Similarly, offshore noise could have adverse impacts on the subsistence fisheries of Native American tribes in the GAA. However, as described in Section 3.12.1.1, local recreational and subsistence fisheries occur predominately in inshore areas. Consequently, ongoing and future offshore activities are expected to have a long-term **negligible** to **minor** adverse cumulative impact on the recreational and subsistence fishing activities of environmental justice populations.

<u>Presence of structures</u>: The cumulative economic impacts of offshore structures to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to the cumulative impacts of new cable emplacement and maintenance. The potential impacts of both IPFs include loss of employment or income due to disruption to commercial fishing or for-hire recreational fishing businesses. Therefore, the cumulative impact level from the presence of structures would be the same as the cumulative new cable emplacement and maintenance impact level: long term **moderate** to **major** adverse depending on the fishery and fishing operation. Financial compensation policies implemented by offshore wind developers, together with the ability of some fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction and installation, O&M, and decommissioning activities related to offshore wind energy development, would help ensure that fishing businesses could continue to operate with minimal disruption.

The cumulative impacts of the construction of offshore structures on submerged marine cultural resources from ongoing and future offshore activities, including the Project, could have long-term **major** disproportionate adverse impacts on Native American tribes that trace their ancestry to these resources. The Project and other proposed wind energy projects are expected to implement plans to avoid and minimize impacts on submerged marine cultural resources. However, ancient submerged landforms could extend well beyond the maximum work area or lease block for an undertaking; for this reason, it may not be practicable to avoid these features through Project redesign.

Vessel traffic: Vessel traffic from ongoing and future offshore activities, including the Proposed Action, is expected to continue. Given that the potential for vessel congestion and gear conflict is expected to be long term, the cumulative economic effects to members of environmental justice populations engaged in commercial fisheries would be long term **minor** to **moderate** adverse.

### Onshore Activities and Facilities

Accidental releases and discharges: The Proposed Action is not expected to increase adverse water quality impacts on the health and safety of environmental justice populations beyond conditions under the No Action Alternative. See Section 3.21 and Section 3.14 for additional details regarding water quality impacts. To the extent that decreases in water quality occur as a result of ongoing and future onshore activities, environmental justice populations could experience adverse environmental and health effects. However, it is expected that onshore and offshore development, including the Proposed Action, would comply with all regulatory requirements for water quality protection. Therefore, when combined with past, present, and other reasonably foreseeable projects, the Project would have short term **negligible** to **minor** cumulative adverse water quality impacts on the health and safety of environmental justice populations.

Air emissions: While air emissions in the region would increase temporarily during construction of offshore wind energy projects, including the Proposed Action, the operation of these projects could contribute to a long-term cumulative net decrease in emissions by substituting some existing fossil fuel sources with a renewable source (see Section 3.4). Therefore, past, present, and other reasonably foreseeable projects are expected to have long-term **minor** to **moderate** beneficial impacts on the health and safety of environmental justice populations.

New cable emplacement/maintenance and presence of structures: As described in Section 3.10, activities associated with construction of the onshore components of the Proposed Action and reasonably foreseeable projects, such as emplacement of onshore cables and new building construction, could physically disturb archaeological sites that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. If archaeological sites that have cultural significance to tribes are disturbed during onshore construction, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse cumulative impact on the affected Native American tribes. If construction of the Proposed Action and reasonably foreseeable projects is able to avoid these cultural resources, the cumulative impact on Native American tribes would be long term **negligible** to **minor** adverse.

Noise: The Proposed Action could increase exposure to noise pollution by environmental justice populations beyond conditions under the No Action Alternative. This would be a noticeable but minor adverse incremental impact and would cease when construction is complete (see Section 3.14). To the extent that increases in noise pollution occur as a result of ongoing and future onshore activities, environmental justice populations could experience adverse environmental and health effects. State and local agencies would be responsible for minimizing and avoiding noise and air quality impacts on nearby neighborhoods, including those neighborhoods in which environmental justice populations reside. Therefore, when combined with past, present, and other reasonably foreseeable projects, the Project would have short-term **minor** adverse cumulative noise impacts on the health and safety of environmental justice populations.

Vehicular traffic: The Proposed Action could result in intermittent delays in travel along impacted roads during the construction and installation phase. This would be a noticeable but minor adverse incremental impact and would cease when construction is complete (see Section 3.14). To the extent that increases in vehicular traffic occur as a result of ongoing and future onshore activities, environmental justice populations could experience adverse environmental and health effects. State and local agencies would be responsible for minimizing and avoiding traffic impacts on nearby neighborhoods, including those neighborhoods in which environmental justice populations reside. Therefore, cumulative traffic impacts to environmental justice populations associated with the Project, when combined with the impacts of past, present, and reasonably foreseeable future activities, would be short term **minor** adverse.

#### 3.12.2.3.4 Conclusions

Project construction and installation, O&M, and decommissioning would have short-term to long-term adverse impacts on environmental justice populations, primarily through economic and public health and safety impacts associated with increases in air emissions, noise, and traffic; decreases in water quality; job and income losses due to the disruption of commercial fisheries, for-hire recreational fishing, or the tourism industry; adverse impacts to subsistence fishing activities; visual impacts on resources culturally important to Native American tribes; and damage to submerged ancient landforms that have cultural significance to Native American tribes. BOEM expects the overall level of impacts to environmental justice populations from the Proposed Action alone due to these factors to be **minor** to **moderate** adverse, as impacts could be reduced or avoided with EPMs. In addition, long-term **negligible** to **moderate** beneficial effects to the health and safety of environmental justice populations could result from reductions in air pollution and GHG emissions to the extent that the Project replaces the need for fossil fuel–combusting power generation.

Considering all the IPFs together, BOEM anticipates that the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in an overall long-term **major** adverse impact to environmental justice populations due to climate change trends and disturbance of landforms and archaeological sites of cultural significance to Native American tribes. The impact to Native American tribes due to ongoing and future activities potentially affecting landforms and archaeological sites would be long term **negligible** to **moderate** adverse if activities can avoid damage to these cultural resources.

### 3.12.2.4 Alternatives C, D, E, and F

Table 3.12-4 provides a summary of IPF findings for these alternatives.

#### 3.12.2.4.1 Conclusions

If some WTGs are omitted under Alternatives C through F, a number of adverse impacts could be diminished relative to the Proposed Action. In particular, there could be a reduction in job and income losses due to the disruption of commercial fisheries, for-hire recreational fishing, or the tourism industry; a reduction in visual impacts on resources culturally important to Native American tribes; and a reduction in damage to submerged ancient landforms that have cultural significance to Native American tribes. However, BOEM expects the overall level of impact to environmental justice populations resulting from each alternative alone would be similar to that of the Proposed Action: long term **minor** to **moderate** adverse and long-term **negligible** to **moderate** beneficial. In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's incremental impacts to environmental justice populations would be similar to the Proposed Action. Therefore, the overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be the same as under the Proposed Action: long term **major** adverse due to climate change trends and disturbance of landforms and of archaeological sites of cultural significance to Native American tribes.

### 3.12.2.5 Alternative G: Impacts of the Preferred Alternative on Environmental Justice

Table 3.12-4 provides a summary of IPF findings for this alternative.

#### 3.12.2.5.1 Conclusions

If some WTGs are omitted under Alternative G, a number of adverse impacts could be diminished relative to the Proposed Action. In particular, there could be a reduction in job and income losses due to 1) the disruption of commercial fisheries, for-hire recreational fishing, or the tourism industry and 2) a reduction in visual impacts on resources culturally important to Native American tribes. However, BOEM expects the overall level of impact to environmental justice populations resulting from each alternative alone would be similar to the Proposed Action: long term **minor** to **moderate** adverse and long-term **negligible** to **moderate** beneficial.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternative G's incremental impacts to environmental justice populations would be similar to the Proposed Action. Therefore, the overall impacts of Alternative G when combined with past, present, and reasonably foreseeable activities would be the same as under the Proposed Action: long term **major** adverse due to climate change trends and disturbance of landforms and of archaeological sites of cultural significance to Native American tribes.

### 3.12.2.6 Mitigation

Additional mitigation measures identified by BOEM and cooperating agencies with the potential to reduce impacts to environmental justice populations are provided in Table F-3 in Appendix F and addressed in Table 3.12-5. Table F-3 also lists potential additional mitigation measures identified under other resource areas that could affect environmental justice populations in the areas of benthic habitat and invertebrates, finfish and EFH, commercial and for-hire recreational fishing, cultural resources, marine mammals, navigation and vessel traffic, and recreation and tourism.

**Table 3.12-5. Additional Mitigation and Monitoring Measures for Environmental Justice (Appendix F, Table F-3)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Environmental data sharing with federally recognized tribes | No later than 90 days after COP approval, Revolution Wind must, at a minimum, contact the federally recognized tribes currently consulting on the Project to solicit their interest in receiving access to the following:<br>Reports generated as a result of the fisheries and benthic monitoring plan<br>Reporting of all NARW sightings<br>Reporting of all injured or dead protected species (turtles and NARW)<br>NARW passive acoustic monitoring<br>PSO reports (e.g., weekly pile-driving reports)<br>Pile-driving schedule and changes thereto<br>At a minimum, Revolution Wind should offer access to the following federally recognized tribes: Delaware Nation, Delaware Tribe of Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mohegan Tribe of Connecticut, Narragansett Indian Tribe, Shinnecock Indian Nation, Wampanoag Tribe of Gay Head (Aquinnah).<br>Revolution Wind must provide access to non-proprietary/non-confidential business information to the federally recognized tribes no later than 30 days after the information becomes available. | This measure would not modify the impact determinations for environmental justice; however, the data shared with tribes would keep them informed of activities and impacts occurring in the analysis area. |
| Environmental justice outreach planning | In areas where environmental justice communities experience direct impacts from onshore construction activities relating to onshore cable emplacement and installation of OnSS and ICF infrastructure, Revolution Wind shall establish outreach with local communities to provide opportunities for community residents and local authorities to engage with Revolution Wind on Project activities. This engagement may be partially fulfilled through Revolution Wind's planned coordination with local authorities during construction of onshore facilities to minimize local traffic impacts (see EPM EJ-3 in Table F-1, Appendix F). As applicable, this engagement may also be partially fulfilled by enhanced stakeholder outreach conducted to meet requirements identified in RIDEM's regulations and policies regarding Environmental Justice Focus Areas related to investigation and remediation of contaminated soil and groundwater (see EPM EJ-4 in Table F-1, Appendix F). Revolution Wind shall offer additional | This measure would not modify the impact determinations for environmental justice; however, outreach to local environmental justice communities would keep them informed of activities and impacts occurring in the analysis area and would inform BOEM of any ongoing concerns. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | engagement opportunities, in coordination with applicable local and state authorities, in a timely and locally appropriate manner, including translation into non-English languages as appropriate. Revolution Wind shall summarize and report to BOEM outreach and engagement efforts with environmental justice communities, and outcomes of engagement within 60 days after completion of onshore facilities construction. | |

#### 3.12.2.6.1 Mitigation Measures Incorporated into the Preferred Alternative

BOEM has identified the following additional mitigation measures listed above in Table 3.12-5, and also found in Table F-3 in Appendix F, as incorporated into Alternative G (Preferred Alternative): environmental data sharing with federally recognized tribes and environmental justice outreach planning. Although these measures, if adopted, would not modify the impact determinations on environmental justice populations, they would facilitate the dissemination of Project information to those populations and would support engagement with communities with environmental justice concerns, which is an important element of addressing environmental justice. Such measures could help establish dialogue between potentially impacted environmental justice populations and Revolution Wind, and the reporting component of the outreach planning measure would inform BOEM of any concerns raised by members of environmental justice populations during onshore construction.

# 3.13 Finfish and Essential Fish Habitat

## 3.13.1 Description of the Affected Environment for Finfish and Essential Fish Habitat

### 3.13.1.1 Finfish

Geographic analysis area: The GAAs used in this EIS define a reasonable boundary for assessing the potential effects, including cumulative effects, resulting from the development of an offshore wind energy industry on the Mid-Atlantic OCS. GAAs for marine biological resources are necessarily large because marine populations range broadly, and cumulative impacts can be expressed over broad areas. GAAs are not used as a basis for analyzing the direct and indirect effects of the Proposed Action, which represent a subset of these broader effects and expressed over a smaller area. These impacts are analyzed specific to each IPF.

The finfish GAA encompasses the Scotian Shelf, Northeast Shelf, and Southeast Shelf Large Marine Ecosystems, which captures most of the movement range within U.S. waters for most species in this group. Because the finfish GAA encompasses the Gulf of Maine down to Cape Hatteras, North Carolina, for the purposes of Project-specific analysis, the focus is on finfish that would be likely to have regular or common occurrences in the RWF and RWEC and could be impacted by Project activities (Figure 3.13-1). The finfish GAA encompasses the extent of potential effects on finfish and their habitats. Thus, while Project-related impacts to finfish habitat are restricted to a relatively small footprint, the GAA for Project-impacts to finfish is necessarily large because marine populations and their dispersal patterns range over broad areas exposed to potential cumulative effects from offshore wind energy development.

Affected environment: Details on baseline conditions of the affected environment for finfish are provided in technical reports developed by Revolution Wind (Inspire Environmental 2021, 2023), which are available on BOEM's public Project website (https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan-april-2021). The information presented here summarizes a refined characterization of benthic habitat conditions developed by BOEM and Revolution Wind working in collaboration with NMFS consistent with updated guidance for mapping benthic habitat (NMFS 2021a). The RWF maximum work area overlaps Cox Ledge, an area of concern for fishery managers because it provides important habitat for several commercially and recreationally important species—notably, spawning habitat for Atlantic cod. A portion of Cox Ledge was designated by the New England Fishery Management Council (NEFMC) as a habitat management area to protect EFH for a number of managed fish species. NOAA acknowledged the importance of Cox Ledge but disapproved the designation because it concluded the proposed gear restrictions approved by the NEFMC would likely be ineffective at minimizing impacts on habitat function (NEFMC 2018; NOAA 2017). On July 30, 2022, the NEFMC approved a new Habitat Area of Particular Concern (HAPC) designation to address concerns over potential adverse impacts from offshore wind development on sensitive hard-bottom habitats and cod spawning activity. The Southern New England HAPC comprises all large-grained complex and complex benthic habitats wherever present within the area bounded by a 10-km (6.2-mile) buffer around the RI/MA and MA WEAs (Plante 2022). The designation is intended to protect high-value complex habitats within this area, emphasizing currently known and potentially suitable areas used by Atlantic cod for spawning (Bachman and Couture 2022; NEFMC 2022). This EFH designation was partially informed by the findings of a 3-year BOEM-funded study investigating the use of Cox Ledge and surroundings by spawning Atlantic cod (#AT-19-08) (Van Hoeck et al. 2023).

The designation will also apply to large-grained complex and complex benthic habitats used by Atlantic herring, Atlantic sea scallop (*Placopecten magellanicus*), little skate (*Leucoraja erinacea*), monkfish, ocean pout (*Zoarces americanus*), red hake, silver hake, windowpane flounder (*Scophthalmus aquosus*), winter flounder (*Pseudopleuronectes americanus*), winter skate (*Leucoraja ocellata*), and yellowtail flounder (*Limanda ferruginea*). This new HAPC designation has not yet been implemented and is pending final approval by NMFS. Given the level of concern raised about potential impacts on Cox Ledge and Atlantic cod, the discussion of potential effects presented in the following sections places emphasis on this and other species of particular concern.

Numerous species of finfish belonging to the demersal, pelagic, and shark assemblages could occur in and near the proposed RWF and RWEC. These include several EFH species (see Section 3.13.1.2) and two ESA-listed species. The finfish resources of the region support diverse and highly valued commercial and recreational fisheries (see Section 3.9). BOEM has funded several surveys of finfish species occurrence in the RI/MA WEA, which are summarized by Guida et al. (2017).

Many of the finfish species found in nearshore marine and estuarine environments were historically used by the region's Native American tribes (Bennet 1955) and are targeted by ongoing tribal subsistence fisheries (BOEM 2020).

Finfish can be divided into two general groupings—demersal and pelagic—based on their primary habitat association. Demersal species spend their adult life stage on or close to the ocean bottom and associate with specific types of benthic habitat. Examples include species like Atlantic cod, red and silver hake, and black sea bass that live on or near the seafloor during one or more life stages and species like skates (Rajidae) and flatfish that spend most of their lives directly on the seafloor. Habitat preferences vary between species. For example, black sea bass, Atlantic cod, and haddock associate primarily with complex, rocky benthic habitats (such as cobbles, boulders, and rocky reefs), while red hake and flounder use biogenic complex habitats (such as mussel or oyster reefs), artificial reefs, and shell habitats as well as hard-bottom reefs in some portions of the region.

Pelagic fishes are generally schooling fish that occupy the middle to upper water column as juveniles and adults. Pelagic species occupy the surface to midwater depths (0 to 3,281 feet [0 to 1,000 m]) from the shoreline to the continental shelf and beyond. Examples include Atlantic herring, bluefish (*Pomatomus saltatrix*), and several shark species. Some demersal species, such as Atlantic cod and black sea bass, have pelagic eggs and larvae. Conversely, some pelagic species, such as Atlantic herring, have benthic eggs. Some purely pelagic species, like tunas (Thunnini), are highly migratory and only occur in the near-coastal and shelf surface waters of the Southern New England-New York Bight in the summer, taking advantage of the abundant prey in warm surface waters. Their eggs and larvae are pelagic and broadly distributed.

These two groups encompass a diversity of species that associate with the full range of environment types that occur in the RWF and RWEC portions of the GAA. Estuarine species, such as summer and winter flounder, are commonly found in nearshore areas, where freshwater inputs from large rivers mix with the ocean. Purely marine species are primarily found in offshore environments and include yellowfin tuna (*Thunnus albacares*), bluefin tuna, bluefish, swordfish, blue shark (*Prionace glauca*), common thresher shark (*Alopias vulpinus*), and shortfin mako shark (*Isurus oxyrinchus*).

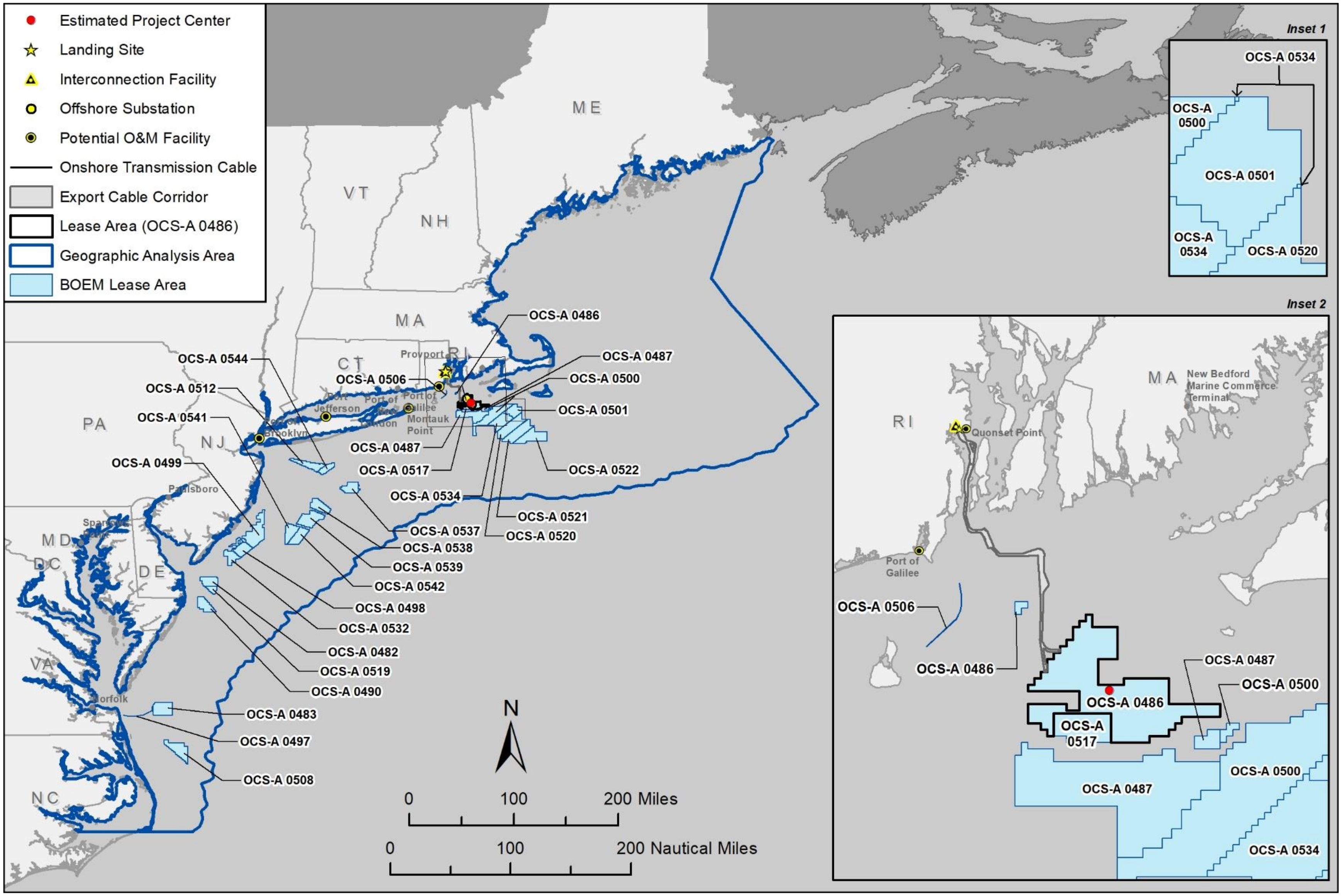


**Figure 3.13-1. Geographic analysis area for finfish and essential fish habitat.**

Anadromous species spawn in freshwater and migrate to the open ocean to grow to adulthood, using estuarine and nearshore marine habitats for migration and larval and juvenile rearing. Four pelagic species of anadromous fish could be present in the Project vicinity and GAA: American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), and Atlantic menhaden (*Brevoortia tyrannus*) (BOEM 2013; Petruny-Parker et al. 2015; Scotti et al. 2010). Additionally, striped bass (*Morone saxatilis*) are likely to use nearshore habitats, and Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*) would use demersal habitats. The catadromous American eel (*Anguilla rostrata*) also occurs as larvae, juvenile glass eels migrating to freshwater, and adults migrating to spawning habitats in the Sargasso Sea. This species uses pelagic habitats on the OCS for larval and juvenile metamorphosis, migration, feeding, and growth (ASMFC 2000).

The demersal and pelagic fish community structure of the Mid-Atlantic and southern New England OCS is shifting due to a combination of factors, including climate change, fishing pressure, and modification of coastal and estuarine habitats (NOAA 2021). For example, the fish community structure in nearby Narraganset Sound has been changing over the past 6 decades, marked by dramatic declines in abundance followed by the slow rebuilding of large predators like sharks (Selachimorpha), the declining abundance of some demersal species (winter flounder, whiting, and red hake), and the increasing abundance for others (Atlantic butterfish, scup [*Stenotomus chrysops*], black sea bass, and squid [Decapodiformes]) (Collie et al. 2008; NOAA 2021). These shifts are mirrored throughout the Mid-Atlantic and southern New England regions (Hare 2016; NOAA 2021).

Five ESA-listed fish species occur in the waters of the Northwest Atlantic OCS: giant manta ray (*Manta birostris*), Atlantic salmon (*Salmo salar*), oceanic whitetip shark (*Carcharhinus longimanus*), Atlantic sturgeon, and shortnose sturgeon (*Acipenser brevirostrum*). Oceanic whitetip sharks are not known to occur in the RWF and RWEC. The oceanic whitetip shark is typically found offshore in the open ocean, on the OCS, or around oceanic islands in water deeper than 604 feet (184 m). The species has a clear preference for open ocean waters between latitudes of 10°N and 10°S but can be found in decreasing numbers out to 30°N and 35°S, with abundance decreasing with greater proximity to continental shelves (Young et al. 2017). This species could conceivably encounter Project vessels in open ocean waters as they travel to the Lease Area from Europe. However, given the low density of oceanic whitetip sharks and the low number of vessel transits from non-local ports, the likelihood of an encounter resulting in a ship strike is discountable. Vessel strikes are not identified as a threat in the status review (Young et al. 2017) or the recovery outline (NMFS 2018); therefore, this species is not considered further in this EIS. The giant manta ray and Atlantic sturgeon are expected to occur in the open marine waters of the Mid-Atlantic OCS where they could be exposed to Project-related effects of the RWF and RWEC. Shortnose sturgeon are unlikely to occur in offshore waters but may be present in nearshore coastal waters of Rhode Island. The species has not been reliably documented within Narragansett Bay (Dadswell et al. 1984; NMFS 1998), but individuals from the nearby Connecticut River population could occur there based on observed migratory patterns between other river systems in New England (Dionne et al. 2013; Fernandes et al. 2010). Critical habitat has not been designated for this species.

The giant manta ray is a pelagic relative of the sharks, most commonly found in open ocean waters well to the south of the RWF and RWEC. However, manta rays migrate seasonally over long distances, and the northern extent of their known range extends to upwelling zones along the edge of the continental shelf immediately south of and potentially including the RWF and RWEC. Critical habitat has not been designated for this species (NMFS et al. 2019). The Atlantic sturgeon is a large demersal, estuarine-dependent, anadromous species that historically spawned in medium-sized to large rivers on the U.S. Atlantic Coast from Labrador to Florida (Atlantic Sturgeon Status Review Team 2007). Five separate distinct population segments (DPSs) of Atlantic sturgeon were listed under the ESA in 2012 (NOAA 2012): Chesapeake Bay (endangered), Carolina (endangered), New York Bight (endangered), South Atlantic (endangered), and Gulf of Maine (threatened). Atlantic sturgeon originating from rivers in Canada are currently not listed. The current marine range of Atlantic sturgeon extends from Labrador Inlet, Labrador, Canada, to Cape Canaveral, Florida (NOAA 2012). Designated critical habitat comprises the core riverine and estuarine habitats used by each DPS (NMFS et al. 2017). Features of Atlantic sturgeon critical habitat include temperature, salinity, dissolved oxygen, water depth, and barriers to passage. The only Project activity that may affect Atlantic sturgeon critical habitat are Project vessel transits within the vessel traffic component of the GAA. Vessels from local ports with rivers in the Atlantic sturgeon New York Bight DPS could travel through critical habitat if the ports are located within or at the mouth of river systems designated as critical habitat for Atlantic sturgeon. If vessel transit for the Project includes ports within Atlantic sturgeon critical habitat, vessel travel from existing ports would have no measurable effect on Atlantic sturgeon critical habitat features. Shortnose sturgeon are an amphidromous species, meaning they spawn and live primarily in freshwater but make extensive use of estuarine and nearshore marine habitats in proximity to their natal rivers (Dionne et al. 2013). This species has been listed as endangered under the ESA since its inception. The closest documented population occurs in the lower Connecticut River approximately 50 miles to the west of the mouth of Narragansett Bay, which is within the range of nearshore migration between estuaries observed in other populations (Dionne et al. 2013; Fernandes et al. 2010).

#### 3.13.1.2 Essential Fish Habitat

Geographic analysis area: The GAA for EFH is the same as that described above for finfish (see Figure 3.13-1).

Affected environment: The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with NMFS on activities that could adversely affect EFH. NOAA defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (NOAA 2004, 2018). The majority of the EFH-listed species occurring in the waters of the Mid-Atlantic and southern New England OCS are managed under federal FMPs developed by the NEFMC and the MAFMC (MAFMC 2019; NEFMC 2018). In addition to these species, several other protected and/or highly migratory species that are managed through FMPs developed by NMFS (2019) are known or likely to occur in the GAA.

EFH-designated species and management groups and a summary of fish stock status that occurs on the southern New England and Mid-Atlantic OCS (MARCO 2019) are presented in Table 3.13-1.

**Table 3.13-1. Southern New England and Mid-Atlantic OCS EFH Species, Management Groups, and Fish Stock Summaries**

| Fishery Management Jurisdiction | Fishery Management Plan | Stock | Is Overfishing Occurring? (harvest exceeds management target) | Is Stock Overfished? (stock abundance is below management target) | Stock Rebuilding Program In Place? |
|---|---|---|---|---|---|
| NEFMC | Atlantic Herring | Atlantic herring - Northwestern Atlantic Coast | No | Yes | Year 1 of 5-year plan |
| | Atlantic Sea Scallop | Sea scallop - Northwestern Atlantic Coast | No | No | No |
| | Northeast Multispecies | Atlantic cod - Georges Bank | Yes | Yes | Year 19 of 23-year plan |
| | | Haddock - Georges Bank | No | No | No |
| | | Atlantic pollock - Gulf of Maine/Georges Bank | No | No | No |
| | | Red hake - Southern Georges Bank/Mid-Atlantic | Yes | Yes | Year 1 of 10-year plan |
| | | Silver hake - Southern Georges Bank/Mid-Atlantic | No | No | No |
| | | White hake - Gulf of Maine/Georges Bank | No | Yes | Year 2 of 10-year plan |
| | | Winter flounder - Southern New England/Mid-Atlantic | No | No - stock rebuilt | No |
| | | Witch flounder - Northwestern Atlantic Coast | Unknown | Yes | Year 4 of 23-year plan |
| | | Yellowtail flounder - Southern New England/Mid-Atlantic | No | Yes | Year 4 of 10-year plan |

| Fishery Management Jurisdiction | Fishery Management Plan | Stock | Is Overfishing Occurring? (harvest exceeds management target) | Is Stock Overfished? (stock abundance is below management target) | Stock Rebuilding Program In Place? |
|---|---|---|---|---|---|
| NEFMC | Northeast Skate Complex | Little skate - Georges Bank/Southern New England | No | No | No |
| | | Winter skate - Georges Bank/Southern New England | No | No | No |
| MAFMC | Surfclam/Ocean Quahog | Atlantic surfclam - Mid-Atlantic Coast | No | No | No |
| | | Ocean quahog - Atlantic Coast | No | No | No |
| | Bluefish | Bluefish - Atlantic Coast | No | Yes | Year 1 of 7-year plan |
| | Mackerel/Squid/Butterfish | Atlantic mackerel - Gulf of Maine/Cape Hatteras | Yes | Yes | Year 3 of 5-year plan |
| | | Butterfish - Gulf of Maine/Cape Hatteras | No | No | No |
| | | Longfin inshore squid - Georges Bank/Cape Hatteras | Unknown | No | No |
| | | Northern shortfin squid - Northwestern Atlantic Coast | No | Unknown | No |
| | Summer Flounder/Scup/Black Sea Bass | Black sea bass - Mid-Atlantic Coast | No | No | No |
| | | Scup - Atlantic Coast | No | No | No |
| | | Summer flounder - Mid-Atlantic Coast | No | No | No |

| Fishery Management Jurisdiction | Fishery Management Plan | Stock | Is Overfishing Occurring? (harvest exceeds management target) | Is Stock Overfished? (stock abundance is below management target) | Stock Rebuilding Program In Place? |
|---|---|---|---|---|---|
| NEFMC/ MAFMC | Monkfish | Goosefish - Southern Georges Bank/Mid-Atlantic | No | No | No |
| | Spiny Dogfish | Spiny dogfish - Atlantic Coast | No | No | No |
| Atlantic Highly Migratory Species | Consolidated Atlantic Highly Migratory Species | Albacore - North Atlantic | No | No | Not applicable (N/A) |
| | | Blacknose shark - Gulf of Mexico | Unknown | Unknown | N/A |
| | | Bluefin tuna - Western Atlantic | No | Unknown | N/A |
| | | Skipjack tuna - Western Atlantic | No | No | N/A |
| | | Yellowfin tuna - Atlantic | No | No | N/A |
| | | Blue shark - North Atlantic | No | No | N/A |
| | | Dusky shark - Atlantic and Gulf of Mexico | Yes | Yes | Year 15 of 100-year plan |
| | | Sandbar shark - Atlantic and Gulf of Mexico | No | Yes | Year 18 of 66-year plan |
| | | Smooth dogfish - Atlantic | No | No | No |
| | | Shortfin mako - North Atlantic | Yes | Yes | Year 4 of plan |
| | | Tiger shark - Atlantic and Gulf of Mexico | Unknown | Unknown | N/A |

Source: NOAA (2022).

Some, but not all, of the EFH species covered by the respective FMPs occur within the RWF and RWEC.

NOAA and fishery management councils also identify HAPCs as a subset of EFH. HAPCs are high-priority areas for conservation, additional management focus, or research because they are rare, sensitive, stressed by development, and/or important to ecosystem function. The only currently designated HAPCs that could be impacted by Project activities are specific habitats for both adult and juvenile summer flounder and juvenile Atlantic cod. However, in July 2022, the NEFMC approved a proposed HAPC designation comprising large-grained complex and complex benthic habitats wherever present within the area bounded by a 6.2-mile buffer around the RI/MA and MA WEAs (Plante 2022). The designation is intended to protect high-value complex habitats within this area, emphasizing currently known and potentially suitable areas used by Atlantic cod for spawning (Bachman and Couture 2022; NEFMC 2022). This designation would also apply to large-grained complex and complex benthic habitats used by Atlantic herring, Atlantic sea scallop, little skate, monkfish, ocean pout, red hake, silver hake, windowpane flounder, winter flounder, winter skate, and yellowtail flounder. This new HAPC designation is currently being finalized and has not yet been implemented.

The summer flounder HAPC includes all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes (i.e., submerged aquatic vegetation [SAV]) in any size bed, as well as loose aggregations found within currently designated adult and juvenile summer flounder EFH. In locations where native SAV species have been eliminated from an area, then exotic species are included (MAFMC et al. 1998). The HAPC for juvenile Atlantic cod is defined as intertidal and benthic structurally complex habitats to a maximum depth of 396 feet (120 m), including eelgrass, mixed sand and gravel, and rocky habitats. The range for juvenile cod in these habitats extends from Maine through, and including portions of Rhode Island. These habitats occur near the RWEC corridor and could be affected by cable emplacement and maintenance and suspended sediment deposition and burial effects.

In the process of developing Project alternatives, BOEM worked collaboratively with NMFS to identify specific areas, or habitat priority zones, within the RWF and RWEC corridor that are of greatest concern for potential adverse impacts to EFH. These habitat priority zones were used to define habitat impact minimization for Alternative C and have been adapted to support the EFH assessment. The zones were modified to provide complete coverage of the maximum work area with contiguous internal boundaries. The modified zones are defined as follows:

- Zone RWF 1: Highest priority area for benthic habitat impact minimization within the Lease Area (boundary modified for EFH assessment)
- Zone RWF 2: Second-highest priority area for benthic habitat impact minimization within the Lease Area (boundary modified for EFH assessment)
- Zones RWF 3a and RWF 3b: Third-highest priority area for benthic habitat impact minimization within the Lease Area (boundary modified for EFH assessment)
- Zone RWF 4: Lowest-priority area for benthic habitat impact minimization within the Lease Area (defined for EFH assessment)
- Zone RWEC-OCS: Portion of RWEC corridor in federal waters (defined for EFH assessment)
- Zone RWEC-RI: Portion of RWEC corridor in Rhode Island waters (defined for EFH assessment)

These habitat priority zones are used to describe existing benthic habitat composition and structure within the maximum work area. This organization supports the characterization of construction and O&M impacts on EFH based on the specific habitat features present within each zone. The habitat priority zones and the distribution of complex, large-grained complex, and soft-bottom benthic habitats within each habitat zone are displayed in Figure 3.13-2 and Figure 3.13-3. Descriptions of each zone, the surveyed area, and proportional distribution of benthic habitat types and features within each zone are presented in the EFH assessment report (BOEM 2023c, 2023d).

BOEM completed an environmental assessment and EFH consultation on the reasonably foreseeable impacts associated with the issuance of leases and subsequent site assessment and site characterization for activities within the RI/MA WEA (BOEM 2013). The assessment included installation and operation of MET towers and buoys and geophysical, geotechnical, archaeological, and biological surveys. BOEM determined that the Project would not significantly affect the quality and quantity of EFH in the environmental assessment's action area. In a letter dated July 30, 2012, the NMFS (2012) concurred with several of BOEM’s standard operating conditions regarding protections they would confer to marine fish and did not raise any objections to lease issuance. However, because the exact placement of MET towers and buoys within the WEA were unknown at the time, the NMFS requested to participate in the review of individual site assessment plans in order to make final conclusions regarding impacts to EFH from site assessment activities. The Project EFH assessment report was submitted to NMFS on February 6, 2023 (BOEM 2023c, 2023d).

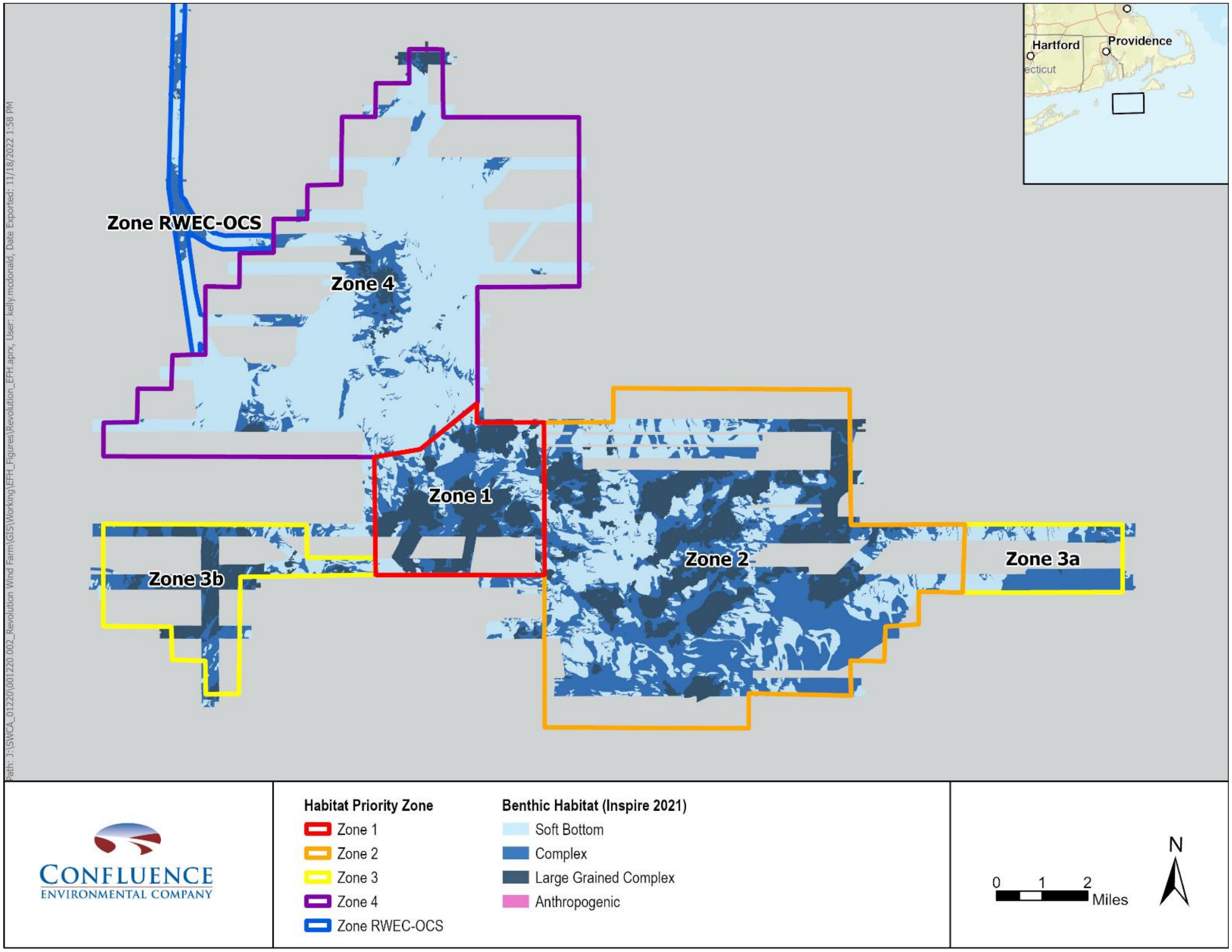


**Figure 3.13-2. Habitat zone boundaries and distribution of large-grained complex, complex, and soft-bottom benthic habitats within the Lease Area (Inspire Environmental 2023).**

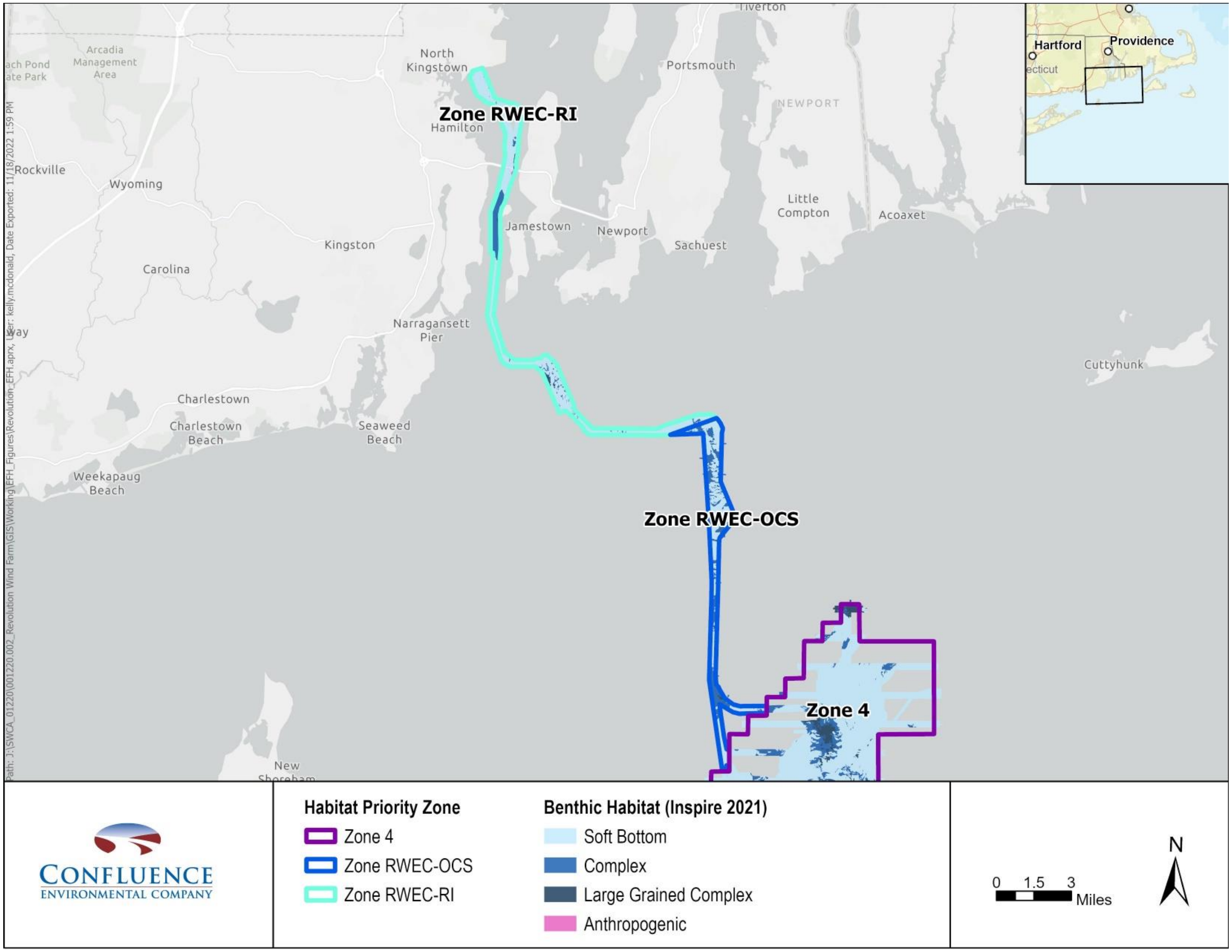


**Figure 3.13-3. Habitat zone boundaries and distribution of large-grained complex, complex, and soft-bottom benthic habitats within the RWEC corridor (Inspire Environmental 2023).**

### 3.13.2 Environmental Consequences

#### 3.13.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

The analysis presented in this section considers the impacts resulting from the maximum-case scenario under the PDE approach developed by BOEM to support offshore wind project development (Rowe et al. 2017). The maximum-case scenario specifications defined in Appendix D, Table D-1 are PDE parameters used to conduct this analysis. Several Project parameters could change during the development of the final Project configuration, potentially reducing the extent and/or intensity of impacts resulting from the associated IPFs. The design parameters in Table 3.13-2 would result in reduced impacts relative to those generated by the design elements considered under the PDE.

**Table 3.13-2. Project Design Parameters That Could Reduce Impacts**

| Design Parameter | Description |
|---|---|
| Fewer WTGs could be permitted | Resulting in fewer offshore structures and reduced IAC length. This would reduce the extent of short-term to permanent impacts on EFH and finfish by reducing the extent of habitat disturbance and suspended sediment deposition impacts from installation of foundations, cables, and scour and cable protection, and associated vessel anchoring activities;<br>reducing the extent and duration of underwater noise impacts from WTG foundation installation; and<br>reducing the extent of reef and hydrodynamic effects resulting from structure presence. |
| Foundation and cable micrositing | Foundation locations and cable routing could be modified to avoid and minimize certain habitat impacts to the greatest extent practicable within design limits. This would reduce long-term to permanent impacts to EFH habitat by reducing the extent of disturbance in large-grained complex and complex habitats. |
| The use of a casing pipe method to construct the RWEC sea-to-shore transition | Would eliminate the need for a temporary cofferdam, resulting in less extensive acoustic and vibration impacts than vibratory pile driving to construct a cofferdam (Zeddies 2021). |
| The use of a temporary cofferdam for RWEC sea-to-shore transition construction | Would reduce turbidity, sediment deposition, and burial effects on finfish and EFH. |

See Appendix E1 for a summary of IPFs analyzed for finfish and EFH across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E, Table E2-4. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives. The duration of impacts (temporal scale) disclosed for this resource deviate slightly from general guidelines provided in Section 3.3.

Table 3.13-3 provides a comparison of all evaluated IPFs for finfish and EFH across alternatives. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers the implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts on finfish and EFH. These EPMs are summarized in Appendix F, Table F-1. Additional EMPs that BOEM could propose, as well as EPMs agreed upon through consultations and agency-to-agency negotiations, are summarized in Appendix F, Tables F-2 and F-3.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. For finfish and EFH, onshore Project activities would not result in impacts to marine resources. Therefore, onshore impacts would have no measurable effects on habitats used by any finfish species and are not evaluated below.

The conclusion section within each alternative analysis discussion includes rationale for the overall effect call determination. Overall, each alternative would result in **moderate** adverse to **moderate** beneficial impacts on finfish and EFH in the GAA, varying by species. Moderate adverse effects could occur because a notable and measurable impact is anticipated, but the resource would likely recover completely when the impacting agents were gone and remedial or mitigating action were taken. Some finfish species could realize moderate beneficial effects from reef effects, which would increase the extent and quality of local habitat for and the abundance of species common to the Lease Area and RWEC corridor over the life of the Project.

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**Table 3.13-3. Alternative Comparison Summary for Finfish and Essential Fish Habitat**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| **Finfish** | | | | | | | |
| Accidental releases and discharges | **Offshore:** Offshore wind energy development could result in the accidental release of water quality contaminants or trash/debris, which could lead to an increase in debris and pollution in the GAA. BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operations of offshore wind energy facilities (30 CFR 250.300). BOEM would require all project construction vessels to adhere to existing state and federal regulations related to ballast and bilge water discharge. Compliance with these and other requirements would effectively minimize releases of trash and debris or nonnative species invasions through ballast water discharge, resulting in ecologically **negligible** adverse impacts. | **Offshore:** BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operations of offshore wind energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). The Project would comply with these requirements (VHB 2023). The Project proponent would also be required to comply with other state and federal regulations to avoid the introduction of nonnative species. Given these restrictions, the impact to finfish from trash and debris from the Project is **negligible** adverse.<br>Given the low potential for spills and the minimal risk of exposure to small short-term spills, the impact from Project-related petroleum spills under reasonably foreseeable circumstances is **negligible** adverse. In the unlikely event of a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse effects on finfish could result.<br>BOEM estimates that the Project when combined with other offshore wind projects would result in approximately 34 million gallons of coolants, fuel, oils, and lubricants cumulatively stored within WTGs and OSSs within the finfish GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. For this reason, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts on finfish ranging from short term to long term in duration. | **Offshore:** See Section 3.13.2.6.1 for construction impact analysis.<br>The risk of accidental releases and discharges under Alternatives C through F would be similar as the Proposed Action and would have a **negligible** adverse impact on finfish because of the low probability of the risk and EPM implementation. The Project would comply with all requirements that disallow the discharge or disposal of solid trash or debris (VHB 2023).<br>Moreover, Alternatives C through F would similarly include inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potentially harmful marine debris from the environment. This would constitute a **minor** beneficial effect on finfish.<br>BOEM anticipates that all projects would follow strict oil spill prevention and response procedures, effectively avoiding the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. For this reason, Alternatives C through F when combined with other past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts on finfish ranging from short term to long term in duration. | | | | **Offshore:** See Section 3.13.2.8.1 for construction impact analysis.<br>The risk of accidental releases and discharges under Alternative G would be similar to the Proposed Action and would have a **negligible** adverse impact on finfish because of the low probability of the risk and EPM implementation. The Project would comply with all requirements that disallow the discharge or disposal of solid trash or debris (VHB 2023).<br>Moreover, Alternative G would similarly include inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potentially harmful marine debris from the environment. This would constitute a **minor** beneficial effect on finfish.<br>BOEM anticipates that all projects would follow strict oil spill prevention and response procedures, effectively avoiding the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. For this reason, Alternative G when combined with other past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts on finfish ranging from short term to long term in duration. |
| Anchoring and new cable emplacement/ maintenance | **Offshore:** Anchoring and cable installation activities would involve direct disturbance of the seafloor, leading to direct impacts on benthic habitats used by demersal finfish. However, these | Offshore: Finfish within the construction footprint would be exposed to risk of displacement, crushing, and burial during seafloor preparation of cable corridors, cable installation, placement of cable protection, and vessel anchoring. These | Offshore: See Section 3.13.2.6.1 for construction impact analysis.<br>Similar to the Proposed Action, finfish within the construction footprint would be exposed to risk of displacement, crushing, and burial during seafloor preparation of cable corridors, cable installation, placement of cable protection, and vessel anchoring. These activities would also impact benthic habitats used by managed finfish, including complex and large-grained complex | | | | **Offshore:** See Section 3.13.2.8.1 for construction impact analysis.<br>Alternative G would reduce the total length of IAC relative to the Proposed Action, meaning that the total amount of cable |

<table>
<tr><th>Impact-Producing Factor</th><th>No Action Alternative</th><th>Alternative B (Proposed Action) up to 100 WTGs</th><th>Alternative C (Habitat Alternative) 64–65 WTGs</th><th>Alternative D (Transit Alternative) 78 to 93 WTGs</th><th>Alternative E (Viewshed Alternative) 64–81 WTGs</th><th>Alternative F (Higher Capacity Turbine Alternative) 56 WTGs</th><th>Alternative G (Preferred Alternative) 65 WTGs</th></tr>
<tr><td></td><td>impacts would be limited in extent relative to the total amount of habitat available in the finfish GAA. The affected habitats would recover to fully functional condition for finfish without mitigation. Therefore, impacts to finfish from vessel anchoring and cable installation would be minor adverse.</td><td>activities would also impact benthic habitats used by managed finfish, including complex and large-grained complex habitats that support Atlantic cod spawning. Cod spawning activity within the Lease Area could be disturbed if anchoring and cable emplacement activities (e.g., grapnel runs and jet plowing) occur in proximity. EPMs committed to by Revolution Wind (see Table F-1, Appendix F)—such as using a boulder grab and a work-class remotely operated vehicle boulder skid for most boulder relocations, siting the RWF and RWEC to avoid hard-bottom habitats, and developing a construction anchoring plan—would minimize impacts and modifications to large-grained complex and complex habitats that support spawning cod and other managed finfish (see Section 3.13.2.10 and Table 3.13-13).<br><br>Disturbance impacts to soft-bottom benthic habitats and associated fish species would be short term, and these habitats and species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could be long term to permanent. Long-term impacts to habitat-forming organisms in complex habitats would require several years to recover full habitat function. Permanent habitat impacts would result where seafloor preparation and placement of scour protection result in conversion to a new habitat. Permanent habitat impacts would result where seafloor preparation and placement of scour protection result in conversion to a new habitat type. Although habitat structure may be altered, habitat composition in the affected areas would recover to functional condition over the life of the Project.<br><br>Activities resulting in the entrainment of eggs and larvae would constitute a short-term adverse impact on finfish that would not result in measurable population-level impacts. On balance, these impacts would be minor to moderate adverse.<br><br>Anchoring, cable protection maintenance, and the eventual decommissioning and removal of buried cables would produce similar effects on finfish as those described for Project construction. These would include direct disturbance of the seafloor, suspended sediment deposition in the</td><td colspan="4">habitats that support Atlantic cod spawning. Cod spawning activity could be disturbed if anchoring and cable emplacement activities (e.g., grapnel runs and jet plowing) occur in proximity. EPMs committed to by Revolution Wind (see Table F-1, Appendix F)— such as using a boulder grab and a work-class remotely operated vehicle boulder skid for most boulder relocations, siting the RWF and RWEC to avoid hard-bottom habitats, and developing a construction anchoring plan—would minimize impacts and modifications to large-grained complex and complex habitats that support spawning cod and other managed finfish (see Section 3.13.2.10 and Table 3.13-13).<br><br>Disturbance impacts to soft-bottom benthic habitats and associated fish species would be short term, and these habitats and species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could take several years to recover to full habitat function.<br><br>Configurations of Alternative C would reduce the total number of turbines and acres of impacts to complex and large-grained complex habitats within Zones RWF 1 and 2 that support managed finfish and would reduce the likelihood of disturbances to Atlantic cod spawning activity relative to the Proposed Action and Alternatives D, E, F, and G.<br>Combining Alternatives C and F would result in further reductions of impacts due to the reduction in turbines and associated reductions in activities that could impact Atlantic cod (i.e., pile driving, anchoring, cable emplacement, and seafloor preparation).<br><br>Alternatives C through F would reduce the total length of IAC relative to the Proposed Action, meaning that the total amount of cable construction and maintenance-related impacts on benthic habitat and finfish would decrease commensurately. However, the effects would still be minor to moderate adverse because each alternative may result in either notable and measurable adverse impacts to the richness or abundance of local finfish species common to the Lease Area or to the extent and quality of local habitat relied upon by finfish common to the Lease Area. Although, finfish and the habitats they rely upon would be expected to recover completely either without remedial or mitigating action or when remedial or mitigating action is taken.<br><br>Alternatives C through F surface occupancy would noticeably reduce the cumulative impact acreage across projects relative to the Proposed Action, but the nature, duration, and general scope of effects would otherwise be similar. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Disturbance impacts to soft-bottom benthic habitats and associated fish species would be short term, and these habitats and species would be expected to fully recover within 18 to 36 months, whereas impacts on complex benthic habitats could take several years to decades to fully recover. Therefore, Alternative C when combined with past, present, and reasonably foreseeable projects would result in minor to moderate adverse cumulative impacts to fish habitat and finfish.</td><td>construction and maintenance-related impacts on benthic EFH and finfish would decrease and the proportional distribution of impacts in soft-bottomed habitat would increase. However, the nature and magnitude of those impacts would be broadly similar to the Proposed Action; therefore, the resulting effects would still be minor to moderate adverse.<br><br>Alternative G surface occupancy would noticeably reduce the cumulative impact acreage across projects relative to the Proposed Action, but the nature, duration, and general scope of effects would otherwise be similar. The duration and magnitude of these effects would vary depending on the types of habitats impacted.<br><br>Atlantic cod spawning could be disturbed if anchoring and cable emplacement activities (e.g., grapnel runs and jet plowing) are occurring in proximity. The base configuration of Alternative G would reduce the total acres of benthic EFH impacts relative to the Proposed Action, and specifically avoid areas leading to less extensive impacts to large-grained complex and complex benthic habitats that support managed finfish, including spawning cod. Alternatives G1 through G3 would further decrease impacts to large-grained complex and complex benthic habitats from vessel anchoring, cable installation and cable protection, and seafloor preparation for foundation installation. Alternative G1 would result in less anchoring and cable emplacement/maintenance activity in the central portion of Zone RWF 1 compared to Alternatives G2 and G3. Most of the recent cod spawning activity within the Lease Area has been observed in the Alternative G2 and G3 areas (Van Hoeck et al. 2023). However, Alternative G1 would still result in anchoring and cable emplacement/maintenance activities that overlap areas observed to support cod spawning relative to Alternative C, which avoids the placement of WTGs</td></tr>
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| | | surrounding area, and injury and displacement of finfish using these habitats. The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSSs into the water column. These activities would result in short-term minor adverse impacts to finfish.<br>BOEM estimates a cumulative total of 11,631 acres of anchoring and mooring-related disturbance and 105,390 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the finfish GAA. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects and other stressors would result in minor to moderate adverse cumulative impacts to finfish. | | | | | within Zone RWF 1 and most of Zone RWF 2. EPMs committed to by Revolution Wind (see Table F-1, Appendix F)— such as using a boulder grab and a work-class remotely operated vehicle boulder skid for most boulder relocations, siting the RWF and RWEC to avoid hard-bottom habitats, and developing a construction anchoring plan—would minimize impacts and modifications to large-grained complex and complex habitats that support spawning cod and other managed finfish (see Section 3.13.2.10 and Table 3.13-13).<br>In addition, BOEM-proposed mitigation and monitoring methods in the EFH assessment (see Table 3.13-13, Section 3.13.2.10) and incorporated into Alternative G—such as micrositing, developing an anchoring plan for both construction and O&M, and the live and hard bottom habitat mapping and avoidance mitigation—would further reduce impacts to benthic EFH that support managed finfish and cod spawning. Disturbance impacts to soft-bottom benthic habitats and associated fish species would be short term, and these habitats and fish species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could be long term to permanent. Long-term impacts to habitat-forming organisms in complex habitats would require several years to recover full habitat function. Permanent habitat impacts would result where seafloor preparation and placement of scour protection result in conversion to a new habitat. Permanent habitat impacts would result where seafloor preparation and placement of scour protection result in conversion to a new habitat type. Although habitat structure may be altered, habitat composition in the affected areas would recover to functional condition over the life of the Project.<br>Therefore, Alternative G when combined with past, present, and reasonably foreseeable projects would result in **minor** to |

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| | | | | | | | **moderate** adverse cumulative impacts to fish habitat and finfish. |
| Bycatch | **Offshore:** A range of monitoring activities has been proposed to evaluate the short-term and long-term effects of existing and planned offshore wind development on biological resources and is also likely for future wind energy projects on the OCS. Some of these monitoring activities are likely to affect finfish through direct sampling and the potential for bycatch and/or damage by sample collection gear. Research and monitoring activities related to offshore wind would not necessarily result in an increase in bycatch-related impacts, although the distribution of those impacts could change. Given this, any bycatch-related impacts on finfish would be **negligible** to **minor** adverse and short term in duration. | **Offshore:** Revolution Wind is proposing to implement the fisheries and benthic monitoring plan (FRMP) as part of the Proposed Action (Revolution Wind and Inspire Environmental 2023). The FRMP employs a variety of survey methods to evaluate the effect of Project construction and operations on benthic habitat structure and composition and economically valuable finfish species. Although the FRMP would result in unavoidable impacts to individual finfish, the extent of habitat disturbance and the number of organisms affected would be small in comparison to the baseline level of impacts from commercial fisheries and would not measurably impact the viability of any species at the population level. Given this, all habitat impacts from FRMP implementation would be short term in duration. The intensity and duration of impacts anticipated from FRMP implementation would constitute a **minor** adverse cumulative effect on finfish. | **Offshore:** The Project would implement the FRMP regardless of the alternative or alternative configuration selected. The impacts of the FRMP on finfish would therefore be the same under Alternatives C through F as the Proposed Action. Therefore, implementation of the FRMP in combination with the anticipated impacts of other planned and likely future monitoring activities would result in **minor** adverse cumulative effects to finfish in the GAA.<br>Alternatives C through F and other planned and future offshore wind energy projects would include fisheries and benthic habitat monitoring plans to gather information about the effects of wind energy development on finfish and other marine resources. These activities would increase knowledge about finfish use of the Mid-Atlantic OCS and the structure and composition of their habitats. This information could lead to improved management of finfish species and key habitats. This would constitute a **minor** beneficial cumulative effect for finfish resources. | | | | **Offshore:** The Project would implement the FRMP regardless of the alternative selected. The impacts of the FRMP on finfish would therefore be the same under Alternative G as the Proposed Action. Therefore, implementation of the FRMP in combination with the anticipated impacts of other planned and likely future monitoring activities would result in **minor** adverse cumulative effects to finfish in the GAA.<br>Alternative G and other planned and future offshore wind energy projects would include fisheries and benthic habitat monitoring plans to gather information about the effects of wind energy development on finfish and other marine resources. These activities would increase knowledge about finfish use of the Mid-Atlantic OCS and the structure and composition of their habitats. This information could lead to improved management of finfish species and key habitats. This would constitute a **minor** beneficial cumulative effect for finfish resources. |
| Climate change | **Offshore:** Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These trends are expected to continue under the No Action Alternative. The intensity of impacts to finfish from climate change are uncertain but are anticipated to range from minor beneficial to **moderate** adverse overall, varying in significance by species. | **Offshore:** The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action, but the Proposed Action could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would be expected to help reduce climate change impacts, resulting in **moderate** adverse cumulative impacts. | **Offshore:** Climate change–related impacts to finfish under Alternative C would be the same as the Proposed Action. Ongoing trends associated with climate change, including increases in water temperature, ocean acidification, changes in runoff and circulation patterns, and species range shifts, are expected to continue under Alternatives C through F. The intensity of climate change cumulative impacts on finfish is uncertain and is likely to vary considerably between species, resulting in **moderate** adverse cumulative impacts. | | | | **Offshore:** Climate change–related impacts to finfish under Alternative G would be the same as the Proposed Action. Ongoing trends associated with climate change, including increases in water temperature, ocean acidification, changes in runoff and circulation patterns, and species range shifts, are expected to continue under Alternative G. The intensity of climate change cumulative impacts on finfish is uncertain and is likely to vary considerably between species, resulting in **moderate** adverse cumulative impacts. |
| EMF | **Offshore:** Under the No Action Alternative, up to 13,469 miles of cable installation would be added in the finfish GAA, producing EMF in the immediate vicinity of each cable during operations. Localized and short-term EMF effects on individual finfish would occur throughout | **Offshore:** Behavioral responses have been observed in some fish species exposed to EMFs, but clear relationships have yet to be established. The Project includes design measures to minimize EMF impacts. Rapid dissipation of EMF over distance therefore means that the effects are | **Offshore:** Cable installation would not result in EMF impacts. Alternatives C through F would result in similar EMF impacts on finfish to the Proposed Action, but those impacts would be reduced in extent due to reductions in the overall length of IAC cable, and the total area exposed would vary depending on the configuration selected (see Table 3.6-10, Table 3.6-26, Table 3.6-27, and Table 3.6-28). The highest EMF levels would occur immediately above exposed cable segments and are the most likely to be detectable by finfish. Any measurable EMF effects, should they occur, would likely be limited to temporary biologically insignificant | | | | **Offshore:** Cable installation would not result in EMF impacts. Project O&M under Alternative G would result in similar EMF impacts on finfish to the Proposed Action, but those impacts would be reduced in extent due to reductions in the overall length of IAC cable and the total area |

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| | the life of each wind energy project but are unlikely to have measurable population-level effects on any species at the scale of the GAA. Therefore, EMF from planned and potential future activities would have a **negligible to minor** adverse effect if HVAC is used, or **moderate** adverse if HVDC is used. | highly localized and are expected to be **minor** adverse.<br>Although uncertainties remain, future actions that produce EMF effects on the order of those generated by the Proposed Action are unlikely to have significant cumulative effects on finfish. BOEM anticipates that future offshore wind energy projects in the GAA would use HVAC transmission and apply similar design measures to avoid and minimize EMF effects on the environment. Cumulative EMF impacts resulting from the Proposed Action in combination with past, present, and reasonably foreseeable activities would therefore result in **minor** adverse effects on finfish from exposure to detectable levels of EMF in limited areas if HVAC is used, or **moderate** adverse if HVDC is used. | behavioral effects. EMF strength would diminish rapidly with distance, becoming undetectable within approximately 30 feet of the cable path (Exponent 2023), resulting in **minor** adverse effects.<br>EMF effects under Alternatives C through F would combine with those generated by the 13,717 miles of new and existing transmission cables from the other new offshore wind facilities planned on the Mid-Atlantic OCS as well as other existing transmission cables. These cumulative effects would be similar to the No Action Alternative but would occur over a larger area, as determined by the broader Project footprint. Cumulative impacts to finfish would therefore be **minor** adverse if HVAC is used, or **moderate** adverse if HVDC is used. | | | | exposed. IAC length under Alternative G would decrease by 39.2 miles relative to the Proposed Action. Alternatives G1, G2, and G3 would decrease IAC length by an additional 9.9, 11.5, and 11.5 miles, respectively (see Table 3.6-10, Table 3.6-26, Table 3.6-27, and Table 3.6-28). The highest EMF levels would occur immediately above exposed cable segments and are the most likely to be detectable by finfish. Any measurable EMF effects, should they occur, would likely be limited to temporary biologically insignificant behavioral effects. EMF strength would diminish rapidly with distance, becoming undetectable within approximately 30 feet of the cable path (Exponent 2023), resulting in **minor** adverse effects.<br>EMF effects under Alternative G would combine with those generated by the 13,717 miles of new and existing transmission cables from the other new offshore wind facilities planned on the Mid-Atlantic OCS as well as other existing transmission cables. These cumulative effects would be similar in nature to the No Action Alternative but would occur over a larger area, as determined by the broader Project footprint. Cumulative impacts to finfish would therefore be **minor** adverse if HVAC is used, or **moderate** adverse if HVDC is used. However, no HVDC projects are currently planned in the GAA. |
| Noise | **Offshore:** Future offshore wind projects would result in noise-generating activities, specifically impact pile driving, HRG surveys, construction and O&M vessel use, and WTG operations. Available information suggests the effects of operational underwater noise from future activities would occur for the life of the projects, would not have population-level effects, and would therefore be **minor** adverse for some species and **negligible** to **minor** adverse for others. On balance, construction noise impacts from future activities that would occur for the life of the projects | **Offshore:** Project construction is likely to result in a short-term to long-term noise impacts sufficient to cause a range of effects on finfish. These effects range from behavioral responses, to masking of biologically important sounds and temporary hearing threshold shifts, to direct injury and mortality. The significance of these effects is likely to vary by species, depending on the number of individuals exposed and the degree to which noise impacts might interfere with important biological functions like spawning. The Proposed Action would include the full build-out of the RWF, which has the potential to disturb spawning Atlantic cod. Time-of-year (TOY) restrictions for pile-driving activity (January | **Offshore**: See Section 3.13.2.4.1 for construction impacts.<br>Project construction and operational noise effects on finfish under Alternatives C through F would be similar in magnitude but reduced in extent relative to the Proposed Action. The same O&M vessels would be used, but fewer vessel trips would be required overall, so the extent and duration of vessel-related noise exposure would also decrease. Configurations of Alternative C would reduce the level of activity and associated noise (e.g., pile driving) relative to the Proposed Action and to Alternative D, E, and F, thereby reducing the geographic extent and duration of noise impacts where Atlantic cod spawning activity in the Lease Area has primarily been observed (i.e., Zone RWF 1) (Van Hoeck et al. 2023). Configurations of Alternatives C and F would result in further reductions of noise impacts due to the reduction in turbines and associated reductions in activities (construction and O&M-related noise, seafloor preparation, etc.) in areas that support spawning cod and other managed finfish that use complex habitats. TOY restrictions for pile-driving activity (January through April and December with contingencies) would reduce the temporal extent of impacts to Atlantic cod spawning, which | | | | **Offshore:** See Section 3.13.2.4.1 for construction impacts.<br>Project construction and operational noise effects on finfish under Alternative G would be similar in magnitude but reduced in extent relative to the Proposed Action. Relative to the Proposed Action, the proposed configurations of Alternative G would construct and operate fewer WTGs and limit the number of WTGs installed in complex and large-grained complex habitats. This would reduce the extent and duration of impacts in these habitat types, which are known to support Atlantic cod |

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| | would likely range from **minor** to **moderate** adverse. | through April and December with contingencies) would reduce the temporal extent of adverse impacts to cod spawning, which data indicate is occurring both within (primarily in Zone RWF 1) and outside the Lease Area from October through March (DeCelles et al. 2017; Inspire Environmental 2018, 2019; Van Hoeck et al. 2023). In addition, ramp-up or soft starts would be used at the beginning of each pile segment during pile driving and/or vibratory pile driving to provide additional protection to mobile species in the vicinity by allowing them to vacate the area prior to the commencement of pile-diving activities, and Revolution Wind would coordinate with Rhode Island Department of Environmental Management (RIDEM) and NOAA NMFS regarding TOY restrictions through the permitting process and would adhere to requirements imposed by these agencies (e.g., TOY restrictions to avoid and/or minimize impacts to winter flounder).<br>On balance, construction noise impacts on finfish would likely range from **minor** to **moderate** adverse.<br>Measurable operational noise would result from the Proposed Action, producing effects detectable by finfish. Those effects are likely to vary in significance by species depending on hearing sensitivity. Effects on species that lack a swim bladder (like sharks, rays, and flatfish) and hearing generalist species (like ocean pout, butterfish, scup, and tunas) are likely to be biologically insignificant. Operational noise could reduce the ability of hearing specialist species (like Atlantic cod, haddock, Atlantic pollock, and hake) to communicate effectively. However, this impact would only be expected to occur within a few hundred feet of each turbine (HDR 2019), and the likelihood of effects (e.g., negative effects on reproduction and survival) in the wild around operational offshore wind farms is unknown (Mooney et al. 2020). Therefore, the effects could range from **negligible** to **minor** adverse based on currently available information.<br>Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction, with the exception that there would be no pile-driving impacts. The impacts of short- | existing data indicate is occurring both within (primarily in Zone RWF 1) and outside the Lease Area between October and March (DeCelles et al. 2017; Inspire Environmental 2019a, 2020; Van Hoeck et al. 2023). In addition, ramp-up or soft starts would be used at the beginning of each pile segment during pile driving and/or vibratory pile driving to provide additional protection to mobile species in the vicinity by allowing them to vacate the area prior to the commencement of pile-diving activities, and Revolution Wind would coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and would adhere to requirements imposed by these agencies (e.g., TOY restrictions to avoid and/or minimize impacts to winter flounder). Proposed mitigations, such as implementation of the passive acoustic monitoring [PAM] plan, would improve understanding of these potential impacts and inform future management and mitigation measures.<br>On balance, construction noise impacts on finfish would likely range from minor to moderate adverse because each alternative may result in either notable and measurable adverse impacts to the richness or abundance of local finfish species common to the Lease Area and RWEC corridor or to the extent and quality of local habitat relied upon by finfish common to these areas. Although, finfish and the habitats they rely on would be expected to recover completely either without remedial or mitigating action or when remedial or mitigating action is taken.<br>Noise effects on finfish from WTG operations could range from negligible to minor adverse depending on how each species uses the affected area during periods when communication is important. For example, operational noise exceeding ambient levels could cause masking effects that reduce the effective communication range for species like cod and haddock. However, this impact would only be expected to occur within a limited area (i.e., within a few hundred feet of a turbine) (HDR 2019), and the likelihood of effects (e.g., negative effects on survival and reproduction) in the wild around operational offshore wind farms is unknown (Van Hoeck et al. 2023; Mooney et al. 2020).<br>Alternatives C through F effects could be additive to areas ensonified by other temporally or spatially overlapping future activities. This could include cumulative impacts to ESA-listed Atlantic sturgeon and manta ray. Shortnose sturgeon are unlikely to be exposed to impact pile-driving noise but could be exposed to underwater noise from UXO detonation and RWEC construction activities in or near Narragansett Bay. Cumulative impacts to shortnose sturgeon are unlikely to occur because their distribution is limited to habitats that are unlikely to be affected by other planned and potential future projects. Fish near impact and vibratory pile-driving activities and UXO detonation could be injured or killed, whereas behavioral effects on fish would extend over greater distances due to vessel activity and O&M-related noise. Such effects, particularly O&M-related noise, would be long term in duration but are unlikely to have a measurable effect on any finfish population at the scale of the GAA. On this basis, cumulative effects on finfish are likely to be negligible to moderate adverse. | | | | spawning and provide habitat functions for other managed fish species. Of the four proposed configurations of Alternative G, Alternative G1 would result in the smallest number of WTGs in the area where the majority of recent cod spawning activity in the Lease Area has been observed (Van Hoeck et al. 2023). Alternative G, particularly Alternative G1, would result in less WTG foundation overlap with cod spawning habitat than any configuration of Alternatives D through F, but more than the two proposed configurations of Alternative C. TOY restrictions for pile-driving activity (January through April) would reduce the temporal extent of impacts to Atlantic cod spawning, which existing data indicate is occurring both within (primarily in Zone RWF 1) and outside the Lease Area between October and March (DeCelles et al. 2017; Inspire Environmental 2019a, 2020; Van Hoeck et al. 2023). In addition, BOEM-proposed mitigation and monitoring methods in the EFH Assessment (see Table 3.13-13, Section 3.13.2.10) and incorporated into Alternative G—such as a TOY restrictions for pile driving from January through April with the addition of December with contingencies and potential IAC installation restrictions pending data collected as part of an Atlantic cod spawning monitoring plan—would help avoid and/or minimize impacts to spawning Atlantic cod and inform future mitigations and monitoring methods. On balance, construction noise impacts on finfish would likely range from **minor** to **moderate** adverse.<br>Alternative G would employ the same types of O&M vessels on a similar schedule to the Proposed Action, but fewer vessel trips would be required overall, so the extent and duration of vessel-related noise exposure would also decrease. Noise effects on finfish from WTG operations could range from **negligible** to **minor** adverse depending on how each species uses the affected area |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| | | term seafloor disturbance and water quality effects on fish would be **negligible** to **minor** adverse.<br>The construction of up to 16 other offshore wind facilities within the GAA for finfish and EFH would result in underwater noise impacts capable of causing short-term injury or behavioral effects on finfish. Three projects within the RI/MA WEA, Sunrise Wind, New England Wind Phase 1, and South Coast Wind, would be constructed during the same period as Revolution Wind (see Table E3-1, Appendix E-3) and could conceivably result in cumulative behavioral-level noise effects on finfish. Vessel noise from the construction and installation as well as O&M activities could cause startle and avoidance responses in fish but would not cause injury. Impacts from O&M vessels and from operations of the WTGs would be permanent across the life of the Project and could result in behavioral responses. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** to **moderate** adverse.<br>The Proposed Action and other planned and future offshore wind energy projects would include fisheries and benthic habitat monitoring plans to gather information about the effects of wind energy development on finfish and other marine resources. These activities would increase knowledge about finfish use of the Mid-Atlantic OCS and the structure and composition of their habitats. This information could lead to improved management of finfish species and key habitats. This would constitute a **minor** beneficial cumulative effect on finfish resources. | | | | | during periods when communication is important. For example, operational noise exceeding ambient levels could cause masking effects that reduce the effective communication range for species like cod and haddock.<br>Alternative G effects could be additive to areas ensonified by other temporally or spatially overlapping future activities. This could include cumulative impacts to ESA-listed Atlantic sturgeon and manta ray. Shortnose sturgeon are unlikely to be exposed to impact pile-driving noise but could be exposed to underwater noise from UXO detonation and RWEC construction activities in or near Narragansett Bay. Cumulative impacts to shortnose sturgeon are unlikely to occur because their distribution is limited to habitats that are unlikely to be affected by other planned and potential future projects. Fish near impact and vibratory pile-driving activities and UXO detonation could be injured or killed, whereas behavioral effects on fish would extend over greater distances due to vessel activity and O&M-related noise. Such effects, particularly O&M-related noise, would be long term but are unlikely to have a measurable effect on any finfish population at the scale of the GAA. On this basis, cumulative effects on finfish are likely to be **minor to moderate** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| Presence of structures | **Offshore:** The future addition of up to 3,113 new WTG and OSS foundations on the Mid-Atlantic OCS could result in hydrodynamic and artificial reef effects that influence finfish community structure in and near the project footprints. Those changes could influence fish community structure within the GAA in the future, but the likelihood, nature, and significance of these potential changes are difficult to predict and a topic of ongoing research. Artificial structures may also provide opportunities for range expansion by invasive species in conjunction with range shifts due to climate change (Degraer et al. 2020; Langhamer 2012; Schulze et al. 2020). Overall, these effects would range in significance from **minor** adverse for some species to **moderate** beneficial for others. | **Offshore:** The installation of up to 102 offshore structures in the form of monopile foundations with associated scour protection would result in the direct disturbance of finfish. The extent of exposure would vary by species and habitat association. Some individual finfish would unavoidably be injured or killed, but the number of individuals affected would be insignificant relative to the size of the population, and the resource would recover completely without additional mitigation. Residual short- to long-term impacts from construction would continue to affect approximately 6,400 additional acres of benthic habitat not otherwise altered by the presence of structures. The time required for functional recovery would vary by habitat type, with soft-bottomed habitats recovering relatively quickly, whereas impacts to large-grained complex and complex benthic habitats could persist for several years. Therefore, effects to finfish and their habitats from Project construction would be **minor** adverse. | **Offshore:** A comparison of the benthic habitat disturbance footprints for foundation installation under the different configurations of Alternatives C through F and the Proposed Action is provided in Table 3.6-4, Table 3.6-11, Table 3.16-12, and Table 3.6-13 in Section 3.6. Implementation of Alternative F in conjunction with Alternatives C, D, and E is estimated to further reduce seafloor disturbance for these alternatives by up to 8% (Alternative C), 21.5% (Alternative D), and 8% (Alternative E). Non-mobile life stages of finfish within these respective footprints would be exposed to displacement, behavioral disturbance, crushing, and burial effects. Although these alternatives would result in slightly less area exposed to potentially harmful effects, construction impacts would not change relative to the Proposed Action and would be **minor** adverse.<br>Once operational, Alternatives C through F would result in long-term to permanent changes in benthic habitat composition and structure similar in nature to the Proposed Action but differing in extent and distribution. Notably, Alternative C would result in less extensive impacts to large-grained complex and complex habitats in both Zones RWF 1 and 2 than the Proposed Action and Alternatives D and E. The complex habitats within Zones RWF 1 and 2 support several species of managed finfish and spawning cod (Van Hoeck et al. 2023) (see Section 3.13.2.4.1 and Figure 3.13-3).<br>The new offshore structures would also cause localized hydrodynamic effects that would influence primary and secondary productivity within and around this artificial reef, and result in broader-scale hydrodynamic effects that could alter how the pelagic eggs and larvae of some finfish species are dispersed across the northern Mid-Atlantic Bight. This could lead to negative, positive, or neutral effects on EFH species that rely on these dispersal patterns, varying by species. The reef effect would alter biological community structure, producing an array of effects on finfish. Those effects could be beneficial or adverse, varying by species. On balance, operational effects to finfish would range from **moderate** adverse to **moderate** beneficial, varying by species and depending on their ability to exploit new habitats created by the placement of artificial structures.<br>Alternatives C through F would produce similar hydrodynamic and reef effects on finfish to the Proposed Action, but those effects would be reduced in extent because fewer structures would be installed. Reef and hydrodynamic effects would be distributed differently, based on the alternative configuration selected, and insufficient information is available to determine if this would result in substantive differences in effects to finfish between alternatives. Operational effects to finfish would range from **moderate** adverse to **moderate** beneficial, varying by species and depending on their ability to exploit new habitats created by the placement of artificial structures.<br>Similarly, impacts generated during decommissioning would be of similar intensity as those generated under the Proposed Action but reduced in extent and duration, ranging from **minor** to **moderate** adverse depending on the species exposed. Individual finfish could be injured or killed during structure removal, the fish community formed around artificial structures would be dispersed, and individuals that are unable to locate new suitable habitats might not survive. | | | | **Offshore:** Implementation of Alternative G is estimated to reduce seafloor disturbance from the Proposed Action and Alternatives D, E, and F, including sensitive habitats important to Atlantic cod and several other managed finfish. Non-mobile life stages of finfish within these respective footprints would be exposed to displacement, behavioral disturbance, crushing, and burial effects. Although this alternative would result in slightly less area exposure to potentially harmful effects, construction impacts would not change relative to the Proposed Action and would be **minor** adverse.<br>Once operational, Alternative G would result in long-term to permanent changes in benthic habitat composition and structure similar in nature to the Proposed Action but differing in extent and distribution. Notably, Alternative G would result in less extensive impacts to large-grained complex and complex habitats on Cox Ledge than the Proposed Action and Alternatives D, E, and F. Alternative G would result in slightly more permanent impacts from structure presence in large-grained complex and complex habitat than Alternatives C1 and C2 (2.7 to 18.6 additional acres, depending on the configuration selected). These habitats are used by several managed finfish, including spawning Atlantic cod, which emerging data indicate is occurring primarily within Zone RWF 1 (Van Hoeck et al. 2023). |

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| | | During operations, the potential effects to finfish and their habitats resulting from the presence of structures are likely to vary by species. The presence of foundations, scour protection, and cable protection would permanently alter the composition and structure of approximately 221 acres of benthic habitat. The available evidence suggests that some demersal fish species are likely to benefit from increased habitat structure and biological productivity, whereas pelagic fishes may also benefit to a lesser extent. However, considerable uncertainty remains about the broader effects of this type of habitat alteration at population scales (Degraer et al. 2020). The Proposed Action is relatively small in scale compared to existing, pending, and planned wind farm developments, suggesting that broader population effects from this one facility are unlikely. Hydrodynamic effects caused by the presence of the wind farm could alter dispersal patterns for pelagic eggs and larvae, which could influence the productivity of some spawning fish populations. Modeling of hydrodynamic effects on representative fish species indicates that any such effects are likely to be localized and not biologically significant at population scales (Johnson et al. 2021). This modeling effort did not consider potential effects on fish stocks, such as Atlantic cod, that spawn in specific locations. However, insufficient information is available to determine the source populations of cod larvae and juveniles occurring in Southern New England waters, and it is uncertain if the area is fully supported by self-recruitment (NEFMC 2022). In theory, hydrodynamic effects on these species could be more significant, but the available information does not suggest that such effects are likely. Hydrodynamic and reef effects could become more significant when combined with those from other planned offshore wind energy projects in the future. On this basis, habitat alteration on finfish resulting from the Proposed Action is expected to be long term in duration and **minor** beneficial to **moderate** adverse in significance. | Alternatives C through F are comparable in scale to several of the offshore renewable energy projects planned in the GAA. BOEM estimates the Proposed Action and other planned future projects will result in the development of 3,146 to 3,183 WTG and OSS foundations in the finfish GAA. Depending on how they are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential biological significance of broader cumulative effects on finfish. Cumulative effects could be beneficial or adverse, varying by species, and would likely range from **minor** to **moderate** adverse in terms of overall impact. | | | | The new offshore structures would also cause localized hydrodynamic effects that would influence primary and secondary productivity within and around this artificial reef, and broader-scale hydrodynamic effects that could alter how the pelagic eggs and larvae of some finfish species are dispersed across the northern Mid-Atlantic Bight. This could lead to negative, positive, or neutral effects on EFH species that rely on these dispersal patterns, varying by species. The reef effect would alter biological community structure, producing an array of effects on EFH species. Those effects could be beneficial or adverse, varying by species. Alternative G would produce similar hydrodynamic and reef effects on finfish to those described for the Proposed Action, but those effects would be reduced in extent because fewer structures would be installed. Operational effects to finfish would range from **moderate** adverse to **moderate** beneficial, varying by species and depending on their ability to exploit new habitats created by the placement of artificial structures.<br>Similarly, impacts generated during decommissioning would be of similar intensity as those generated under the Proposed Action but reduced in extent and duration, ranging from **minor** to **moderate** adverse depending on the species exposed. Individual finfish could be injured or killed during structure removal, the fish community formed around artificial structures would be dispersed, and individuals that are unable to locate new suitable habitats might not survive. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| | | The Proposed Action includes regular inspections of the RWF to identify and remove derelict fishing gear and other trash and debris. Other future projects are expected to include similar measures in their O&M plans, creating an effective mechanism for identifying and removing derelict fishing gear and other dangerous marine debris from the GAA. Collectively, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** beneficial cumulative effects on finfish from removal of derelict fishing gear and marine debris.<br>Cumulative effects are likely to vary by species and could be positive or negative, Cumulative impacts from hydrodynamic and artificial reef effects would likely range from **moderate** beneficial to **moderate** adverse in significance, whereas cumulative impacts from debris removal are likely to be **minor** beneficial. Collectively, cumulative impacts from the combined reef and hydrodynamic effects of multiple offshore wind energy projects on finfish could be positive or negative, varying by species, and would likely range from **moderate** adverse to **moderate** beneficial in significance, varying by species. | | | | | Alternative G is comparable in scale to several of the offshore renewable energy projects planned in the GAA. BOEM estimates that Alternative G and other planned future projects will result in the development of 3,155 WTG and OSS foundations in the finfish GAA. Depending on how they are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential biological significance of broader cumulative effects on finfish. Cumulative effects could be beneficial or adverse, varying by species, and would likely range from **minor** to **moderate** adverse in terms of overall impact. |
| Sediment deposition and burial | **Offshore:** Although suspended sediment and burial effects are an unavoidable consequence of offshore wind energy construction, O&M, and decommissioning, these effects would be limited in extent and short term in duration, effectively ending once the sediments have resettled. Individual finfish could be adversely affected, but the number of individuals impacted and the duration of effects would be unlikely to adversely affect any finfish species at the population level at the scale of the GAA and would therefore be **minor** adverse. | **Offshore:** The Project would result in short-term, elevated levels of suspended sediment near major bed-disturbing activities like cable installation. Given the short-term nature of the impact and the limited extent of significant burial effects relative to the amount of habitat available, burial effects on benthic eggs and larvae would be short term and expected to recover without remedial or mitigating action and therefore **minor** adverse.<br>Cable protection maintenance would produce similar effects on finfish as those described for Project construction, although they would be reduced in extent and spread out over time. The resulting effects from O&M and decommissioning would therefore be **minor** adverse. | **Offshore:** See Section 3.13.2.4.1 for construction impacts.<br>Cable protection maintenance would produce similar effects on finfish as those described for Project construction, although they would be reduced in extent and spread out over time. These effects would range from short-term behavioral disturbance of benthic fauna and other finfish accustomed to naturally high rates of sediment deposition, to mortality of benthic eggs and fish subject to burial effects greater than 0.4 inch (10 mm). The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSS into the water column. The resulting adverse effects from O&M and decommissioning would therefore be **minor** adverse**.**<br>Alternatives C through F would result in localized short-term **minor** adverse sediment deposition and burial effects on finfish. Short-term burial effects exceeding 10 mm would occur over an estimated 7,150 acres within the GAAs for finfish. Construction-related disturbance and suspended sediment effects would impact habitat and could disturb, injure, or kill finfish. | | | | **Offshore:** See Section 3.13.2.4.1 for construction impacts. |

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| | | Cumulative impacts would be more extensive and distributed across offshore WEAs within the GAA. However, these effects would be short term in duration and are not likely to have measurable population-level effects on any finfish species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse. | Alternatives C through F in combination with future offshore wind projects would generate similar sediment deposition and burial effects to those described for the Proposed Action. Juvenile and adult finfish associated with benthic habitats are unlikely to be significantly affected by sediment deposition at the burial depths anticipated, but benthic eggs and larvae of some species could be harmed. Impacts would be short term and would have a limited extent of significant burial effects relative to the amount of habitat available. Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any finfish species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse. | | | | Cable protection maintenance would produce similar effects on finfish as those described for Project construction, although they would be reduced in extent and spread out over time. These effects would range from short-term behavioral disturbance of benthic fauna and other finfish accustomed to naturally high rates of sediment deposition, to mortality of benthic eggs and fish subject to burial effects greater than 0.4 inch (10 mm). The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSS into the water column. The resulting adverse effects from O&M and decommissioning would therefore be **minor** adverse.<br>Alternative G would result in localized short-term **minor** adverse sediment deposition and burial effects on finfish. Short-term burial effects exceeding 10 mm would occur over an estimated 6,578 acres within the GAAs for finfish. Construction-related disturbance and suspended sediment effects would impact habitat and could disturb, injure, or kill finfish.<br>Alternative G in combination with future offshore wind projects would generate similar sediment deposition and burial effects to those described for the Proposed Action. Juvenile and adult finfish associated with benthic habitats are unlikely to be significantly affected by sediment deposition at the burial depths anticipated, but benthic eggs and larvae of some species could be harmed. Impacts would be short term and would have a limited extent of significant burial effects relative to the amount of habitat available. Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any finfish species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| **EFH** | | | | | | | |
| Accidental releases and discharges | **Offshore:** Offshore wind energy development could result in the accidental release of water quality contaminants or trash/debris, which could lead to an increase in debris and pollution in the GAA. However, compliance with BOEM and USCG requirements would effectively minimize releases of trash and debris. Therefore, effects on EFH would be **negligible** adverse. | **Offshore**: BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of environmentally damaging trash or debris (MARPOL, Annex V, Public Law 100–220 (101 Stat. 1458)). Given these restrictions, the risk to EFH species and habitats from trash and debris from the Proposed Action would be **negligible** adverse.<br>The Project would follow strict oil spill prevention and response procedures during all Project phases, effectively avoiding the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse effects to EFH species and their habitats could result.<br>BOEM estimates that the Project when combined with other offshore wind projects would result in approximately 34 million gallons of coolants, fuel, oils, and lubricants cumulatively stored within WTGs and OSSs within the GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. For this reason, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts. | **Offshore:** Similar to the Proposed Action, given the restrictions imposed by BOEM and the USCG, the risk to EFH from trash and debris from Alternatives C through F is negligible adverse. Moreover, Alternatives C through F would similarly include inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potentially harmful marine debris from the environment and would constitute a **minor** beneficial effect on finfish.<br>Similarly, the same strict oil spill prevention and response procedures would apply, effectively avoiding the risk of large-scale environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, minor to moderate adverse effects to EFH could result.<br>Alternatives C through F would slightly reduce total chemical uses relative to the Proposed Action, but this effect would be small in comparison to projected chemical use on the Mid-Atlantic OCS overall. All future offshore energy development projects would comply with BOEM and USCG regulations that prohibit dumping of trash and debris and require measures to avoid and minimize accidental spills. These regulations minimize, but not completely eliminate, the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse cumulative effects would occur. | | | | **Offshore:** Similar to the Proposed Action, given the restrictions imposed by BOEM and the USCG, the risk to EFH from trash and debris from Alternative G is negligible adverse. Moreover, Alternative G would similarly include inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potentially harmful marine debris from the environment. This would constitute a **minor** beneficial effect on finfish.<br>Similarly, the same strict oil spill prevention and response procedures would apply, effectively avoiding the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, minor to moderate adverse effects to EFH could result.<br>Alternative G would slightly reduce total chemical uses relative to the Proposed Action, but this effect would be small in comparison to projected chemical use on the Mid-Atlantic OCS overall. All future offshore energy development projects would comply with BOEM and USCG regulations that prohibit dumping of trash and debris and require measures to avoid and minimize accidental spills. These regulations minimize, but not completely eliminate, the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse cumulative effects would occur. |
| Anchoring and new cable | **Offshore:** Offshore wind energy facility construction would involve direct disturbance of the seafloor leading to direct impacts on finfish. In general, | **Offshore:** Seafloor disturbance from various overlapping cable installation activities, including boulder relocation, jet plow trenching for cable installation, and placement of cable protection, | **Offshore:** The potential impact to EFH related to crushing and burial during construction of Alternatives C through F would be the same as or similar to the Proposed Action and would have a **minor to moderate** adverse impact on EFH. | | | | **Offshore:** The potential impact to EFH related to crushing and burial during construction of Alternative G would be the same as or similar to the Proposed Action |

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| emplacement/ maintenance | these effects would be localized to the disturbance footprint and vicinity. The specific type and extent of habitat conversion and resulting effects on finfish would vary depending on the project design, species present, and site-specific conditions. Therefore, the impacts from this disturbance on finfish would be **minor** adverse. | could impact up to 3,451 acres distributed throughout the RWF and RWEC maximum work areas. Additionally, 10% of cable protection could need to be replaced over the life of the Project. EFH within these construction footprints would be directly exposed to disturbance. Short-term disturbance impacts on soft-bottom benthic habitats would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could be long term to permanent. Long-term impacts to habitat-forming organisms in complex habitats would require several years to recover full habitat function. Permanent habitat impacts would result where seafloor preparation and placement of scour protection result in conversion to a new habitat. Permanent habitat impacts would result where seafloor preparation and placement of scour protection result in conversion to a new habitat type. Although habitat structure may be altered, habitat composition in the affected areas would recover to functional condition over the life of the Project.<br>On balance, these impacts would constitute short-term to permanent adverse impacts on EFH, but those impacts would not result in a biologically significant change in the overall extent of available EFH habitat within the Lease Area and RWEC corridor. Therefore, these impacts would be **minor** to **moderate** adverse.<br>BOEM estimates a cumulative total of 11,631 acres of anchoring and mooring-related disturbance and 105,390 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the finfish and EFH GAA. When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would result in **moderate** adverse cumulative impacts. | Alternatives C through F would reduce the total length of IAC relative to the Proposed Action, meaning that the total amount of cable protection and maintenance-related impacts on EFH would decrease commensurately. The resulting adverse effects from O&M and decommissioning would be similar in nature but lesser in magnitude than those from Project construction, O&M, and decommissioning and would therefore be **minor** adverse.<br>Alternatives C through F would result in localized, minor to moderate impacts to EFH through seafloor disturbance from cable installation and vessel anchoring and mooring. Of Alternatives C through F, Alternative C would have the least overall potential disturbance to EFH of these four alternatives. The surface occupancy would noticeably reduce the cumulative impact acreage across Alternatives C through F relative to the Proposed Action, but the nature, duration, and general scope of effects would otherwise be similar. Impacts on soft-bottom benthic habitats and associated finfish species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could take a several years to recover to full habitat function. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to EFH. | | | | and would have a **minor to moderate** adverse impact on EFH.<br>Alternative G would reduce the total length of IAC relative to the Proposed Action, meaning that the total amount of cable protection and maintenance-related impacts on EFH would decrease commensurately. Notably, Alternative G would result in less extensive impacts to large-grained complex and complex habitats important to several EFH species compared to the Proposed Action. Under the base configuration of Alternative G, 6.7% and 25.9% of an estimated 4,291 acres of impacts would occur in large-grained complex and complex habitats, respectively, compared to 14.9% and 27.3% of 5.247 acres, respectively. Alternatives G1 through G3 would reduce benthic habitat impacts by an additional 479 to 488 acres relative to the base Alternative G. The resulting adverse effects from O&M and decommissioning would be similar in nature but lesser in magnitude than those resulting from Project construction, O&M, and decommissioning and would therefore be **minor** adverse.<br>Alternative G would result in localized, minor to moderate impacts to EFH through seafloor disturbance from cable installation and vessel anchoring and mooring. The surface occupancy would noticeably reduce the cumulative impact acreage across Alternative G relative to the Proposed Action, but the nature, duration, and general scope of effects would otherwise be similar. Disturbance impacts to soft-bottom benthic habitats and associated fish species would be short term, and these habitats and species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could be long term to permanent. Long-term impacts to habitat-forming organisms in complex habitats would require several years to recover full habitat function. Permanent habitat impacts would result where seafloor preparation and placement of scour |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| | | | | | | | protection result in conversion to a new habitat type. Although habitat structure may be altered, habitat composition in the affected areas would recover to functional condition over the life of the Project. These effects would be similar in nature but reduced in extent relative to the Proposed Action. Alternative G would result in localized minor to moderate adverse impacts to EFH habitat through an estimated 3,204 acres of anchoring and mooring-related disturbance and 3,452 acres of cabling-related seafloor disturbance within the EFH habitat GAA. Actual anchoring requirements have not been fully specified, and the former represents an overestimate of probable effects. Further, an appreciable portion of anchoring and cable installation impacts would overlap. Therefore, total acres of EFH habitat impacted by this IPF would likely be smaller than the total 6,656 acres from these two sources.<br>Therefore, Alternative G when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to EFH. |
| Climate change | **Offshore:** Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These trends are expected to continue under the No Action Alternative. The intensity of impacts on EFH resulting from climate change are uncertain and will vary by species but on the whole are anticipated to be minor to **moderate** adverse. | **Offshore:** The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action, but the Proposed Action could also contribute to a long-term net decrease in GHG emissions. When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would have a noticeable effect on GHG emissions. Regardless, climate change will likely result in **moderate** adverse cumulative impacts on EFH species and habitats. | **Offshore:** Climate change–related impacts to EFH under Alternatives C through F would be the same as the Proposed Action. Ongoing trends associated with climate change, including increases in water temperature, ocean acidification, changes in runoff and circulation patterns, and species range shifts, are expected to continue. The intensity of climate change cumulative impacts on EFH is uncertain and is likely to vary considerably between species, resulting in **moderate** adverse effects regardless of the alternative selected. When combined with other past, present, and reasonably foreseeable actions, Alternatives C through F would have a noticeable effect on GHGs emissions. However, projected climate change impacts on EFH would likely remain **moderate** adverse regardless of the alternative selected. | | | | **Offshore:** Climate change–related impacts to EFH under Alternative G would be the same as the Proposed Action. Ongoing trends associated with climate change, including increases in water temperature, ocean acidification, changes in runoff and circulation patterns, and species range shifts, are expected to continue. The intensity of climate change cumulative impacts on EFH is uncertain and is likely to vary considerably between species, resulting in **moderate** adverse effects regardless of the alternative selected. When combined with other past, present, and reasonably foreseeable actions, Alternative G would have a noticeable effect on GHGs emissions. However, projected climate change impacts on EFH will likely remain **moderate** adverse regardless of the alternative selected. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| EMF | **Offshore:** Under the No Action Alternative, up to 13,469 miles of cable installation would be added in the GAA, producing EMF in the immediate vicinity of each cable during operations. Because measurable EMF effects are generally limited to within tens of feet of cable corridors, these future activities would not affect existing EMF conditions unless a transmission cable were routed directly through the GAA. Accordingly, EMF effects from future activities would most likely be **negligible** to **minor** adverse if HVAC is used, or **moderate** adverse if HVDC is used. | **Offshore:** The effects of EMF and associated substrate heating on EFH species and habitats would be the same as those described previously for finfish, wherein findings indicate that long-term EMF effects on EFH would likely be **minor** adverse along most of the lengths of the IAC, OSS-link cable, and RWEC.<br>BOEM anticipates that future offshore wind energy projects in the GAA would use HVAC transmission and apply similar design measures to avoid and minimize EMF effects on the environment. Cumulative EMF impacts resulting from the Proposed Action in combination with past, present, and reasonably foreseeable activities would therefore be **minor** adverse if HVAC is used, or **moderate** adverse if HVDC is used. | **Offshore:** Alternatives C through F would result in similar EMF impacts on EFH to those described previously for the Proposed Action, but those impacts would be reduced in extent, and the total area exposed would vary depending on the configuration selected. Long-term EMF effects on EFH would likely be **minor** adverse along most of the lengths of the IAC, OSS-link cable, and RWEC.<br>Under Alternatives C through F, EMF effects would combine with those generated by the 13,717 miles of new and existing transmission cables from the other new offshore wind facilities planned on the Mid-Atlantic OCS as well as other existing transmission cables. These cumulative effects would be similar in nature to those for the No Action Alternative but would occur over a larger area, as determined by the broader Project footprint. Cumulative impacts to EFH would therefore be **minor** adverse if HVAC is used, or **moderate** adverse if HVDC is used. | | | | **Offshore:** Alternative G would result in similar EMF impacts on EFH to those described for the Proposed Action, but those impacts and the total area exposed would be reduced in extent. Long-term EMF effects on EFH would likely be **minor** adverse along most of the lengths of the IAC, OSS-link cable, and RWEC.<br>Under Alternative G, EMF effects would combine with those generated by the 13,717 miles of new and existing transmission cables from the other new offshore wind facilities planned on the Mid-Atlantic OCS as well as other existing transmission cables. These cumulative effects would be similar in nature to those for the No Action Alternative but would occur over a larger area. Cumulative impacts to EFH would therefore be **minor** adverse if HVAC is used, or **moderate** adverse if HVDC is used. |
| Noise | **Offshore:** Several proposed offshore wind projects could be developed on the Mid-Atlantic OCS between 2022 and 2030, including some projects near the RWF (see Appendix E), and would result in noise-generating activities. As stated for finfish, future projects could result in **negligible** to **moderate** adverse effects to EFH. | **Offshore:** The construction and installation of the RWF would involve activities that would generate underwater noise exceeding established thresholds for mortality and permanent or short-term injury, TTS, and behavioral effects. Underwater noise would render the affected habitats unsuitable for EFH species over the short term and could have short-term impacts on prey availability for EFH species. The extent, duration, and severity of noise effects on EFH would vary depending on the noise source and the sensitivity of the affected EFH species and their prey to noise impacts during their lifecycle, but would be likely range from **minor** to **moderate** adverse.<br>BOEM anticipates that underwater noise generated by operations of the WTGs and O&M-related vessels, as well as decommissioning, would result in effects considered **negligible** to **minor** adverse, based on the impacts described previously for finfish.<br>Localized and short-term to permanent cumulative impacts from the Proposed Action would combine with similar localized impacts from other past, present, and reasonably | **Offshore:** The construction and installation of Alternatives C through F would generate underwater noise exceeding established thresholds for mortality and permanent or short-term injury, TTS, and behavioral effects similar to those described for finfish. Underwater noise would render the affected habitats unsuitable for EFH species over the short term and could have short-term impacts on prey availability for EFH species. The extent, duration, and severity of noise effects on EFH would vary depending on the noise source and the sensitivity of the affected EFH species and their prey to noise impacts during their life cycle. Alternatives C through E would reduce the number of foundations and extent of IAC relative to the Proposed Action, with a commensurate reduction in associated construction noise impacts. Alternative C would provide the greatest overall reduction in construction activity and associated noise effects in identified Atlantic cod spawning habitat (Van Hoeck et al. 2023) compared to the Proposed Action. Combining Alternatives C and F would result in further reductions of noise impacts due to the reduction in turbines and associated reductions in activities that could impact Atlantic cod (construction and O&M-related noise, seafloor preparation, etc.).<br>The underwater noise effects would be the same or similar as those described above for finfish and would be likely range from **minor** to **moderate** adverse.<br>Underwater noise effects on finfish resulting from O&M and decommissioning of Alternatives C through F would be similar in magnitude but reduced in extent relative to those described for the Proposed Action and therefore **negligible** to **minor** adverse, based on the impacts described previously for finfish.<br>BOEM estimates that underwater noise from the construction of up to 16 other offshore wind facilities would result in short-term injury or behavioral effects on finfish over a cumulative area. Vessel noise from construction and installation, as well as O&M activities, could cause startle and avoidance responses in fish but would not cause injury. Periodic noise from O&M vessels and continuous or near-continuous WTG operational noise exceeding behavioral effects | | | | **Offshore:** The construction and installation of Alternative G would generate underwater noise exceeding established thresholds for mortality and permanent or short-term injury, TTS, and behavioral effects similar to those described for the Proposed Action but reduced in extent and duration. Underwater noise would render the affected habitats unsuitable for EFH species over the short term and could have short-term impacts on prey availability for EFH species. The extent, duration, and severity of noise effects on EFH would vary depending on the noise source and the sensitivity of the affected EFH species and their prey to noise impacts during their life cycle. Alternatives G1 to G3 would further reduce construction activity and associated noise effects due to the reduction in turbines and associated reductions in activities that could impact Atlantic cod (construction and O&M-related noise, seafloor preparation, etc.), relative to the Proposed Action, leading to less extensive impacts on identified Atlantic cod |

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| | | foreseeable activities, resulting in **negligible** to **moderate** adverse effects on EFH. | thresholds for fish would occur within a few hundred feet of each source (HDR 2019). These effects would occur over the life of the Project through decommissioning. These localized and short-term to permanent cumulative impacts from Alternatives C through F would combine with similar localized impacts from other past, present, and reasonably foreseeable activities, resulting in **negligible** to **minor** adverse effects on EFH and finfish species and their habitats. | | | | spawning habitat (Van Hoeck et al. 2023) compared to the Proposed Action.<br>The underwater noise effects would be the same or similar as those described above for finfish and would be likely range from **minor** to **moderate** adverse.<br>Underwater noise effects on finfish resulting from O&M and decommissioning of Alternative G would be similar in magnitude but reduced in extent relative to those described for the Proposed Action and therefore **negligible** to **minor** adverse, based on the impacts described previously for finfish. However, the potential for more significant operational noise effects on EFH species such as cod is uncertain.<br>BOEM estimates that underwater noise from the construction of up to 16 other offshore wind facilities would result in short-term injury or behavioral effects on finfish over a cumulative area. Vessel noise from construction and installation, as well as O&M activities, could cause startle and avoidance responses in fish but would not cause injury. Periodic noise from O&M vessels and continuous or near-continuous WTG operational noise exceeding behavioral effects thresholds for fish would occur within a few hundred feet of each source (HDR 2019). These effects would occur over the life of the Project through decommissioning. These localized and short-term to permanent cumulative impacts from Alternative G would combine with similar localized impacts from other past, present, and reasonably foreseeable activities, resulting in **negligible** to **minor** adverse effects on EFH and finfish species and their habitats. |
| Bycatch | **Offshore**: A range of monitoring activities have been proposed to evaluate the short-term and long-term effects of existing and planned offshore wind development on biological resources and are also likely for future wind energy projects on the OCS. Some of these | **Offshore:** Revolution Wind is proposing to implement the FRMP as part of the Proposed Action (Revolution Wind and Inspire Environmental 2023). The FRMP employs a variety of survey methods to evaluate the effect of RWF construction and operations on selected finfish | **Offshore:** The effects to EFH from Alternatives C through F are anticipated to be the same as or similar to the Proposed Action. | | | | **Offshore:** The effects to EFH from Alternative G are anticipated to be the same as or similar to the Proposed Action. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| | monitoring activities are likely to affect EFH through direct sampling and the potential for bycatch and/or damage by sample collection gear. Research and monitoring activities related to offshore wind would not necessarily result in an increase in bycatch-related impacts, although the distribution of those impacts could change. Given this, any bycatch-related impacts on EFH would be **negligible** to **minor** adverse, and short term in duration. | species and on benthic habitat structure and function.<br>Although the FRMP would result in unavoidable impacts to EFH species and their habitats, the extent of habitat disturbance and the number of organisms affected would be small in comparison to commercial and recreational fishing mortality and would not measurably impact the viability of any species at the population level. Given this, all habitat impacts from FRMP implementation would be short term in duration. The intensity and duration of impacts anticipated from FRMP implementation would constitute a **minor** cumulative effect on finfish. These impacts would be offset by an improved understanding of the effects of offshore wind development on regional fish species and their habitats. This could in turn contribute to improved management of EFH species and their habitats. | | | | | |
| Presence of structures | **Offshore:** The future addition of up to 3,113 new WTG and OSS foundations on the Mid-Atlantic OCS could result in hydrodynamic and artificial reef effects that influence finfish community structure in and near the project footprints, resulting in effects that would be permanent and **moderate** beneficial for some species from habitat conversion and have **minor** adverse effects due to permanent habitat loss. | **Offshore:** The installation of 102 monopile foundations with associated scour protection would result in direct disturbance to EFH species and their habitats.<br>The ongoing presence of monopiles, their foundations, and scour protection during Project O&M within the RWF and RWEC would create an artificial reef effect as well as hydrodynamic effects. The reef effect would alter biological community structure, producing an array of effects on EFH species. Those effects could be beneficial or adverse, varying by species. Although localized effects are possible, ecosystem modeling studies of a European wind farm showed little difference in key food web indicators before and after construction and installation (Raoux et al. 2017). Thus, large-scale food web shifts are not expected due to the installation of WTGs and conversion of pelagic habitat to hard surface and would be expected to result in **negligible** to **minor** adverse or beneficial effects, varying by species. Hydrodynamic effects would influence primary and secondary productivity at local scales within and around this artificial reef, and dispersal patterns for the pelagic eggs and larvae of some finfish species at larger scales across the northern Mid-Atlantic Bight. This could lead to negative, | **Offshore:** Similar to the Proposed Action, Alternatives C through F would result in the long-term alteration of water column and seafloor habitats due to structure presence, resulting in a diversity of effects on EFH. Monopile foundations and other hard surfaces installed would create the same type of habitat impacts and artificial reef effects, but those effects would be less extensive and distributed differently in comparison to the Proposed Action. Insufficient information is available to determine how the changes in Project configuration under Alternatives C through F could alter the extent and significance of potential hydrodynamic effects of EFH species and habitats. Alternatives C through F would include inspection offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potentially harmful marine debris from the environment. This would constitute a minor beneficial cumulative effect to EFH.<br>BOEM estimates that Alternatives C through F and other planned future projects would result in the development of 3,146 to 3,183 WTG and OSS foundations in the EFH GAA. Depending on how these are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential significance of broader cumulative effects on finfish and EFH. Collectively, cumulative impacts from the combined reef and hydrodynamic effects of multiple offshore wind energy projects on EFH could be positive or negative, varying by species, and would likely range from **moderate** adverse to **moderate** beneficial in significance, varying by species. | | | | **Offshore:** Similar to the Proposed Action, Alternative G would result in the long-term alteration of water column and seafloor habitats due to structure presence, resulting in a diversity of effects on EFH. Alternative G would result in the long-term alteration of EFH habitat composition on approximately 189.7 acres of seafloor. That total would comprise approximately 2.3 and 54.3 acres of seafloor displaced by foundations and associated scour protection, respectively; 5.7 acres of cable protection system impacts extending beyond the scour protection footprint; and 120.5 acres affected by cable protection. The foundations would effectively displace EFH habitat, with each foundation replacing 0.03 to 0.04 acre of seafloor with a vertical structure extending from the seafloor to the surface. Monopile foundations and other hard surfaces installed would create the same type of habitat impacts and artificial reef effects, but those effects would be less extensive and distributed differently in comparison to the Proposed Action. Notably, Alternative G would result in less extensive impacts to large-grained complex and complex habitats important to several EFH species. |

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| | | positive, or neutral effects on EFH species that rely on these dispersal patterns, varying by species. These effects would vary from **negligible** to **moderate** adverse in significance, varying by species.<br>BOEM estimates that the Proposed Action and other planned future projects would result in the development of 3,190 WTG and OSS foundations in the EFH GAA. Depending on how these are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential significance of broader cumulative effects on finfish and EFH species and habitat. Effects could be beneficial or adverse, varying by species. Collectively, cumulative impacts from the combined reef and hydrodynamic effects of multiple offshore wind energy projects on EFH could be positive or negative, varying by species, and would likely range from **moderate** adverse to **moderate** beneficial in significance, varying by species. | | | | | Insufficient information is available to determine how the changes in Project configuration under Alternative G could alter the extent and significance of potential hydrodynamic effects of EFH species and habitats. Alternative G would include inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potentially harmful marine debris from the environment. This would constitute a **minor** beneficial cumulative effect to EFH.<br>BOEM estimates that Alternative G and other planned future projects would result in the development of 3,155 WTG and OSS foundations in the EFH GAA. Depending on how these are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential significance of broader cumulative effects on finfish and EFH. Collectively, cumulative impacts from the combined reef and hydrodynamic effects of multiple offshore wind energy projects on EFH could be positive or negative, varying by species, and would likely range from **minor** to **moderate** adverse to **moderate** beneficial in significance, varying by species. |

| **Impact-Producing Factor** | **No Action Alternative** | **Alternative B (Proposed Action) up to 100 WTGs** | **Alternative C (Habitat Alternative) 64–65 WTGs** | **Alternative D (Transit Alternative) 78 to 93 WTGs** | **Alternative E (Viewshed Alternative) 64–81 WTGs** | **Alternative F (Higher Capacity Turbine Alternative) 56 WTGs** | **Alternative G (Preferred Alternative) 65 WTGs** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sediment deposition and burial | **Offshore:** As previously noted, under the No Action Alternative, up to 13,469 miles of cable installation would be added in the GAA. These effects would be short term in duration, effectively ending once the sediments have resettled, resulting in short-term **minor** adverse effects on finfish. | **Offshore:** The Project would result in short-term, elevated levels of suspended sediment near major bed-disturbing activities like cable installation. Given the short-term nature of the impact and the limited extent of significant burial effects relative to the amount of habitat available, however, sediment deposition and burial effects on EFH habitat would be short term and expected to recover without remedial or mitigating action and therefore would be **minor** adverse.<br>Up to 10% of cable protection could be replaced over the life of the Project under the Proposed Action. Cable protection maintenance would produce similar effects on EFH species as those described for Project construction and installation, although reduced in extent and spread out over time. The resulting effects from O&M and decommissioning would therefore be **minor** adverse.<br>Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any EFH species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse**.** | **Offshore:** Alternatives C through F would result in similar sediment deposition and burial impacts on EFH to those described for the Proposed Action, but those impacts would be reduced in extent, and the total area exposed would vary depending on the configuration selected. Although this alternative would result in a slightly smaller area exposed to potential sediment deposition impacts, overall impacts would not change relative to the Proposed Action and would be **minor** adverse.<br>Cable protection maintenance would produce similar **minor** adverse effects on EFH as those described for Project construction, although reduced in extent and spread out over time. These effects would range from short-term sediment deposition and burial effects greater than 0.4 inch (10 mm). The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSS into the water column.<br>Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any EFH species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse**.** | | | | **Offshore:** Alternative G would result in similar sediment deposition and burial impacts on EFH to those described for the Proposed Action, but those impacts would be reduced in extent. Although this alternative would result in a slightly smaller area exposed to potential sediment deposition impacts, overall impacts would not change relative to the Proposed Action and would be **minor** adverse.<br>Cable protection maintenance would produce similar **minor** adverse effects on EFH as those described for Project construction, although reduced in extent and spread out over time. These effects would range from short-term sediment deposition and burial effects greater than 0.4 inch (10 mm). The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSS into the water column.<br>Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any EFH species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse**.** |

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### 3.13.2.2 Alternative A: Impacts of the No Action Alternative on Finfish

#### 3.13.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for finfish (see Section 3.13.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.13.2.2.2 Cumulative Impacts

This section discloses potential finfish impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

#### Offshore Activities and Facilities

This section discloses potential finfish impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1. The duration of impacts disclosed for this resource deviate slightly from BOEM guidelines provided in Section 3.3.[40]

<u>Accidental releases and discharges:</u> Offshore wind energy development could result in the accidental release of water quality contaminants or trash/debris, which could theoretically lead to an increase in debris and pollution in the GAA (see Section 3.21 for a characterization of existing water quality conditions). In general, the types of accidental hazardous materials releases associated with marine construction projects consist of fuels, lubricating oils, and other petroleum products. BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operations of offshore wind energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). Project proponents would also be required to comply with other state and federal regulations to avoid the unintentional introduction of nonnative species. Compliance with these requirements would effectively minimize releases of trash and debris. Any accidental release of plastic or other solid debris would be highly localized, dissipate quickly, and therefore result in ecologically **negligible** adverse impacts to finfish in relation to baseline plastic pollution levels (Morét-Ferguson et al. 2010).

Increased vessel traffic associated with offshore renewable energy construction presents the potential for the inadvertent introduction of invasive species during discharge of ballast and bilge water. BOEM would require all Project vessels to adhere to existing state and federal regulations related to ballast and bilge water discharge, including USCG ballast discharge regulations (33 CFR 151.2025) and EPA NPDES Vessel General Permit standards, effectively avoiding the likelihood of nonnative species invasions through ballast water discharge. Considering these requirements and the dispersed distribution of planned

[40] NMFS (2021b) recommends the following temporal definitions: short term (less than 2 years); long term (2 years to < life of the Project); permanent (life of the Project).

offshore wind energy facilities, existing water quality trends are likely to continue. The impacts associated with accidental releases and discharges are anticipated to be **negligible** adverse.

<u>Anchoring and new cable emplacement/maintenance:</u> Up to 8,427 acres could be affected by anchoring/mooring activities and 101,381 acres could be affected by cable installation for future offshore wind energy development within the finfish GAA. Anchoring and cable installation activities would involve direct disturbance of the seafloor, leading to direct impacts on benthic habitats used by demersal finfish. These impacts would temporarily degrade some habitats and could change habitat structure and composition in ways that alter habitat suitability for certain species. For example, vessel anchoring in complex or large-grained complex habitats can create troughs in the seafloor that are effectively permanent (HDR 2020), and damage to structure-forming invertebrates on hard substrates can take several years to fully recover (de Marignac et al. 2008). In contrast, anchoring impacts in soft-bottom habitats are expected to fully recover within 18 to 30 months following initial disturbance through natural sediment transport (Daylander et al. 2012) and recolonization by benthic invertebrates from adjacent habitats (Grabowski et al. 2014; HDR 2020).

Finfish within the construction footprint would be exposed to risk of displacement, crushing, and burial during seafloor preparation of cable corridors, cable installation, placement of cable protection, and vessel anchoring. Impacts to large-grained complex and complex benthic habitat from vessel anchoring, cable installation and cable protection, and seafloor preparation for foundation installation could impact managed finfish that use these habitats (e.g., monkfish) and may indirectly disturb important behaviors like spawning. Atlantic cod spawning occurring within other lease areas could be disturbed if anchoring and cable emplacement activities (e.g., grapnel runs and jet plowing) are occurring in proximity. EPMs for ongoing projects, such as using a boulder grab and a work-class remotely operated vehicle boulder skid for most boulder relocations, siting export cables and WTGs to avoid hard-bottom habitats, and developing and implementing construction and O&M anchoring plans, are expected to help minimize impacts and modifications to large-grained complex and complex habitats that support spawning cod and other managed finfish.

Disturbance impacts to soft-bottom benthic habitats and associated fish species would be short term, and these habitats and species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could be long term to permanent. Long-term impacts to habitat-forming organisms in complex habitats would require several years to recover full habitat function. Permanent habitat impacts would result where seafloor preparation and placement of scour protection result in conversion to a new habitat. Permanent habitat impacts would result where seafloor preparation and placement of scour protection result in conversion to a new habitat type. Although habitat structure may be altered, habitat composition in the affected areas would recover to functional condition over the life of the Project.

Research obtained by BOEM (2023e) suggests that full recovery of habitat function is likely to occur within a decade of disturbance. The study in question compared the community composition and abundance of habitat-forming organisms in heavily fished areas on Georges Bank to reference sites. The findings of this long-term study demonstrated that epifaunal species damaged by repeated exposure to scallop dredging were able to recover to levels that were statistically indistinguishable from unfished reference sites within 6 years. Although some short- and long-term degradation of finfish habitat from anchoring impacts could occur, these impacts would be limited in extent relative to the total amount of habitat available in the finfish GAA. The affected habitats would recover to fully functional condition for finfish without mitigation. Therefore, impacts to finfish from vessel anchoring would be **minor** adverse. Under the No Action Alternative, up to 13,469 miles of cable installation would be added in the GAA for finfish. These activities would result in short- and long-term seafloor profile alterations that are likely to affect both the physical structure of the habitat and habitat-forming invertebrates used by demersal finfish as habitat. Placement of cable protection would introduce human-made hard surfaces to the seafloor, resulting in a long-term change in benthic habitat composition. Short-term alterations would occur in soft-bottom habitats and would result from the flattening of sand and damage to biogenic structures like worm tubes and burrows and depressions formed by fish and invertebrates during seafloor preparation for cable installation. Seafloor preparation in large-grained complex and complex benthic habitats could result in long-term changes in seafloor profile. For example, boulder relocation during seafloor preparation could convert existing complex benthic habitat to heterogeneous complex habitat by creating a furrow of soft-bottom habitat within the larger matrix. Similarly, boulders and cobbles rolled into soft-bottom habitat would constitute a long-term change in the seafloor profile of the affected area. Cable burial would result in short-term disruption to benthic communities through sediment suspension, physical disturbance, physical displacement, and egg and larva entrainment (see Section 3.13.2.2.1). Collectively, these impacts would alter the suitability of the affected habitat for different finfish species, with the effects depending on habitat association. For example, species that associate with soft-bottom substrates (e.g., summer flounder) would gain habitat in areas where boulder relocation exposes swaths of sand and lose habitat where boulder relocation and cable protection replace sandy substrates with new hard surfaces. The affected habitats would eventually recover to full function, and any net losses of habitat suitability for any individual species would be localized minor adverse.

In summary, vessel anchoring and cable installation and maintenance could result in both short-term and long-term impacts to habitats used by demersal finfish, varying based on the type of habitat affected and the nature of the impact. These impacts would be limited in extent to the footprint of the disturbance. Impacts to soft-bottom habitats would be short term in duration, and habitats would recover completely without additional mitigation. Some long-term to permanent changes in complex habitat structure could occur, but the habitat functions provided by habitat-forming invertebrates would eventually recover without mitigation. On this basis, impacts to finfish from anchoring and new cable emplacement/maintenance would be **minor** adverse.

<u>Bycatch</u>: A range of monitoring activities have been proposed to evaluate the short-term and long-term effects of existing and planned offshore wind development on biological resources and are also likely for future wind energy projects on the OCS. Some of these monitoring activities are likely to affect finfish. For example, the South Fork Wind Fisheries Research and Monitoring Plan (SFW and Inspire Environmental 2020) included both direct sampling of finfish and the potential for bycatch and/or damage to habitat-forming invertebrates by sample collection gear. Biological monitoring uses the same types of methods and equipment employed in commercial fisheries, meaning that impacts to finfish would be similar in nature but reduced in extent in comparison to impacts from current and likely future fishing activity. Monitoring activities are commonly conducted by commercial fishers under contract who would otherwise be engaged in fishing activity. As such, research and monitoring activities related to offshore wind would not necessarily result in an increase in bycatch-related impacts on finfish, although the distribution of those impacts could change. Therefore, any bycatch-related impacts on finfish would be **negligible** to **minor** adverse and short term in duration.

Climate change: Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These changes have affected habitat suitability for the finfish community of the GAA and surrounding region, including several EFH species. For example, several finfish species have shifted in distribution to the northeast, farther from shore and into deeper waters, in response to an overall increase in water temperatures and an increasing frequency of marine heat waves (NOAA 2021). Warmer water could influence finfish migration and could increase the frequency or magnitude of disease (Brothers et al. 2016; Hoegh-Guldberg and Bruno 2010). Climate change is also contributing to shifts in finfish geographic ranges, individual fish health and viability, increased frequency of fatal marine heatwaves, and apparent reductions in marine productivity (NOAA 2021). These trends are expected to continue under the No Action Alternative. The intensity of impacts to finfish from climate change are uncertain but are anticipated to range from **minor** beneficial to **moderate** adverse overall, varying in significance by species.

EMF: Numerous submarine power and communications cables are present within the RWEC corridor, with most running parallel to the RWEC. These cables would presumably continue to operate and generate EMF effects under the No Action Alternative. While the type and capacity of those cables are not specified, the associated baseline EMF effects can be inferred from the available literature. Electrical telecommunications cables are likely to induce a weak EMF on the order of 1 to 6.3 µV/m within 3.3 feet (1 m) of the cable path (Gill et al. 2005). Fiber-optic communications cables with optical repeaters would not produce EMF effects. EMF effects from submarine power cables would be similar in magnitude to those described for the Proposed Action but would vary depending on specific transmission load. For example, the two power cables supplying Nantucket Island at a typical load of 46 kV and 420 amps (Balducci et al. 2019).

Under the No Action Alternative, up to 13,469 miles of offshore wind–related transmission cable installation would be added in the finfish GAA, producing EMF in the immediate vicinity of each cable during operations. BOEM anticipates that proposed offshore wind energy projects would use HVAC transmission, but HVDC designs are possible and could occur. BOEM would require these future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects. EMF effects on finfish from these future projects would vary in extent and significance depending on overall cable length, the proportion of buried versus exposed cable segments, and Project-specific transmission design (e.g., HVAC or HVDC, transmission voltage, etc.). Because measurable EMF effects are generally limited to within tens of feet of cable corridors, these future activities would not affect existing EMF conditions unless a transmission cable were routed directly through the GAA. Accordingly, EMF effects from future activities would most likely be negligible adverse. However, Hutchison et al. (2018, 2020a) have observed behavioral responses in rays experimentally exposed to EMF from HVDC transmission. Electrosensitive fishes are adapted to detect biogenic DC EMF or EMF with AC frequencies below 10 Hz (CSA Ocean Sciences Inc and Exponent 2019). Thus, the exclusive use of 60 Hz AC in underwater transmission cables for offshore wind is not expected to induce significant behavioral responses in electrosensitive animals. In general, the widespread development of transmission infrastructure for offshore wind energy may result only in localized EMF effects of sufficient intensity to affect the behavior of individual finfish. Measurable EMF levels would diminish rapidly with distance, typically becoming indistinguishable from the baseline conditions within less than 30 feet of both buried and exposed cable segments (Exponent 2023). EMF sufficient to cause behavioral effects in fish would be highly localized, typically restricted to areas within 3 feet or less of exposed cable segments. Localized and short-term EMF effects on individual finfish would occur throughout the life of each wind energy Project but are unlikely to have measurable population-level effects on any species at the scale of the GAA. Therefore, EMF from planned and potential future activities would have a **negligible to minor** adverse effect if HVAC is used, or **moderate** adverse if HVDC is used. However, as stated previously, future offshore wind energy projects are anticipated to use HVAC transmission, which produces lower EMF HVDC transmission.

Noise: Several proposed offshore wind construction projects could be developed on the Mid-Atlantic OCS between 2022 to 2030, including some projects in proximity to the RWF (see Appendix E). This would result in noise-generating activities, specifically, impact pile driving, HRG surveys, construction and O&M vessel use, and WTG operations. BOEM believes it is reasonable to conclude that impact pile driving, construction vessel, and HRG survey noise from future projects would generate short-term adverse effects on finfish within the GAA. Due to the unknowns associated with future projects, the timing, extent, and severity of these effects on habitat and aquatic community structure cannot currently be quantified.

Popper et al. (2014) compiled available research on underwater noise effects on fish and other aquatic life and established thresholds for mortality and permanent injury, recoverable injury, and TTS for different types of noise sources based on life stages or hearing group specific sensitivity (Table 3.13-4).

**Table 3.13-4. Noise Exposure Thresholds for Finfish Lethal Injury, Temporary Threshold Shift, and Behavioral Effects**

| Sound Source | Fish Hearing Group | Lethal Injury, Peak*,† | Lethal Injury, Cumulative*,‡ | Recoverable Injury, Cumulative*,‡ | Temporary Threshold Shift*,‡ | Behavioral§ |
|---|---|---|---|---|---|---|
| Impact pile driving | Fish with swim bladder, involved in hearing | 207 | 207 | 203 | 186 | 150 |
| | Fish with swim bladder, not involved in hearing | 207 | 210 | 203 | 186 | 150 |
| | Fish without swim bladder | 213 | 219 | 216 | 186 | 150 |
| | Eggs and larvae | 210 | 207 | None defined | None defined | N/A |
| UXO detonation | All fish hearing groups | 229 | None defined | None defined | None defined | None defined |
| | Eggs and Larvae | >13 mm/s¥ | None defined | None defined | None defined | N/A |
| HRG surveys | All fish | N/A | N/A | N/A | 186 | 150 |

Notes: N/A = not applicable.
* Thresholds from Popper et al. (2014).
† Values in dB re 1 μPa.
‡ Values in decibels referenced to the sum of cumulative pressure in micropascals squared, normalized to 1 second.
¥ Particle acceleration exposure threshold (Popper et al. 2014).
§ Threshold from FHWG (2008).

Popper et al. (2014) have defined different thresholds for different fish species groups and life stages based on the current understanding of sound sensitivity. For evaluating direct effects on fish, any area exposed to construction and installation-related underwater noise sufficient to cause lethal injury, recoverable injury, TTS, and/or behavioral effects is considered to be temporarily unsuitable for the affected fish. This constitutes a minor to moderate adverse effect on fish lasting for the duration of the associated noise source.

The currently available underwater noise exposure thresholds for fish are based on the sound pressure component. Several fish species, notably those species in the hearing specialist group such as Atlantic cod, are also sensitive to the particle motion component of sound (Hawkins et al. 2021; Popper and Hawkins 2018; Roberts and Elliot 2017). Impulsive noise sources, notably impact pile driving and UXO detonation, can produce intense particle motion effects within a short distance of the sound source and can transmit particle motion effects in low frequency bands (1–40 Hz) over broader distances through vibration of the seafloor (Hawkins et al. 2021). Particle motion effects from substrate vibration caused by impact pile driving and UXO detonation could be detectable to sensitive fish species on or within a few feet of the seafloor to potentially several thousand feet of the source (Hawkins et al. 2021). Other sound sources, including HRG surveys, seafloor preparation, and cable laying activity, would also produce particle motion effects. HRG survey equipment is suspended in the water column and does not contact the seafloor; therefore, particle motion effects are likely to be limited to within tens of feet or less of the mobile sound source. In contrast, seafloor preparation and cable laying activities occur on the seafloor. Particle motion effects from these sources have not been directly studied. However, the sound and vibration energy generated by these activities are much less intense than those produced by impact pile driving. For example, cable trenching using jet and mechanical plows produces noise levels on the order of 178 to 188 dB re 1 µPa m (Bald et al. 2015; Nedwell et al. 2003). On this basis, it is reasonable to infer that particle motion effects from these activities are unlikely to exceed those generated by impact pile driving and UXO detonation.

Particle motion effects are unlikely to cause injury to fish but could affect their behavior (Hawkins et al. 2021; Roberts and Elliot 2017). Fish species that have benthic or epibenthic life stages, such as Atlantic herring (spawning adults and eggs), ocean pout (all life stages), little skate (all life stages), winter flounder (all life stages), red hake (juveniles and adults), monkfish (juveniles and adults), and winter skate (all life stages), are most likely to be exposed to particle motion and substrate vibration effects from pile driving, UXO detonation, and cable laying activities. Pelagic fish species and life stages in proximity (i.e., within feet to tens of feet) to sound sources may also be exposed to particle motion effects.

Popper and Hawkins (2018) conclude that Atlantic cod, and probably many other fish species in the hearing specialist group, are sensitive to both sound pressure and particle motion and use both aspects of sound to assess and orient themselves in the three-dimensional aquatic environment. This ability likely enables fishes to locate a particular source of sound, such as prey or potential mates, and may also assist them in identifying and locating sounds from a particular source within the general ambient noise environment. Anthropogenic sounds that interfere with the ability to detect sound pressure and particle motion could interfere with this ability (Hawkins et al. 2021). Although these potential effects are acknowledged, exposure thresholds for the particle motion component of sound have yet to be developed for finfish (Hawkins et al. 2021). Given this, potential effects to finfish from the particle motion component of sound cannot be fully assessed at this time.

The planned and future development of offshore wind energy facilities could affect the endangered Atlantic sturgeon and the threatened giant manta ray, primarily through exposure to harmful levels of underwater noise during Project construction. Adult and subadult endangered Atlantic sturgeon are expected to occur in the GAA throughout the year but appear to be present in lower numbers in the summer (Dunton et al. 2015; Ingram et al. 2019; Savoy and Pacileo 2003; Stein et al. 2004). The GAA for finfish is used by all five ESA-listed DPSs of Atlantic sturgeon, and individuals from these DPSs could be exposed to construction and O&M-related effects on demersal finfish species. The threatened giant manta ray is expected to occur in the waters south of the RI/MA WEA, within upwelling waters at the edge of the continental shelf break. Giant manta ray occurrence on the Mid-Atlantic OCS is rare (Miller and Klimovich 2017), but occurrence in proximity to some proposed future actions within the GAA cannot be completely discounted. The most significant impacts on Atlantic sturgeon and giant manta ray are expected from exposure to pile-driving noise and UXO detonation during construction. However, potentially harmful noise levels would be expected to occur close to the pile, and most mobile fish would be expected to move away from pile-driving activities, limiting the potential effects of elevated underwater noise levels. Given that construction noise impacts from future projects are likely to be similar to those described in Section 3.13.2.2.1 for construction of the Proposed Action, effects to Atlantic sturgeon and giant manta ray from individual projects would be limited to short-term minor adverse behavioral effects and disturbance. Shortnose sturgeon are unlikely to be exposed to impact pile-driving noise but could be exposed to underwater noise from UXO detonation and RWEC construction activities in or near Narragansett Bay. Shortnose sturgeon have not been reliably documented in Narragansett Bay. But, as stated previously, individuals from the nearby Connecticut River population could occur there based on observed migratory patterns between other river systems in New England (Dionne et al. 2013; Fernandes et al. 2010). For this reason, planned and reasonably foreseeable future activities are not likely to result in adverse population-level consequences on either of these species and would therefore be **minor** adverse.

Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct drive systems like those proposed for the RWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 $L_{RMS}$, occasionally reaching as high as 128 $L_{RMS}$, in the 10-Hz to 8-kHz range. This is consistent with the noise levels observed at the BIWF (110 to 125 SPL) (Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. However, the 6-MW turbines used at BIWF may not be representative of noise levels produced by higher-capacity WTG designs like those considered for the Project. No comparable observational data have been collected for the larger-capacity WTGs proposed for Revolution Wind. Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects on finfish, including EFH species, could be more intense and extensive than those considered herein, but the findings have not been validated. In general, these noise levels are below established behavioral thresholds for fish (see Table 3.6-7, Section 3.6.2.3.1), comparable to environmental baseline levels in busy marine traffic areas, and unlikely to be detectable to fish outside the respective wind farm footprints. Further, whether or not auditory masking occurs and has an effect on survival and reproduction in the wild around operational offshore wind farms is not known (Mooney et al. 2020). In Europe, some species, such as Atlantic cod, have shown no response in relation to sound levels and have shown increases in abundance close to wind turbines (Bergström et al. 2013). Proposed time-of-year (TOY) restrictions for pile-driving activity for other offshore wind projects in the region would minimize adverse impacts from construction on Atlantic cod spawning. Further, proposed mitigations, such as passive acoustic monitoring (PAM) plans, would improve understanding of these potential impacts and inform future management and mitigation measures. The information currently available suggests the effects of operational underwater noise from future activities would occur for the life of the Project but are not anticipated to have population-level effects and would therefore be **minor** for some species and **negligible to minor** adverse for others. On balance, construction noise impacts from future activities that would occur for the life of the Project would likely range from **minor** to **moderate** adverse. Construction noise, such as pile driving, could result in notable and measurable adverse impacts to finfish, including to the richness or abundance of local species common to the area or to the extent and quality of the habitat. Although, finfish resources would be expected to completely recover when remedial or mitigating actions are taken (e.g., TOY restrictions).

Presence of structures: The future addition of up to 3,113 new WTG and OSS foundations on the Mid-Atlantic OCS could result in hydrodynamic and artificial reef effects that influence finfish community structure within and in proximity to project footprints and beyond. This could in turn influence the abundance and distribution of finfish species. While hydrodynamic and reef effects would largely be limited to the areas within and or close to wind farm footprints, the development of individual or contiguous wind energy facilities in nearby areas could produce cumulative effects that are beneficial for some finfish species and detrimental for others.

The widespread development of offshore renewable energy facilities would create a distributed network of artificial reefs on the Mid-Atlantic OCS. These reefs form biological hotspots that could support species range shifts and expansions and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). In general, species that are attracted to the structural complexity and increased biological productivity provided by the structures may benefit and increase in abundance. In contrast, species associated with soft-bottom habitats may be permanently displaced by the long-term presence of the structures. Those changes could influence fish community structure within the GAA in the future, but the likelihood, nature, and significance of these potential changes are difficult to predict and a topic of ongoing research. Artificial structures may also provide opportunities for range expansion by invasive species in conjunction with range shifts due to climate change (Degraer et al. 2020; Langhamer 2012; Schulze et al. 2020). Overall, these effects would range in significance from **minor** adverse for some species to **moderate** beneficial for others.

The Mid-Atlantic Bight cold pool is a mass of relatively cool water that forms in the spring and is maintained through the summer by stratification. The cold pool supports a diversity of fish species that are usually found farther north but thrive in the cooler waters it provides (Chen 2018; Lentz 2017). Changes in the size and seasonal duration of the cold pool over the past 5 decades are associated with shifts in the fish community composition of the Mid-Atlantic Bight (Chen 2018; Saba and Munroe 2019). The GAA and neighboring lease areas within the RI/MA and MA WEAs are located on the approximate northern boundary of the cold pool. The potential effects of extensive wind farm development on features like the cold pool is a topic of emerging interest and ongoing research (Chen et al. 2016). Changes in cold pool dynamics resulting from future activities, should they occur, could conceivably result in changes in habitat suitability and fish community structure but the extent and significance of these potential effects are largely unknown.

Human-made structures, especially tall vertical structures such as foundations, alter local water flow at a fine scale by potentially reducing wind-driven mixing of surface waters or increasing vertical mixing as water flows around the structure (Carpenter et al. 2016; Cazenave et al. 2016; Segtnan and Christakos 2015). When water flows around the structure, turbulence is introduced that influences local current speed and direction. Turbulent wakes have been observed and modeled at the kilometer scale (Cazenave et al. 2016; Vanhellemont and Ruddick 2014). Although impacts on current speed and direction decrease rapidly around monopiles, there is a potential for hydrodynamic effects out to a kilometer from a monopile (Li et al. 2014). Direct observations of the influence of a monopile extended to at least 300 m, but the monopile was indistinguishable from natural variability in a subsequent year (Schultze et al. 2020). The range of observed changes in current speed and direction 300 to 1,000 m from a monopile is likely related to local conditions, wind farm scale, and sensitivity of the analysis. In strongly stratified locations, the mixing seen at monopiles is often masked by processes forcing towards stratification (Schultze et al. 2020), but the introduction of nutrients from depth into the surface mixed layer can lead to a local increase in primary production (Floeter et al. 2017).

A growing body of research has demonstrated that offshore wind farms could have observable effects on oceanographic conditions up to tens of miles downfield from wind farm sites (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorell et al. 2022; Floeter et al. 2022; Raghukumar et al. 2022). These atmospheric and oceanographic effects can also influence stratification and mixing of surface waters, although the extent of these effects and resulting significance on biological processes are likely to vary considerably between different oceanographic environments (van Berkel et al. 2020).

Van Berkel et al. (2020) and Schultze et al. (2020) note that environments characterized by strong seasonal stratification, such as the Mid-Atlantic Bight, are likely to be less sensitive to changes and disruptions to oceanographic processes from atmospheric effects. In addition, atmospheric effects are influenced by WTG design. Golbazi et al. (2022) demonstrated that the surface effects of wind wakes from 10- to 15-MW WTGs (the size range being considered for development in the region) were less than those produced by smaller turbine designs currently employed in Europe (Akhtar et al. 2022; Christiansen et al. 2022; Daewel et al. n.d. [2023]). Broadly speaking, the atmospheric effects of wind farms appear to decrease as WTG hub height above the sea surface increases. Collectively, these findings indicate that planned and probable future wind farm development on the Mid-Atlantic OCS is not likely to produce hydrodynamic effects on the order of those associated with European wind farm development in the southern North Sea (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorell et al. 2022).

This conclusion is supported by regional modeling. BOEM has conducted a modeling study to predict how turbulent wakes and atmospheric effects resulting from offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions in the northern Mid-Atlantic Bight. Johnson et al. (2021) considered a range of development scenarios, including full build-out of both WEAs with 1,063 WTG and OSS foundations at approximately 1-nm spacing. Johnson et al. (2021) determined that all scenarios would lead to small but measurable changes in current speed, wave height, and sediment transport in the northern Mid-Atlantic Bight. In addition, small changes in stratification could occur. Specifically, stratification within and downfield from the WEAs was likely to strengthen, leading to prolonged retention of cold water near the seafloor during spring and summer. These findings suggest that offshore wind development in these WEAs is unlikely to negatively disrupt cold pool dynamics.

Hydrodynamic effects would lead to changes in surface current and circulation patterns within and around the WEAs, which would in turn affect the dispersal of planktonic organisms, eggs, and larvae. Johnson et al. (2021) used an agent-based model to evaluate how these oceanographic impacts could affect planktonic dispersal and larval settlement for two fish species (summer flounder and silver hake) and the Atlantic sea scallop. In the case of scallops, they determined that offshore wind development could affect egg and larval dispersal patterns, leading to increases in larval settlement density in some areas and decreases in others. For example, silver hake larval settlement was modeled to increase in the undeveloped region east of proposed offshore wind leases under a scenario that considered full development of all planned offshore wind facilities due to induced changes to current speeds. In contrast, summer flounder would experience a slight reduction in the density of settled larvae in central Nantucket Sound and an increase in larval density in inshore coastal habitats on Montauk and Nantucket Islands, Rhode Island, and Connecticut under the same scenario (Johnson et al. 2021). However, these small and localized effects are unlikely to be biologically significant at population levels as the larvae of these species originate from both local and distant spawning areas and are dispersed throughout the region (Johnson et al. 2021).

Prior to the Johnson et al. (2021) analysis, Chen et al. (2016) used a hydrodynamic model to assess how the installation of large numbers of wind turbines on the Mid-Atlantic OCS would impact oceanographic processes during storm events. They determined that structure presence would not have a significant influence on southward larval transport from Georges Bank and Nantucket Shoals into the Mid-Atlantic Bight, but wind farm development could lead to an increase in cross-shelf larval dispersion. The combined findings of the Johnson et al. (2021) and Chen et al. (2016) modeling studies indicate that broad changes in regional circulation patterns are unlikely to occur as a result of regional offshore wind development. These patterns are broadly consistent over time but vary from year to year, and organisms that depend on circulation-driven larval dispersal are adapted to that variability (Chen et al. 2021; McCay et al. 2011; Munroe et al. 2018; Roarty et al. 2020; Zhang et al. 2015). In this context, localized shifts in larval transport and settlement density on the scale of miles to tens of miles are unlikely to negatively affect larval survival at regional scales. Even where they occur, localized changes to larval recruitment may not necessarily translate to negative effects on adult biomass. For example, Atlantic sea scallops are prone to overcrowding and reduced growth rates in areas where larval recruitment exceeds carrying capacity (Bethoney and Stokesbury 2019). In such cases, changes in dispersal that reduce overcrowding could lead to positive effects on larval growth and survival to adulthood.

While hydrodynamic impacts on finfish are likely to vary between species, the modeled findings for summer flounder and silver hake are likely representative of the magnitude of potential effects on most fish species that rely on current-driven dispersal of planktonic larvae. Localized changes in larval settlement patterns in the absence of population-level effects would constitute a **minor** adverse impact on this resource. This impact would be effectively permanent.

<u>Sediment deposition and burial:</u> Cable placement and other related construction activities would disturb the seafloor, creating plumes of fine sediment that would disperse and resettle in the vicinity. The resulting effects on finfish would be similar in nature to those observed during construction of the BIWF (Elliot et al. 2017) but would vary in extent and severity depending on the type and extent of disturbance and the nature of the substrates. For example, fish exposed to low levels of suspended sediment on the order of 100 to 500 mg/L may simply suspend feeding and avoid the affected area. Fish exposed to higher concentrations of suspended sediments (e.g., greater than 1,000 mg/L) may experience short-term stress

and physiological injury. The benthic eggs and larvae of some finfish species are sensitive to burial and could be injured or killed by sediment deposition (Kjelland et al. 2015; Michel et al. 2013; Wilber and Clarke 2001). While sensitivity varies widely, the eggs and larvae of some species can be killed by as little as 0.4 inch (10 mm) of sediment deposition. The eggs of certain species, like winter flounder, are particularly sensitive and can be killed by burial depths less than 0.1 inch (3 mm) (Michel et al. 2013). Effects of this magnitude are likely to occur during the construction of any planned or potential future offshore wind energy project. The highest suspended sediment levels would occur closest to the disturbance and would dissipate with distance, generally returning to baseline conditions within a few hours (RPS 2022). Observations from the construction of the BIWF showed that suspended sediments returned to baseline levels faster than predicted by preconstruction modeling (HDR 2020). In theory, bed-disturbing activities occurring nearby (i.e., within a few hundred feet) could elevate suspended sediment levels within the GAA, resulting in short-term minor adverse effects on finfish. However, most fish species are mobile enough to avoid harmful suspended sediments.

While suspended sediment and burial effects are an unavoidable consequence of offshore wind energy construction, O&M, and decommissioning, these effects would be limited in extent and short term in duration, effectively ending once the sediments have resettled. Individual finfish could be adversely affected, but the number of individuals impacted and the duration of effects would be unlikely to adversely affect any finfish species at the population level at the scale of the GAA and would therefore be **minor** adverse.

#### 3.13.2.2.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on finfish associated with the Project would not occur. However, ongoing and future activities would have continuing short-term, long-term, and permanent impacts on finfish primarily through pile-driving noise, new cable emplacement, and the presence of structures related to other wind projects within the GAA. Climate change impacts would similarly continue to impact finfish populations regionally.

BOEM anticipates that the impacts of ongoing activities, including climate change, port development and expansion, navigation dredging, and continued recreational and commercial fishing activity, would be **moderate** adverse for finfish species in the GAA. Fish stock management is an important component of maintaining healthy fish stocks. In the absence of climate change and other impact-generating activities, fishing activity would contribute to ongoing **minor** adverse impacts to finfish. In addition to ongoing wind farm activities, reasonably foreseeable activities other than offshore wind could also contribute to impacts on finfish. Based on the same reasonably foreseeable activities noted above, BOEM anticipates that the impacts of reasonably foreseeable new activities (e.g., increased vessel traffic) other than offshore wind would be **minor** adverse. BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **moderate** adverse impacts on finfish.

The combined significance criteria are used to characterize the combined effects of all IPFs likely to occur in the GAA under the No Action Alternative. BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends (i.e., climate change), and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts and could include **moderate** beneficial impacts to finfish.

Future offshore wind activities are expected to generate impacts under several IPFs, the most prominent being the presence of structures—namely, foundations and scour/cable protection.

The No Action Alternative would forgo the fisheries monitoring that Revolution Wind has voluntarily committed to perform, the results of which could provide an understanding of the effects of offshore wind development; benefit future management of finfish; and inform planning of other offshore developments. However, other ongoing and future surveys could still provide similar data to support similar goals.

### 3.13.2.3 Alternative A: Impacts of the No Action Alternative on Essential Fish Habitat

#### 3.13.2.3.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for essential fish habitat (see Section 3.13.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the geographic analysis area. These IPFs are described and analyzed in Appendix E1.

#### 3.13.2.3.2 Cumulative Impacts

This section discloses potential essential fish habitat impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

#### Offshore Activities and Facilities

This section discloses potential EFH impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1. The duration of impacts disclosed for this resource deviate slightly from general guidelines provided in Section 3.3.

<u>Accidental releases and discharges:</u> As stated previously for finfish, offshore wind energy development could result in the accidental release of water quality contaminants or trash/debris, which could theoretically lead to an increase in debris and pollution in the GAA (see Section 3.21 for a characterization of existing water quality conditions). In general, the types of accidental hazardous materials releases that would impact finfish would also impact EFH. Project proponents would be required to comply with state and federal regulations to avoid the discharge of solid debris and unintentional introduction of nonnative species. Compliance with BOEM and USCG requirements would effectively minimize releases of trash and debris. Similar to finfish, effects on EFH would be expected to be **negligible** adverse.

<u>Anchoring and new cable emplacement/maintenance:</u> Offshore wind energy facility construction would involve direct disturbance of the seafloor leading to direct impacts on EFH. In general, these effects would be localized to the disturbance footprint and vicinity. The specific type and extent of habitat conversion and resulting effects would vary depending on the project design, species present, and site-specific conditions. Future activities would also disturb up to 101,381 acres of seafloor during cable installation, although the impacts from this disturbance on EFH would be **minor** adverse. See Section 3.13.1.1.1 for additional details.

Climate change: As stated previously for finfish, climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These trends are expected to continue under the No Action Alternative. The intensity of impacts resulting from climate change are uncertain but are anticipated to be **minor** to **moderate** adverse.

EMF: At least seven submarine power and communications cables are in the vicinity of the RWEC corridor, with most running parallel the RWEC. These cables would presumably continue to operate and generate EMF effects under the No Action Alternative. While the type and capacity of those cables are not specified, the associated baseline EMF effects can be inferred from the available literature. Electrical telecommunications cables are likely to induce a weak EMF on the order of 1 to 6.3 µV/m within 3.3 feet (1 m) of the cable path (Gill et al. 2005). Fiber-optic communications cables with optical repeaters would not produce EMF effects.

Under the No Action Alternative, up to 13,469 miles of cable installation would be added in the GAA, producing EMF in the immediate vicinity of each cable during operations. BOEM anticipates that proposed offshore wind energy projects would use HVAC transmission, but HVDC designs are possible and could occur. BOEM would require these future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects from cable operations. EMF effects on EFH from these future projects would vary in extent and significance depending on overall cable length, the proportion of buried versus exposed cable segments, and project-specific transmission design (e.g., HVAC or HVDC, transmission voltage, etc.). Because measurable EMF effects are generally limited to within tens of feet of cable corridors, these future activities would not affect existing EMF conditions unless a transmission cable were routed directly through the GAA. Accordingly, EMF effects from future activities would most likely be **negligible** adverse. However, Hutchison et al. (2018; 2020a) have observed behavioral responses in electrosensitive fish that were exposed to EMF from a HVDC cable in a controlled environment. These findings suggest more extensive behavioral impacts resulting in higher level (e.g., **minor** or **moderate**) adverse effects could result should future projects use HVDC transmission.

Noise: As mentioned above for finfish, several proposed offshore wind projects could be developed on the Mid-Atlantic OCS between 2022 to 2030, including some projects in proximity to the RWF (see Appendix E), resulting in noise-generating activities. BOEM believes it is reasonable to conclude that future projects could result in **negligible to moderate** adverse effects to EFH.

Presence of structures: As discussed under finfish, BOEM conducted a modeling study to predict how planned offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions northern Mid-Atlantic Bight. BOEM determined that small but measurable changes in current speed, wave height, and sediment transport in the northern Mid-Atlantic Bight would occur. In addition, small changes in stratification could occur, leading to prolonged retention of cold water near the seafloor within the WEAs during spring and summer. However, these localized and small effects are unlikely to be biologically significant at population levels (Johnson et al. 2021).

While hydrodynamic impacts on EFH are likely to vary between species, the modeled findings for summer flounder and silver hake are likely representative of the magnitude of potential effects on species having planktonic larvae. Localized changes in larval settlement patterns in the absence of population-level effects would constitute a **minor** adverse impact on this resource. This impact would be effectively permanent.

The future addition of up to 3,088 new WTG and OSS foundations on the Mid-Atlantic OCS could result in hydrodynamic and artificial reef effects that influence finfish community structure within and in proximity to project footprints. This could in turn influence the abundance and distribution of EFH species. While hydrodynamic and reef effects would largely be limited to the areas within and/or close to wind farm footprints, the development of individual or contiguous wind energy facilities in nearby areas could produce cumulative effects that would be permanent and **moderate** beneficial for some species from habitat conversion and have **minor** adverse effects due to permanent habitat loss. New structures would attract structure-oriented fishes as long as the structures remain. Abundance of certain fishes could increase with short-term to permanent **moderate** adverse impacts.

Hydrodynamic disturbance resulting from the broadscale development of large offshore wind farms is a topic of emerging concern because of potential effects on the Mid-Atlantic Bight cold pool. The cold pool is a mass of relatively cool water that forms in the spring and is maintained through the summer by stratification. The cold pool supports a diversity of fish species that are usually found farther north but thrive in the cooler waters it provides (Chen 2018; Lentz 2017). Changes in the size and seasonal duration of the cold pool over the past 5 decades are associated with shifts in the fish community composition of the Mid-Atlantic Bight (Chen 2018; Saba and Munroe 2019). The GAA and neighboring lease areas within the RI/MA and MA WEAs are located on the approximate northern boundary of the cold pool. The potential effects of extensive wind farm development on features like the cold pool is a topic of emerging interest and ongoing research (Chen et al. 2016). Changes in cold pool dynamics resulting from future activities, should they occur, could conceivably result in changes in habitat suitability and fish community structure but the extent and significance of these potential effects are unknown.

<u>Sediment deposition and burial:</u> As discussed under finfish, cable placement and other related construction activities would create plumes of fine sediment that would disperse and resettle. These effects would be short term in duration, effectively ending once the sediments have resettled. Similarly, suspended sediment concentrations close to the disturbance could exceed levels associated with behavioral and physiological effects on fish but would dissipate with distance, generally returning to baseline conditions within a few hours. In theory, bed-disturbing activities occurring nearby (i.e., within a few hundred feet) could elevate suspended sediment levels within the GAA, resulting in short-term **minor** adverse effects.

#### 3.13.2.3.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on EFH resulting from the Project would not occur. However, ongoing and future activities would have continuing short-term to long-term impacts on EFH species and habitats, primarily as a result of construction-related noise impacts, operational noise, seafloor disturbance and habitat modifications, hydrodynamic and reef effects resulting from the presence of offshore wind energy structures, and the interactions between these impacts and the ongoing effects of climate change.

The combined significance criteria are used to characterize the combined effects of all IPFs likely to occur in the GAA under the No Action Alternative. BOEM anticipates that the impacts of ongoing activities—especially fishing, navigation dredging, coastal development, and climate change—would be **moderate** adverse for EFH species. Fish stock management is an important component of maintaining healthy fish stocks. In addition to ongoing activities, reasonably foreseeable activities other than offshore wind could also contribute to impacts on EFH. BOEM anticipates that the impacts of reasonably foreseeable activities other than offshore wind and climate change on EFH would be **minor** adverse. BOEM expects the combination of ongoing activities, climate change, and reasonably foreseeable activities other than offshore wind to result in **moderate** adverse impacts on EFH, with moderate adverse impacts resulting primarily from climate change.

BOEM anticipates that future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse and could include **moderate** beneficial impacts to EFH. Future offshore wind activities are expected to contribute considerably to several IPFs, the most prominent being the presence of structures—namely, foundations and scour/cable protection.

The No Action Alternative would forgo the fisheries monitoring that Revolution Wind has voluntarily committed to perform, the results of which could provide an understanding of the effects of offshore wind development; benefit future management of EFH; and inform planning of other offshore developments. However, other ongoing and future surveys could still provide similar data to support similar goals.

### 3.13.2.4 Alternative B: Impacts of the Proposed Action on Finfish

#### 3.13.2.4.1 Construction and Installation

##### Offshore Activities and Facilities

<u>Accidental releases and discharges</u>: The impact to finfish from trash, debris, and spills from the Project would be the same as described under the No Action Alternative; **negligible** adverse.

In the unlikely event a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse effects on finfish, including listed finfish, could result. These effects could be short term to long term in duration depending on the type and volume of material released, the duration of exposure, and the animals and life stages exposed; fish eggs and larvae are less mobile and are considered more susceptible to spilled materials in surface waters (see Section 3.21.1.2).

<u>Anchoring and new cable emplacement/maintenance:</u> Finfish within the construction footprint would be exposed to risk of displacement, crushing, and burial during seafloor preparation of cable corridors, cable installation, placement of cable protection, and vessel anchoring. These activities would also impact benthic habitats used by certain finfish species, with the effects ranging in duration from short term to long term. The acres of construction-related seafloor disturbance are summarized by benthic habitat type in Section 3.6.2.4.1 and Table 3.6-4. As shown, seafloor disturbance from jack-up vessels and general vessel anchoring could impact up to 3,247 acres. Seafloor disturbance from various overlapping cable installation activities, including boulder relocation, jet plow trenching for cable installation, and placement of cable protection could impact up to 2,043 acres distributed throughout the RWF and RWEC maximum work areas.

Finfish within these construction footprints would be directly exposed to disturbance. Juvenile and adult fish are mobile and would likely avoid being harmed or killed by construction equipment and materials placement. In contrast, certain fish species, such as cod, ocean pout, Atlantic pollock, and winter flounder, have benthic eggs and/or larvae that would be vulnerable to these effects. The extent of exposure would vary by species and habitat association. For example, ocean pout eggs are typically found in hard-bottom substrates, meaning that this species more likely to be exposed to boulder relocation and placement of scour and cable protection in large-grained complex and complex habitats. Winter flounder lay their eggs in soft-bottom benthic habitat, which translates to greater exposure to jet plow, sea-to-shore transition construction, and vessel anchoring in this habitat type. Approximately 58% of the estimated construction disturbance footprint is composed of soft-bottom habitat, 15% is large-grained complex habitat, and 27% is complex habitat ranging from boulders and cobbles to complex mixtures of mobile sand, gravel, cobble, and boulders.

The estimated anchoring impacts are presented in Section 3.6.2.4.1 and Table 3.6-4 based on the best currently available information, comprising anchoring information presented in the COP and supplemental information about jack-up vessel anchoring and pull-ahead anchoring provided by Revolution Wind. The general vessel anchoring estimate of 3,167 acres comprises the area covered by 102,656-foot (200-m) radius circles, one around each proposed WTG and OSS foundation, where construction-related anchoring impacts may occur. Actual anchoring requirements and the average extent of impacts per foundation would likely be appreciably smaller. Jack-up vessel and pull-ahead anchoring acreage estimates are precise and based on currently understood anchoring requirements and equipment. Jack-up vessel anchoring during WTG and OSS foundation installation would impact approximately 21.1 acres of seafloor habitat. Some portion of these impacts would occur in areas previously impacted by seafloor preparation for foundation installation and subsequently impacted by placement of scour protection. Pull-ahead anchoring for cable installation would impact an estimated 16.1 acres, based on the anticipated number of anchoring events, anchor type, and substrate conditions in the RWEC corridor. Combined impacts from general vessel anchoring, jack-up vessel anchoring, and pull-ahead anchoring would impact up to, but likely less than, an estimated total 3,204 acres of seafloor.

Benthic habitat in the areas wherein anchoring impacts could occur is composed of approximately 19.1% large-grained complex, 30.0% complex, and 50.9% soft-bottom habitats. However, the total acreage and distribution of anchoring impacts cannot be predicted with certainty because anchoring requirements and vessel positioning are affected by construction needs and real-time wind and current conditions. The vessel anchoring plan developed by the applicant (see EPM Ben-6 in Table F-1, Appendix F) would be used to identify and avoid impacts to large-grained complex and complex benthic habitats to the greatest extent practicable. Impacts on bedforms in soft-bottom benthic habitat are expected to recover within 18 to 30 months following initial disturbance as a result of natural sediment transport processes (Daylander et al. 2012) and recolonization by habitat-forming organisms from adjacent habitats. This estimate is based on observed recovery rates from fishing-related disturbance (Grabowski et al. 2014), on cable installation impacts at the nearby BIWF (HDR 2020), and on similar seafloor disturbance impacts observed in other regions (de Marignac et al. 2008). In contrast, anchoring in complex and large-grained complex habitats could result in long-term to permanent impacts on habitat structure by redistributing coarse substrates (i.e., creation of anchor furrows) and by damaging habitat-forming organisms on those substrates.

Cable installation impact acreage values presented in Section 3.6.2.4.1 and Table 3.6-4 represent the best available estimate of the total impact footprint for the Proposed Action design, based on proposed seafloor preparation and cable installation technologies and methods. These impacts could occur anywhere within the 131-foot-wide (40-m-wide) cable installation impact corridors, which cover an estimated 1,325, 2,471, and 148 acres for the RWEC, IAC, and OSS-link, respectively. The precise location of specific seafloor preparation impacts is not currently known; therefore, the distribution of impacts by habitat type for each cable is based on the composition of its respective impact corridor. The RWF and RWEC would be sited to avoid and minimize impacts on large-grained complex and complex benthic habitats to the greatest extent practicable (see EPM Ben-1 in Table F-1, Appendix F). This would shift some of the projected impacts on complex habitats to soft-bottom habitat. Therefore, the actual distribution of impacts by habitat type will likely vary from the estimates presented in Table 3.6-4.

Seafloor preparation and cable installation activities would impact approximately 158 and 743 acres of large-grained complex and complex habitat, respectively, and 2,375 acres of soft-bottom habitat within the RWF and RWEC construction footprints. Finfish within the construction footprint would be exposed to risk of displacement, crushing, and burial during seafloor preparation of cable corridors, cable installation, placement of cable protection, and vessel anchoring. Impacts to large-grained complex and complex benthic habitat from vessel anchoring, cable installation and cable protection, and seafloor preparation could impact managed finfish that use these habitats (e.g., monkfish) and may indirectly disturb Atlantic cod spawning. Atlantic cod spawning could be disturbed if anchoring and cable emplacement activities (e.g., grapnel runs and jet plowing) are occurring in proximity. Figure 3.13-4 shows the locations of cod observation data in relation to the Proposed Action (observations primarily observed in Zone RWC 1). EMPs committed to by Revolution Wind (see Table F-1, Appendix F), including measures designed to reduce impacts to complex habitats (e.g., using a boulder grab and a work-class remotely operated vehicle boulder skid for most boulder relocations, siting export cables and WTGs to avoid hard-bottom habitats, and developing and implementing construction and O&M anchoring plans), would minimize impacts and modifications to complex habitats that support managed finfish and important biological functions like spawning.

Disturbance impacts to soft-bottom benthic habitats and associated fish species would be short term, and these habitats and species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could be long term to permanent. Long-term impacts to habitat-forming organisms in complex habitats would require several years to recover full habitat function. Permanent habitat impacts would result where seafloor preparation and placement of scour protection result in conversion to a new habitat. Permanent habitat impacts would result where seafloor preparation and placement of scour protection result in conversion to a new habitat type. Although habitat structure may be altered, habitat composition in the affected areas would recover to functional condition over the life of the Project.

Recent research conducted by the NEFSC and NEFMC (BOEM 2023e) determined that HAPC features for the gadidae cod family species on Georges Bank recovered relatively quickly from damage by intensive scallop dredging activity. Near-complete recovery of benthic epifauna, including habitat-forming organisms on boulders and cobbles, was achieved within 6 years of the disturbance. Given their proximity to the Lease Area, these findings provide a useful basis for estimating the likely duration of effects of benthic habitat disturbance from anchoring disturbance and other construction-related activities.

Manta rays are pelagically oriented and planktivorous; therefore, seafloor anchoring and new cable emplacement/maintenance are unlikely to have a measurable effect on this species. In contrast, seafloor disturbance and habitat modification associated with anchoring and cable emplacement/maintenance would kill or displace sturgeon prey organisms such as worms, clams, amphipods, and other benthic infauna.

Finfish present along the cable routes may be subject to lethal crushing, burial, or entrainment effects. Adult fish would likely exhibit avoidance responses and exit the active construction and installation area, but there is potential for lethal effects. Placement of cable protection and installation of the cofferdam could crush or bury adult fish unable to avoid the area. Studies of mortality rates from dredging provide a useful basis for evaluating potential impacts from cable installation. Adult fish are typically able to avoid dredging disturbance, meaning entrainment rates are generally low (Wenger et al. 2017). Once fish are entrained, mortality rates can be high, exceeding 30% (Armstrong et al. 1982). However, the jet and mechanical plows used for cable installation are not directly comparable to dredging equipment. Dredges ingest substantial volumes of water and sediment at the seafloor. In contrast, mechanical plows physically dig sediments out of the seafloor. Jet plows draw water from near the sea surface through screened intakes and inject it into the seafloor to loosen sediments, making it easier to displace them from the cable trench. Given this, fish larvae, eggs, and small immobile juveniles that are unable to avoid seafloor preparation and cable installation equipment are most likely to be exposed to crushing, burial, and entrainment effects.

Anchoring and cable emplacement activities during construction would therefore likely result in direct impacts on larval, juvenile, and adult Atlantic cod associated with these habitats, as described above. Construction would also result in long-term to permanent impacts on the composition and structure of benthic habitats used by this species. The nature, duration, and severity of these impacts, including impacts to habitat-forming organisms, are discussed in Sections 3.6.2.2.1 and 3.6.2.3.1. Although impacts to complex habitats would be long-term to permanent in duration, it is not clear that habitat suitability for species like cod would be substantially diminished over the same duration. For example, Wilber et al. (2022a) observed an increase in Atlantic cod abundance at the BIWF compared to reference locations. Reubens et al. (2013) observed a similar increase in Atlantic cod abundance and documented the presence of settled larvae and juveniles exhibiting robust growth rates within a large European wind farm on the Baltic Sea. In both cases the observations occurred within a few years after construction was completed.

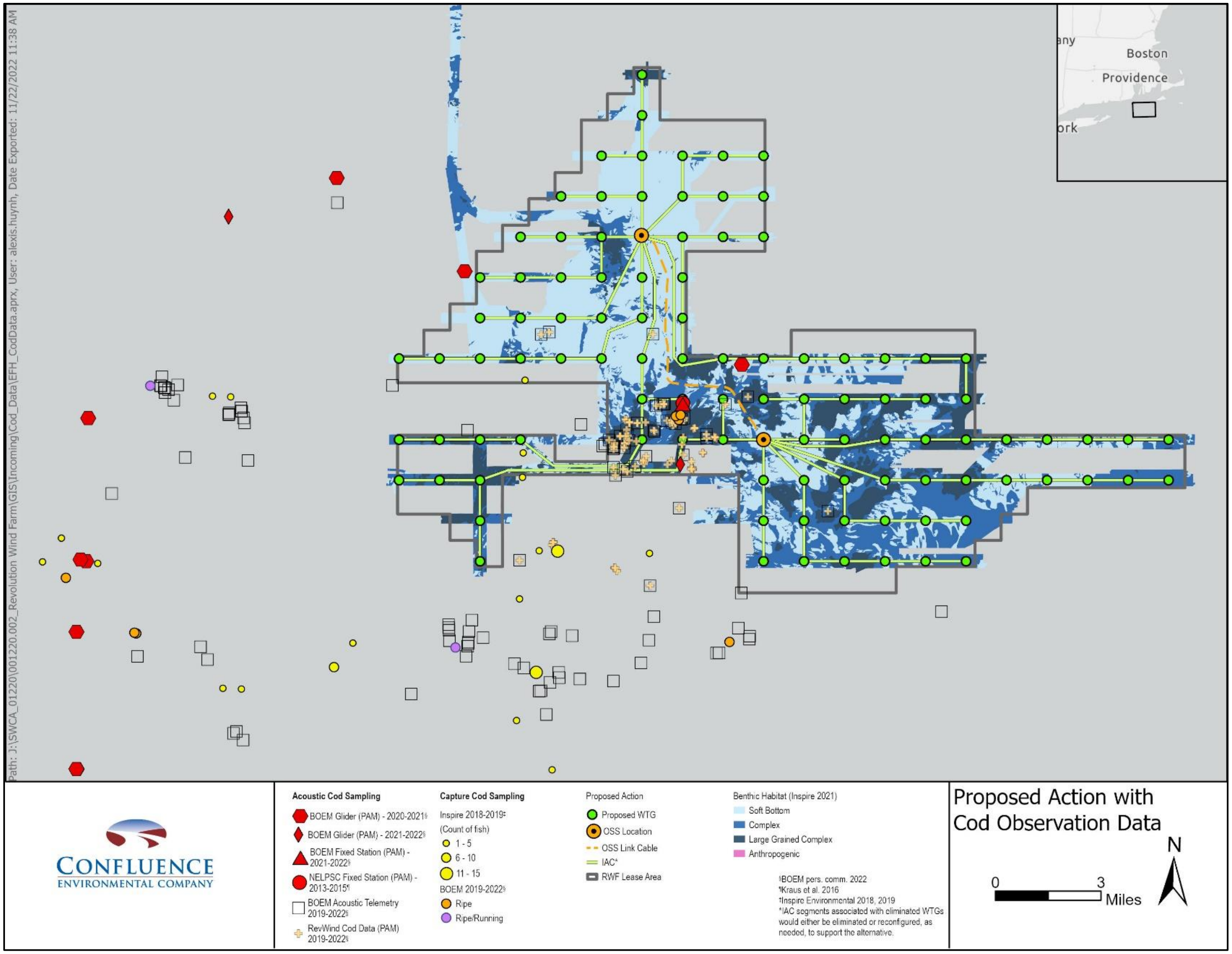


**Figure 3.13-4. Proposed Action with cod observation data.**

Jet plow operation during cable installation would entrain and kill pelagic fish eggs and larvae that are near the equipment intakes during operation. Both the jet and mechanical plow could entrain benthic eggs and larvae present within the seafloor disturbance footprint. While potential entrainment impacts have not been quantified for the Proposed Action, the findings of a recent analysis conducted for the adjacent SFWF provide a useful example of the magnitude of potential effects. Inspire Environmental (2019b) estimated that over a billion fish eggs could be exposed to entrainment impacts from installation of the SFEC and SFWF IAC, with exposure varying by species. For example, entrainment would kill an estimated 23,000 Atlantic cod larvae, a negligible number of haddock and Atlantic pollock larvae, and up to 2.8 million Atlantic mackerel larvae. Given the similarity in location and greater scale of cable installation activities, the Proposed Action would likely produce similar or larger entrainment effects. However, these impacts must be placed into context with natural mortality to understand their significance. The total volume of water entrained during SFWF and SFEC construction (approximately 20 million cubic meters) represented a miniscule fraction of the billions of cubic meters of near-surface habitat on the Mid-Atlantic OCS. A typical female cod lays over 1 million eggs (Alonso-Fernández et al. 2009), meaning that a spawning aggregation could produce hundreds of millions of eggs and larvae. The natural mortality rate is estimated to be 10% to 20% per day for cod eggs and 6% per day for larvae (Mountain et al. 2008). Mackerel are abundant, and each female can produce between 300,000 and 2 million planktonic eggs (Morse 1980). In this context, entrainment losses of tens of thousands of cod larvae or even several million mackerel eggs and larvae would be insignificant relative to the billions spawned in the region each year. While the Proposed Action is larger than the SFWF, and cable laying requirements are more extensive, impacts on finfish from jet plowing would be similar in scale and biologically insignificant relative to existing levels of abundance and the background mortality rate of fish eggs and larvae. On balance, entrainment of eggs and larvae would constitute a short-term adverse impact on finfish that would not result in measurable population-level impacts. Therefore, these impacts would be **minor to moderate** adverse.

<u>Noise</u>: Construction-related sources of noise, particle motion, and vibration that could affect finfish and/or prey resources are impact and vibratory pile driving, preconstruction HRG surveys, vessel and cable installation equipment, and UXO detonation. Popper et al. (2014) compiled available research on underwater noise effects on fish and other aquatic life and established noise exposure thresholds for mortality, injury, and TTS in different species and life stages of fish based on sensitivity to sound. The FHWG (2008) recommended a generalized threshold for behavioral effects on fish from noise exposure. These thresholds represent the current state of the science regarding potential noise effects on fish and are presented in Table 3.13-4.[41] The low-frequency noise produced by construction and installation–related vessel engine noise could also cause auditory masking effects as those described below for WTG operations. Vessel noise is a common source of low-frequency sound in the marine environment that may result in auditory masking of biologically important sounds or elicit behavioral responses. Behavioral

[41] The noise thresholds in Table 3.13-3 represent the best available science regarding finfish sensitivity to injury and behavioral-level effects from underwater noise exposure. No exposure thresholds have been defined for auditory masking effects in fish, but for the purpose of this Draft EIS, these effects are considered likely to occur at exposure levels between the behavioral threshold and the TTS threshold for each hearing group. NMFS applies different threshold criteria developed by the FHWG (2008) to evaluate underwater noise effects on ESA-listed species. The BOEM BA for the Proposed Action uses these more conservative thresholds to evaluate potential underwater noise effects on Atlantic sturgeon, manta rays, and their prey and forage species (BOEM 2023a, 2023b).

responses in fishes differ depending on species and life stage, with younger, less-mobile age classes being the most vulnerable to vessel noise impacts (Gedamke et al. 2016; Popper and Hastings 2009).

UXOs present in the maximum work area would have to be detonated if they cannot be safely relocated prior to construction. Kusel et al. (2023) and Hannay and Zykov (2022) modeled construction noise likely to result from impact pile driving and UXO detonation and calculated the distances required to attenuate noise below applicable injury and behavioral criteria for each noise source by hearing group and type of effect (see Table 3.13-4). As of February 2023, 16 UXOs have been identified in the RWEC corridor. Revolution Wind has determined that all 16 devices can be safely avoided by shifting the cable route within the approved installation corridor without the need for detonation (Orsted 2023). However, it is possible that additional devices could be discovered in preconstruction surveys or during construction that cannot be avoided or safely relocated. BOEM has concluded that the need for UXO detonation cannot be entirely ruled out; therefore, the potential effects of this activity on finfish are considered herein.

The currently available underwater noise exposure thresholds for fish are based on the sound pressure component. Several fish species, notably those species in the hearing specialist group such as Atlantic cod, are also sensitive to the particle motion component of sound (Hawkins et al. 2021; Popper and Hawkins 2018; Roberts and Elliot 2017). Impulsive noise sources, notably impact pile driving and UXO detonation, can produce intense particle motion effects within a short distance of the source and can transmit particle motion effects in low-frequency bands (1–40 Hz) over broader distances through vibration of the seafloor (Hawkins et al. 2021). Particle motion effects from substrate vibration caused by impact pile driving and UXO detonation could be detectable to sensitive fish species on or within a few feet of the seafloor to potentially several thousand feet of the source (Hawkins et al. 2021). Other sound sources, including HRG surveys, seafloor preparation, and cable laying activity, would also produce particle motion effects. HRG survey equipment is suspended in the water column and does not contact the seafloor; therefore, particle motion effects are likely to be limited to within tens of feet or less of the mobile sound source. In contrast, seafloor preparation and cable laying activities occur on the seafloor. Particle motion effects from these sources have not been directly studied. However, the sound and vibration energy generated by these activities are much less intense than those produced by impact pile driving. For example, cable trenching using jet and mechanical plows produces noise levels on the order of 178 to 188 dB re 1 µPa m, comparable to the noise levels generated by associated construction vessels (Bald et al. 2015; Nedwell et al. 2003). On this basis, it is reasonable to infer that particle motion effects from these activities are unlikely to exceed those generated by impact pile driving and UXO detonation.

Table 3.13-4 organizes fish into groups based on the presence of a swim bladder and the involvement of this organ in hearing. Noise impacts on fish vary depending on the ability of the fish to detect sound pressure. Popper et al. (2014) reviewed the available research and developed a set of recommended injury thresholds for different groups of fishes depending on their specific biological sensitivity to sound. Fish with a swim bladder or other gas chamber involved in hearing (e.g., Atlantic herring and fish in the cod family) are considered hearing specialists and are the most sensitive to underwater noise impacts. Fish that have a swim bladder that is not directly involved in hearing, or hearing generalists, are intermediate in sensitivity to noise impacts. Fish species that lack swim bladders and similar gas-filled organs (e.g., sharks, rays, and flatfish) are the least susceptible to underwater noise impacts. This group includes the Elasmobranchii, a subclass of fishes comprising sharks, skates, rays, and their relatives. Fishes in this subclass lack swim bladders or any other kind of hearing specialization and can only detect the particle motion component of sound (Casper 2006). Particle motion effects dissipate rapidly and are highly localized around the noise source, with detectable effects on finfish typically limited to within 3 to 6 feet of the source (Edmonds et al. 2016; Payne et al. 2007). Eggs and larvae lack gas-filled organs and are less susceptible to injury but are unable to avoid noise impacts because they are less mobile than adults.

As shown in Table 3.13-4, impact pile driving used to install the RWF monopile foundations is one of the most intense sources of noise resulting from the Project and would produce the most significant and extensive noise effects on fish due to the number of WTG and OSS foundations to be installed. As shown in Table 3.13-5, potentially lethal noise effects on adult fish occur from 604 to 5,883 feet from each WTG monopile and 617 to 5,194 feet from each OSS monopile. Potentially lethal effects on fish eggs and larvae could occur from 2,470 to 3,683 feet and 2,756–3,458 feet from each WTG and OSS monopile, respectively. Pile driving would produce noise above the 150 dB re 1 µPa behavioral effects threshold from 14,403 to 34,987 feet from each source, respectively. The range of threshold distances for injury from UXO detonation are for devices ranging in size from 5- to 1,000-pound devices, the latter being the largest explosive analyzed by Hannay and Zykov (2022). Detonation of 1,000-pound UXOs could injure or kill adult fish and fish eggs and larvae up to 951 and 1,384 feet from the source, respectively. Revolution Wind anticipates that up to 13 UXOs ranging from 5 to 1,000 pounds in size may need to be detonated in place (LGL 2022). The actual number and location of UXOs is not currently known, but the largest devices are most likely to be found within the central portion of the RWF and in state waters on the RWEC corridor at the mouth and outside of Narragansett Bay (Ordtek 2021).

**Table 3.13-5. Distances to Underwater Noise Injury and Behavioral Thresholds by Fish Hearing Group and Exposure Type for Wind Turbine Generator and Offshore Substation Foundation Installation, Unexploded Ordnance Detonation, High-Resolution Geophysical Surveys, and Vessel Operation**

| Activity* | Number of Sites | Total Days | Noise Exposure Type | Hearing Group | Exposure Threshold† | Range of Threshold Distances (feet)‡ |
|---|---|---|---|---|---|---|
| 12-m WTG monopile foundation installation | 100 | 33 | Peak injury | Fish–Swim bladder involved in hearing | 207 | 69–371 |
| | | | | Fish–Swim bladder not involved in hearing | 207 | 69–371 |
| | | | | Fish–No swim bladder | 213 | 13–59 |
| | | | | Eggs and larvae | 207 | 69–371 |
| | | | Cumulative Injury | Fish–Swim bladder involved in hearing | 207 | 3,848–5,883 |
| | | | | Fish–Swim bladder not involved in hearing | 210 | 2,470–3,638 |
| | | | | Fish–No swim bladder | 219 | 604–856 |
| | | | | Eggs and larvae | 210 | 2,470–3,638 |
| | | | TTS | All fish | 186 | 23,094–43,842 |
| | | | Behavioral effects | All fish | 150 | 14,403–34,987 |
| 15-m OSS monopile foundation installation | 2 | 2 | Peak injury | Fish–Swim bladder involved in hearing | 207 | 125–299 |
| | | | | Fish–Swim bladder not involved in hearing | 207 | 125–299 |
| | | | | Fish–No swim bladder | 213 | 33-62 |
| | | | | Eggs and larvae | 207 | 125–299 |

| Activity* | Number of Sites | Total Days | Noise Exposure Type | Hearing Group | Exposure Threshold† | Range of Threshold Distances (feet)‡ |
|---|---|---|---|---|---|---|
| | | | Cumulative injury | Fish–Swim bladder involved in hearing | 207 | 3,885–5,194 |
| | | | | Fish–Swim bladder not involved in hearing | 210 | 2,756–3,458 |
| | | | | Fish–No swim bladder | 219 | 617–797 |
| | | | | Eggs and larvae | 210 | 2,756–3,458 |
| | | | TTS | All fish | 186 | 20,623–38,625 |
| | | | Behavioral effects | All fish | 150 | 15,157–35,722 |
| Temporary cofferdam installation | 1 | 14 | Behavioral effects | All fish | 150 | 2,543 |
| UXO detonation | 13 | 13 | Injury or mortality | All fish | 229 | 161–951 |
| | | | | Eggs and larvae | >13 | 148–1,384 |
| HRG surveys | 10,755 | 248 | TTS | All fish | 186 | 16 |
| | | | Behavioral effects | All fish | 150 | 2,572 |
| Construction vessel operation | N/A | ~730 | Behavioral effects | All fish | 150 | 442 |

* Installation scenario for 12-m monopile is 6,500 strikes/pile at the installation rate of three piles/day. Installation scenario for 15-m monopile is 8,000 strikes/pile at the installation rate of one pile/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction. UXO detonation results assume a worst-case scenario requiring detonation of a 1,000-pound explosive device using a attenuation achieving 10 dB of sound source reduction. Total HRG survey impact area based on an estimated 10,775 linear miles of survey effort, or approximately 48 miles per day over 248 days at an average survey vessel speed of 2.2 knots.

† Peak injury thresholds are SPL in dB re 1 µPa; cumulative injury thresholds are SEL in decibels referenced to the sum of cumulative pressure in micropascals squared, normalized to 1 second for 12 hours of exposure; behavioral injury threshold is SPL in dB re 1 µPa. The UXO detonation threshold for eggs and larvae is particle acceleration exceeding 13 millimeters per second.

‡ Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG and OSS values are the range of threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites and seasonal conditions. Revolution Wind anticipates up to 13 UXOs requiring detonation in place could be encountered in the maximum work area, with devices ranging in size from 5 to 1,000 pounds (LGL 2022). The low and high range of threshold distances shown are for detonation of for 5- and 1,000-pound UXOs, respectively, as modeled by Hannay and Zykov (2022). Detonation impacts could occur anywhere within the RWF and/or along the RWEC corridor, depending on where UXOs are identified.

Hearing generalist species have a swim bladder that is not directly involved in hearing. Species in this group may also use sound to communicate (Ladich and Schultz-Mirbach 2016; Popper et al. 2014). Examples of hearing generalists that occur in the RWF and RWEC include ocean pout, sturgeon, butterfish, scup, and tunas. While the presence of a swim bladder makes these species susceptible to sound-related injury, they are less vulnerable than the hearing specialists. Impact pile driving is the only source of construction noise likely to cause injury in this group, affecting individuals within approximately 2,470 to 3,683 feet and 2,756 to 3,458 feet of WTG and OSS monopile installation, respectively (see Table 3.13-5).

Fish that lack a swim bladder are the least vulnerable to noise impacts. While they have hearing organs and are susceptible to hearing injury, the lack of a swim bladder makes them less vulnerable to internal injuries leading to death (Popper et al. 2014). Examples of species in this hearing group that occur in the RWF and RWEC include flatfishes (e.g., summer, winter, and yellowtail flounder), skates (e.g., little, barndoor, and winter skate), and sharks (e.g., sand tiger, tiger, and sandbar shark). For this group, monopile installation is the only activity likely to cause injury-level noise effects from cumulative exposure within approximately 604 to 856 feet and 617 to 797 feet of WTG and OSS monopile installation, respectively (see Table 3.13-5).

Fish eggs and larvae are potentially susceptible to injury and mortality from intense underwater noise. While available evidence is limited, Popper et al. (2014) defined injury criteria for eggs and larvae that are used in this EIS to evaluate potential effects on both finfish (see Table 3.13-4). Impact pile driving and UXO detonation are the only construction noise sources likely to produce injury-level effects on eggs and larvae. This level of effect could occur within approximately 2,470 to 3,683 feet and 2,756 to 3,458 feet of WTG and OSS monopile installation, respectively, and within 148 to 1,384 feet of UXO detonations, depending on the size of the device. The significance of these impacts will vary depending on when the impacts occur and proximity to important spawning habitats. The instantaneous injury exposure area (area within which modeled underwater noise from a single monopile installation is above the injury threshold for fish eggs and larvae) is relatively small (within a few thousand feet of each site). Stationary eggs and larvae within this area would likely experience higher than natural levels of mortality. Although mortality-level effects on fish eggs and larvae could occur, these impacts are likely to be **minor** adverse overall because 1) the area of effect is small relative to the available habitat; 2) the loss of individuals would likely be insignificant relative to natural mortality rates for planktonic eggs and larvae across the GAA, which can range from 1% to 10% per day or higher (White et al. 2014); and 3) proposed TOY restrictions for pile driving (January through April and December with contingencies) could reduce the amount of Atlantic cod eggs and larvae exposed to injurious levels of pile-driving noise.

As stated, Revolution Wind has identified 16 UXOs in the RWEC corridor, all of which can be avoided by rerouting cable installation. Therefore, UXO detonation is not currently anticipated. However, it is possible that additional devices could be discovered during construction that could require detonation in place. Although this is unlikely, BOEM is providing an evaluation of potential UXO detonation effects on finfish should it be required. UXO detonations within the central portion of the Lease Area would be a concern if they occurred in proximity to sensitive habitats or life stages, such as Atlantic cod spawning. The central portion of the RWF encompasses large areas of continuous, large-grained and complex habitats, including medium- and low-density boulder fields, that recent evidence has indicated support spawning cod (Van Hoeck et al. 2023). Direct mortality, disturbance of spawning cod aggregations, and extensive damage to complex habitats (including attached fauna and epifauna present that may support adult cod) from UXO detonations are a concern because both Atlantic cod stocks (i.e., Gulf of Maine and Georges Bank) are considered overfished, but fishing rates established under rebuilding plans promote population growth (NOAA 2023). However, the status of cod populations and of spatiotemporal distribution of spawning in this region is not as well understood as other regions in the northwestern Atlantic (e.g., Gulf of Maine and Georges Bank). The infrequency of cod observed in fishery-independent trawl surveys contributes to the poor understanding of stocks in this region (Langan et al. 2020). Although, there is information indicating that, unlike other spawning stocks, cod in southern New England have increased in abundance during the last 20 years (Langan et al. 2020), and cod in this region have shown a tendency to be distributed over larger areas (Loehrke 2014). Existing and emerging data also indicate that cod spawning occurs throughout the southern New England region (DeCelles et al. 2017; Inspire Environmental 2019a, 2020; Van Hoeck et al. 2023). UXOs detonated within the RWEC-RI would also be a concern if they occur near juvenile cod HAPC (i.e., areas with cobble and pebble substrates) present within the RWEC-RI. Additional information regarding the specific benthic habitat (i.e., bedform features and classifications), as well as biogenic features and habitat-forming organisms found within the central portion of the Lease Area and the RWEC in Rhode Island state waters, is provided in the EFH assessment report (BOEM 2023c, 2023d).

Noise impacts on fish are likely to vary by species depending on general sensitivity to sound and how noise impacts overlap with sensitive life stages. Studies of fish response to noise impacts from seismic survey equipment provide a useful basis for evaluating the effects of potential exposure to sound sources like impact pile driving and UXO detonation. Seismic air guns used to map seafloor geology for oil exploration produce high-intensity impulsive sound comparable to or exceeding that produced by impact pile driving. Meekan et al. (2021) studied the behavioral responses of demersal finfish to repeated exposure to seismic survey noise and found no significant impacts to population and community structure, behavior, and distribution compared to reference sites. Although this effort studied a different fish community in western Australia, the results may be instructive here. The finding of no significant impact on fish population biology or community structure suggests that, for many fish species, noise impacts from impact pile driving and UXO detonation are likely to be short term and localized.

Noise impacts could be greater if they occur in important spawning habitat, occur during peak spawning periods, and/or result in reduced reproductive success in one or more spawning seasons. This could in theory result in long-term effects to populations if one or more year classes suffer suppressed recruitment. Alteration of the ambient noise environment could interfere with this ability, leading to potentially significant effects varying by species. For example, monopile installation is the most extensive and longest duration source of noise impacts and the most likely to cause adverse effects on Atlantic spawning cod.

Southern New England, including Cox Ledge, is known to support cod spawning aggregations (Clucas et al. 2019) during the winter months, but the status of cod populations and of spatiotemporal distribution of spawning in this region is not as well understood as other regions in the northwestern Atlantic (e.g., Gulf of Maine and Georges Bank). The infrequency of cod observed in fishery-independent trawl surveys contributes to the poor understanding of stocks in this region (Langan et al. 2020). However, there is information indicating that, unlike other spawning stocks, cod in southern New England have increased in abundance during the last 20 years (Langan et al. 2020), and cod in this region have shown a tendency to be distributed over larger areas (Loehrke 2014). Existing data also indicate that cod spawning occurs throughout the Southern New England region (DeCelles et al. 2017; Inspire Environmental 2019a, 2020; Van Hoeck et al. 2023).

Atlantic cod continue to be managed in U.S. waters as two units: the Gulf of Maine and the Georges Bank management units. An Atlantic Cod Stock Structure Working Group formed in 2018 recently carried out a multidisciplinary evaluation of cod structure in U.S. waters and identified a number of mismatches between the current management units and biological stock structure. Using evidence from an evaluation of early life history characteristics, an examination of genetic analyses, fishermen's ecological knowledge, and tagging studies, the working group concluded that cod in southern New England represent a unique biological stock, with demographics that are largely independent of neighboring populations (McBride and Smedbol 2022). In general, tagging studies have indicated that spawning groups in southern New England are largely sedentary (Loehrke 2014) and exhibit a high degree of residency; although, some tagging efforts have indicated extensive movements of cod from the Great South Channel to the western Gulf of Maine, with some movement into southern New England (Loehrke 2014; McBride and Smedbol 2022; O'Brien and Worcester 2009; Tallack 2009, 2012; Lui 2019; Wise 1963). A subsequent working group convened by the New England Fisheries Management Council is currently reviewing the available data and evaluating whether cod in southern New England should be managed as a discrete stock. A decision to recognize cod in southern New England (and other regions in the Northeast) as a unique biological stock will have downstream fisheries management implications, including the development of new stock/population assessments, that would allow fisheries managers to better understand and work toward rebuilding overfished Atlantic cod populations.

The presence of spawning cod has been documented in and near the RWF from October through March (Inspire Environmental 2019a, 2020; Van Hoeck et al. 2023). Van Hoeck et al. (2023) recorded peaks in grunt detections from an inferred spawning aggregation in November through December within the central portion of the Lease Area (i.e., Zone RWF 1) between 2013 and 2015. Spawning maturation data from cod captured via hook and line both within and outside the RWF (i.e., areas to the south and west) have found spawning-condition cod (both males and females) from December through March. These data indicate that pile driving could occur when maturing and mature spawning cod are present near the maximum work area during a portion of their spawning season. However, it is unknown what proportion of cod spawning sites in southern New England is present within the RWF, and it is unclear if the central portion of the RWF (i.e., Zone RWF 1) still supports the spawning aggregation observed to occur from data collected between 2013 and 2015 (Van Hoeck et al. 2023). Subsequent acoustic surveys in the central portion of Zone RWF 1 yielded minimal grunt detections in November (n = 2) between 2020 and 2022, and it is unclear whether this is indicative of the absence of the spawning aggregation or if this is due to insufficient sampling stations (Van Hoeck et al. 2023). A separate and potential contributing factor to the lack of recently observed spawning activity may be associated with ongoing commercial and recreational fishing of Atlantic cod within the Lease Area and throughout the southern New England region during the spawning season.

Per the Final EIS's temporal impacts definitions shown in Table 3.3-4, pile driving is considered a short-term temporary impact in which the effects (i.e., sound) would end when the activity ceases. Impact pile driving would not occur for 24 hours a day over the course of 5 months. Rather, pile driving would occur for up to 12 hours during any 24-hour period over the course of 5 months (i.e., May through December) and would not be conducted concurrently (i.e., more than one monopile installed simultaneously). Assuming ideal conditions under the Proposed Action (i.e., the installation of 100 WTGs), it would take approximately 36 days to install all WTGs and OSSs. The actual installation rates are likely to be lower due to a variety of factors, including weather delays, EPM and mitigation compliance, equipment malfunctions, supply chain constraints, and crew availability (e.g., COVID limitations). Although foundations installation could extend into November and December, it would likely be limited to a small number of foundations that were previously delayed. The number and duration of pile-driving events occurring in November and December, if any, would likely be limited.

Nevertheless, underwater sound from pile driving could impact Atlantic cod, hake, and black sea bass, which belong to the hearing specialist group and rely on sound for communication and other important behaviors (Rowe and Hutchings 2006; Stanley et al. 2020). Stanley et al. (2020) determined that impulsive underwater noise from activities like impact pile driving could interfere with black sea bass communication during spawning but concluded that they would likely return to normal spawning behavior once the impact ceased. In a separate study, Stanley et al. (2022) found that in a controlled environment, the effect of replayed pile-driving sound resulted in decreased swimming and increased resting behavior in non-spawning black sea bass; however, opportunistic observations of the same sampled black sea bass revealed spawning within 1 month of exposure to pile-driving sounds. Other species, such as Atlantic cod, may be more sensitive to noise impacts. Some researchers have observed or speculated that Atlantic cod could suspend spawning and even abandon preferred spawning habitats when exposed to intense disturbance associated with commercial fishing activity or sound associated with seismic surveys (Andersson et al. 2017; Dean et al. 2012; Engås et al. 1996; Mueller-Blenke et al. 2010). In contrast, other research on the effects of impulsive seismic survey sound that can last weeks to months has indicated that this level of behavioral response is unlikely (McQueen et al. 2022; Meeken et al. 2021). For example, Meekan et al. (2021) observed no short-term (days) or long-term (months) effects of exposure to the composition, abundance, size structure, behavior, or movement to assemblages of tropical demersal fishes, including hearing specialist species (e.g., *Lutjanidae* sp.), in Western Australia exposed to noise from a commercial-scale seismic air gun survey with received SELs of up to approximately 180 dB re 1 μPa2·s. McQueen et al. (2022) examined the responses of spawning cod in the North Sea exposed to seismic air gun noise over two 1-week periods, with fluctuating SELs of up to 145 dB re 1 μPa2·s, comparable to a full-scale industrial survey 5 to 40 km away (Handegard et al. 2003). Tagged cod in this study were found not to be displaced from spawning grounds (McQueen et al. 2022). McQueen et al. (2022) speculated that strong affinity to selected spawning sites overcame the behavioral effects of stressor exposure. Although the sound source (i.e., seismic air guns) is not analogous to pile driving, they both produce high-intensity, impulsive sound primarily in the approximately 100-Hz or lower frequency bands that overlap the spectral range of cod communication and hearing sensitivity and are informative in the absence of studies assessing the impacts of pile driving to Atlantic cod.

Overall, these findings suggest that, although noise exposure during sensitive life stages is a potential concern, disturbances resulting from impulsive sound sources, such as pile driving or seismic air guns, may not necessarily result in adverse effects, such as the complete abandonment of an area for the duration of a spawning season versus temporary displacement or disturbance of Atlantic cod or other hearing specialist species. It is expected that sound attenuation systems, such as bubble curtains, would be used to reduce received SELs from pile-driving noise. However, even with sound attenuation systems, monopile installation is still the largest acoustic impact from the Proposed Action. Van Hoeck et al (2023) found that, based on temporal patterns of Atlantic cod grunts, spawning in southern New England waters is concentrated in November and December, which partially overlaps the timeline of construction.

Although there remain some data gaps regarding spawning cod response to pile driving, empirical studies with cod and seismic surveys and recent work with black sea bass and pile driving suggest that any responses are likely temporary. Additional studies to better understand the spatiotemporal dynamics and habitat use of spawning Atlantic cod in and near the RWF are ongoing (BOEM 2021a).

Other hearing specialist species could be exposed to construction noise, but the consequences of exposure would vary depending on multiple factors. For example, monkfish spawn between May and December but do so over broad areas and likely multiple times per year (Johnson et al. 2008). Red hake spawn in the summer, and the RWF and RWEC are located within a broader area identified as a hotspot for spawning and larval dispersal (NEFSC 2020). However, unlike cod, red hake spawns in the water column and does not associate with specific benthic habitats, and therefore has less potential for direct noise exposure.

The potential for other construction noise sources, such as vessel engines and HRG surveys, to negatively impact cod and related species is less clear. Although construction vessel noise (e.g., engine vibration, propeller cavitation) could occur during cod spawning in winter and early spring, vessel noise is lower in volume than impact pile-driving noise. As noted above, cod have continued to display high fidelity to spawning sites on Cox Ledge despite the ambient noise levels present in this environment. In this context, vessel use is not likely to significantly alter the ambient noise environment relative to the existing baseline. This suggests that any impacts on cod spawning could be limited in extent and duration and short term minor adverse with respect to HRG surveys and construction vessel noise.

Underwater sound from vessels can cause avoidance behavior, which has been observed for Atlantic herring and Atlantic cod and is a likely behavior of other species (Handegard et al. 2003; Vabø et al. 2002). Fish may respond to approaching vessels by diving toward the seafloor or by moving horizontally out of the vessel's path, with reactions often initiated well before the vessel reaches the fish (Berthe and Lecchini 2016; Ona et al. 2007). The avoidance of vessels by fish has been linked to high levels of infrasonic and low-frequency sound (approximately 10–1,000 Hz) emitted by vessels. Accordingly, it was thought that quieter vessels would result in less avoidance (and consequently quieter vessels would have a higher chance of encountering fish) (De Robertis et al. 2010). By comparing the effects of a quieted vessel to the effects of a conventional research vessel on schooling herring, it was found that the avoidance reaction initiated by the quieter vessel was stronger and more prolonged than the one initiated by the conventional vessel (Ona et al. 2007). In a comment to this publication, Sand et al. (2008) pointed out that fish are sensitive to particle acceleration and that the cue in this case may have been low-frequency particle acceleration caused by displacement of water by the moving hull. This could explain the stronger response to the larger, noise-reduced vessel in the study by Ona et al. (2007), which would have displaced more water as it approached.

Nedelec et al. (2016) investigated the response of reef-associated fish by exposing them in their natural environment to playback of vessel engine sounds. They found that juvenile fish increased hiding and ventilation rate after a short-term vessel sound playback, but responses diminished after long-term playback, indicating habituation to sound exposure over longer durations. These results were corroborated by Holmes et al. (2017) who also observed short-term behavioral changes in juvenile reef fish after exposure to vessel noise as well as desensitization over longer exposure periods. Although sounds emitted by vessel activity are unlikely to injure fish, vessel sound has been documented to cause short-term behavioral responses (Holmes et al. 2017).

Analysis of vessel noise related to the Cape Wind Energy Project estimated that noise levels from construction vessels at 10 feet (3 m) were loud enough to elicit an avoidance response but not loud enough to do physical harm (MMS 2008). Pelagic species and life stages and prey species that occur high in the water column (e.g., Atlantic butterfish, Atlantic herring, Atlantic mackerel, bluefish, and some highly migratory pelagic species) would be the most likely impacted species by vessel and construction noise, although the behavioral avoidance impacts would be short term. However, in inshore shallow waters, benthic species and life stages could also be impacted. Any disturbance they did experience would result in a short-term impact of avoidance of vessel noise. Therefore, finfish within the Lease Area and RWEC corridor may initially exhibit a negative behavioral response to vessel activity; however, as vessel traffic increases throughout the previously discussed Project timeline, habituation to vessel noise by finfish is likely to occur. Project-related vessel noise would be intermittent and of short duration, so the overall impacts to fish are expected to be negligible.

However, these effects must be considered against the baseline levels of vessel traffic. Thousands of commercial and recreational vessel trips pass through the RI/MA WEA every year (see Section 3.16). Additionally, commercial and recreational fishing activity in and around the RWF likely generates hundreds of vessel trips and thousands of operational hours on an annual basis. In this context, construction and installation vessel use is not likely to significantly alter the ambient noise environment relative to the existing baseline. While construction and installation–related vessel noise could induce physiological stress responses or avoidance behaviors and could result in auditory masking of biologically significant sounds, BOEM anticipates that short-term exposure to vessel noise would not measurably alter normal behavior patterns.

As discussed in the No Action Alternative, construction of the Project could affect the Atlantic sturgeon, shortnose sturgeon, and the giant manta ray primarily through exposure to harmful levels of underwater noise during foundation installation as well as behavioral exposure from noise produced by preconstruction HRG surveys. NMFS uses different underwater noise impact criteria to assess potential underwater noise impacts on ESA-listed fish species (FHWG 2008). Adult and subadult endangered Atlantic sturgeon are expected to occur in the offshore waters of the Mid-Atlantic OCS throughout the year but appear to be present in lower numbers in the summer (Dunton et al. 2015; Ingram et al. 2019; Savoy and Pacileo 2003; Stein et al. 2004). This indicates that ESA-listed Atlantic sturgeon could be exposed to Project-related noise impacts.

The most prominent impacts on Atlantic sturgeon are expected from exposure to pile-driving noise. Although individuals from the five DPSs of ESA-listed Atlantic sturgeon could be affected by the Proposed Action, which could include impacts up to and including injury or mortality. Individuals from these DPSs could be exposed to any of the effects described above on benthic habitats and finfish that are pertinent to demersal fish species. Individual animals could be exposed to potential effects ranging from short-term behavioral disturbance to short-term or permanent hearing threshold shifts, to barotrauma injury or mortality from exposure to intense underwater noise from impact pile driving and UXO detonation. Most underwater noise impacts would be limited to short-term behavioral alteration.

Shortnose sturgeon could be exposed to impact pile-driving noise from RWF construction during installation of sheet pile cofferdam for the sea-to-shore transition and could also be exposed to underwater noise from UXO detonation and RWEC construction activities in Narragansett Bay. Shortnose sturgeon have not been reliably documented in Narragansett Bay. However, as stated previously, individuals from the nearby Connecticut River population could occur in Narragansett Bay based on observed migratory patterns between other river systems in New England (Dionne et al. 2013; Fernandes et al. 2010).

In summary, Project construction is likely to result in short-term to long-term noise impacts sufficient to cause a range of effects on finfish. The significance of these effects is likely to vary by species, depending on the number of individuals exposed and the degree to which noise impacts might interfere with important biological functions like spawning. EPMs committed to by Revolution Wind (see Table F-1, Appendix F), including ramp-up/soft starts and TOY restrictions for pile-driving activity (January through April), would reduce the magnitude and temporal extent of impacts to Atlantic cod spawning, which existing data indicate is occurring both within (primarily in Zone RWF 1) and outside the Lease Area between October and March (DeCelles et al. 2017; Inspire Environmental 2019a, 2020; Van Hoeck et al. 2023). In addition, Revolution Wind would coordinate with Rhode Island Department of Environmental Management (RIDEM) and NOAA NMFS regarding TOY restrictions through the permitting process and would adhere to requirements imposed by these agencies (e.g., TOY restrictions to avoid and/or minimize impacts to winter flounder). On balance, construction noise impacts on finfish would likely range from **minor** to **moderate** adverse.

Presence of structures: The impacts resulting from installed foundations would be similar to those described above in the anchoring and new cable placement/maintenance IPF. Juvenile and adult fish are mobile and would likely avoid being harmed or killed by construction equipment and materials placement. In contrast, certain fish species, such as cod, ocean pout, Atlantic pollock, and winter flounder, have benthic eggs and/or larvae that would be vulnerable to these effects. The extent of exposure would vary by species and habitat association. Some individual finfish would unavoidably be injured or killed, but the number of individuals affected would be insignificant relative to the size of the population and the resource would recover completely without additional mitigation. Therefore, effects to finfish from construction of structures would be **negligible** adverse.

Sediment deposition and burial: The Project would result in short-term, elevated levels of suspended sediment near major bed-disturbing activities like cable installation. Anticipated water column sediment concentrations and burial depths resulting from this impact mechanism are described in Table 3.6-8, Section 3.6.2.3.2. TSS concentrations of the magnitude and duration anticipated are below levels associated with measurable adverse effects on finfish (Wilber and Clarke 2001; Yang et al. 2017) and would therefore be negligible. Juvenile and adult finfish associated with benthic habitats are unlikely to be significantly affected by sediment deposition at the burial depths anticipated, but benthic eggs and larvae of some species could be harmed (Kjelland et al. 2015; Michel et al. 2013; Wilber and Clarke 2001). While sensitivity varies widely, the eggs and larvae of some species can be killed by as little as 0.4 inch (10 mm) of sediment deposition. The eggs of certain species, like winter flounder, are particularly sensitive and can be killed by burial depths less than 0.1 inch (3 mm) (Michel et al. 2013). While some adverse effects would undoubtedly occur, the extent of deposition and burial impacts is small relative to the amount of egg and larval settlement habitat available, and the duration of those impacts would be short term (hours to days). As described previously for larval entrainment, lethal burial of even several thousand eggs and larvae would be biologically insignificant relative to the number of eggs and larvae in the environment and natural mortality rates. Given the short-term nature of the impact and the limited extent of significant burial effects relative to the amount of habitat available, burial effects on benthic eggs and larvae would be short term and expected to recover without remedial or mitigating action and therefore **minor** adverse.

#### 3.13.2.4.2 Operations and Maintenance and Decommissioning

##### Offshore Activities and Facilities

Accidental releases and discharges: Potential impacts to finfish from accidental releases and discharges during O&M and decommissioning of the Project would be similar to and less than those described under construction and installation because the volumes of fuels and oils and number of vessels required during O&M and decommissioning would be less than that required during construction and operations (Section 3.21.2.2.2). As described for construction and installation, accidental releases that could occur during O&M and decommissioning would be infrequent and **negligible** adverse. In the unlikely event of a large accidental spill, impacts to finfish would similarly range from **minor** to **moderate** adverse depending on the size and timing of the event, the nature of the material evolved, the extent and duration of species exposure, and the necessary response measures used. As an example, Atlantic cod eggs float near the surface and are abundant in and near the RWF site from February to April (NEFMC 2017). A high-volume spill of toxic material that disperses on the water surface during this period could injure or kill large numbers of cod eggs, adversely affecting year class recruitment.

Anchoring and new cable emplacement/maintenance: As stated in Section 3.5.2 of the COP, the Project does not anticipate that the IAC, OSS-link cable, and RWEC would require routine maintenance. The cables themselves would be unlikely to require repair but up to 10% of cable protection could need to be replaced over the life of the Project. Cable repair and maintenance, replacement of scour protection, spill response, and other O&M activities could require vessel anchoring. Anchoring would result in short-term, localized impacts to benthic habitat similar to those described for Project construction but reduced in scale and dispersed over the operational life of the Project. Cable protection maintenance and the eventual decommissioning and removal of buried cables would produce similar effects on finfish as those described for Project construction in Section 3.13.2.2.1. These would include direct disturbance of the seafloor, suspended sediment deposition in the surrounding area, and injury and displacement of finfish using these habitats. It is anticipated that these activities would result in short term **minor** adverse impacts to finfish.

EMF: Table 3.6-10 in Section 3.6.2.3.2 summarizes potential EMF and substrate heating exposure for benthic invertebrates from Project operations. Those findings are also applicable to demersal finfish. The EMF values displayed are the estimated maximum values that would occur at the seafloor directly over the cable. EMF strength would diminish rapidly with distance, becoming undetectable within approximately 30 feet of the cable path (Exponent 2023). The most intense EMF effects would occur immediately above exposed RWEC segments laid on the seafloor surface and covered by an armoring blanket.

Hutchison et al. (2020b) reviewed available research on the sensitivity of various finfish species to EMF effects. They concluded that the available knowledge base on EMF effects on fish is insufficient to fully evaluate potential EMF effects from the widespread development of offshore renewable energy. Behavioral responses have been observed in some fish species exposed to EMFs, but clear relationships have yet to be established. Researchers studying EMF effects on fish have identified observable effects but usually at test exposures ranging from tens to hundreds of times greater than the strongest exposures likely to result from the Project. The type of power source is also an important factor. HVAC produces a different type of field effect from HVDC that may not be as detectable by electrosensitive fish species.

BOEM has evaluated the potential sensitivity of commercially and recreationally important fish species to likely EMF levels generated by commercial wind farm transmission cables on the OCS (Normandeau et al. 2011; CSA Ocean Sciences Inc. and Exponent 2019). CSA Ocean Sciences Inc. and Exponent (2019) determined that most fish species would not be able to detect EMF from HVAC transmission cables, and those species that are able to detect EMFs would not experience significant physiological or behavioral effects. All currently proposed offshore wind energy projects, including the Proposed Action, would employ HVAC transmission exclusively. The preponderance of available research on a variety of fish species (e.g., Armstrong et al. 2015; Bevelhimer et al. 2013; Orpwood et al. 2015) indicates that the minimum magnetic field exposure threshold for observable effects on behavior exceeds 1,000 milligauss (mG) for most fish species. The minimum threshold for observable detection of low-frequency (less than 10 Hz) electrical fields in electrosensitive fish species is on the order of 20 millivolt/meter (mV/m) (Basov 1999). Each of these thresholds is an order of magnitude greater than the maximum potential EMF effect likely to result from Project operation. In addition, these thresholds are representative of sensitivity to very low frequency bioelectric or direct current electrical fields. Given this, they are likely not representative of sensitivity to EMFs generated by HVAC transmission at 60 Hz, which is not detectable by many finfish species.

These findings support the conclusions of Normandeau et al. (2011) that the magnetite-based sensory organs of fish are unable to detect AC magnetic fields below 50 mG. The minimum thresholds for observable physiological and behavioral effects in available research are much higher than the minimum detection threshold suggested by Normandeau et al. (2011), on the order of 250 to over 1,000 mG. In a more recent review of EMF effects produced by offshore wind energy, Gill et al. (2020) concluded that HVAC-induced electrical fields in fish on the order of those produced by the Project would unlikely result in observable effects on physiology or behavior. Although EMF and substrate heating effects would vary depending on transmission voltage and the position of the cable on the seafloor (i.e., buried to target depth or laid on seafloor surface), those effects are unlikely to result in more than minor effects on finfish behavior.

Calculated magnetic and electrical field effects for buried and exposed segments of the IAC for average loading are summarized in Table 3.13-6. Calculated magnetic and electrical field effects for buried and exposed segments of the RWEC for average loading are summarized in Table 3.13-6. A summary of applicable EMF effect thresholds from available research are summarized by species and life stage group in Table 3.13-7 and are applied here to evaluate potential EMF effects on finfish.

**Table 3.13-6. Modeled Electromagnetic Field Levels and Estimated Substrate Heating Effects Under Average and Peak Load Conditions for Buried and Exposed Cable Segments and Miles of Cable by Category for the Proposed Action**

| Component | Installation | Total Cable Length (linear miles) | Magnetic Field (mG) at Seafloor | Magnetic Field (mG) 3.3 Feet above Seafloor | Electrical Field (mV/m @60 Hz) at Seafloor | Electrical Field (mV/m @60 Hz) 3.3 Feet above Seafloor | Substrate Heating |
|---|---|---|---|---|---|---|---|
| IAC | Buried to 3.3 feet | 104.5 | 57 | 17 | 2.1 | 1.3 | +10 to +20°C within 0.4 to 0.6 m of cable |
| | On seafloor surface | 11.6 | 522 | 21 | 5.4 | 1.7 | Negligible |
| OSS-link cable | Buried to 3.3 feet | 8.4 | 147 | 41 | 4.4 | 2.3 | +10 to +20°C within 0.4 to 0.6 m of cable |
| | On seafloor surface | 0.9 | 1,071 | 91 | 13 | 1.6 | Negligible |
| RWEC[†] | Buried to 3.3 feet | 70.6 | 147–210 | 41 | 4.4 | 2.3 | +10 to +20°C within 0.4 to 0.6 m of cable |
| | On seafloor surface | 12.7 | 1,071–1,529 | 91 | 13 | 1.6 | Negligible |

**Table 3.13-7. Magnetic and Induced Electrical Field Levels Used to Evaluate Potential Electromagnetic Field Effects on Finfish**

| Species and Life Stage Group | Type of Effect | Magnetic Field | Induced Electrical Field (mV/m) | Source |
|---|---|---|---|---|
| Fish eggs and larvae | Survival and development | > 1,000 mG | > 500 mV/m | Brouard et al. (1996); Cameron et al. (1985) |
| Finfish | Physiological and behavioral | > 950 mG | 20 mV/m | Armstrong et al. (2015); Basov (1999); Bevelhimer et al. (2013); Orpwood et al. (2015) |

| Species and Life Stage Group | Type of Effect | Magnetic Field | Induced Electrical Field (mV/m) | Source |
|---|---|---|---|---|
| Sharks and skates | Behavioral | 250–1,000 mG | < 2–5 mV/m* | Bedore and Kajiura (2013); Hutchison et al. (2020a); Kempster et al. (2013) |

* This threshold only applies to induced electrical fields at frequencies below 20 Hz; the 60-Hz induced electrical field from the HVAC IAC and RWEC would likely not be detectable by sharks, skates, and rays (Bedore and Kajiura 2013).

Atlantic sturgeon are electrosensitive but appear to have a relatively low sensitivity to magnetic fields based on studies of other sturgeon species. Bevelhimer et al. (2013) studied behavioral responses of lake sturgeon to artificial EMF fields and identified a magnetic field detection threshold between 10,000 and 20,000 mG, well above the levels likely to result from the Proposed Action (i.e., 57–522 mG above the IAC and 147–1,071 mG on the seafloor surface above the buried and exposed RWEC and OSS-link). This indicates that Atlantic sturgeon are likely insensitive to magnetic field effects resulting from the Proposed Action.

Sturgeon may, however, be able to detect the induced electrical field generated by transmission cables. Atlantic sturgeon have specialized electrosensory organs capable of detecting electrical fields on the order of 0.5 mV/m (Gill et al. 2012; Normandeau et al. 2011). Exponent (2023) calculated that the maximum induced electrical field strength in Atlantic sturgeon from the RWF IAC and the RWEC would be 0.7 mV/m or less, slightly below the detection threshold for the species. However, this analysis only considered the field associated with buried cable segments. Based on magnetic field strength, the induced electrical field in sturgeon near exposed cable segments is likely to exceed the 0.5-mV/m threshold. This suggests that Atlantic sturgeon would likely be able to detect the induced electrical fields in immediate proximity to exposed cable segments. Sturgeon species have been reported to respond to low-frequency AC electric signals. For example, migrating Danube sturgeon (*Acipenser gueldenstaedtii*) have been reported to slow down when crossing beneath overhead high-voltage cables and speed up once past them (Gill et al. 2012). This is not a useful comparison, however, because overhead power cables are unshielded and generate relatively powerful induced electrical fields compared to shielded submarine cables. Insufficient information is available to associate exposure to induced electrical fields generated by submarine cables with measurable behavioral or physiological effects (Gill et al. 2012). However, it is important to note that natural electrical field effects generated by wave and current actions are on the order of 10 to 100 µV/m, many times stronger than the induced field generated by buried cable segments. Given the range of baseline variability and limited area of detectable effects relative to available habitat on the OCS, the effects of Atlantic sturgeon exposure to Project-related EMF are therefore likely to be discountable.

Manta rays are elasmobranchs, a group of fishes with specialized electrosensory organs that allow these species to detect the low-intensity bioelectric signals generated by other aquatic organisms. Bedore and Kajiura (2013) reviewed the electrosensitivity of several elasmobranch species and determined detection thresholds ranging from 20 to 50 µV/m and detection distances of approximately 1.6 feet (50 cm) for most of the species tested. It is important to note that these species primarily included predators that forage on benthic organisms. Manta rays are pelagic filter feeders that are presumably less reliant on their electrosensory organs to detect prey, suggesting they are likely on the lower end of this sensitivity range. Given that manta ray occurrence in the marine component of the GAA is rare, and this species is most commonly distributed higher in the water column away from the seafloor, the likelihood of measurable effects on manta rays from exposure to Project-related EMF is discountable.

The Project includes EPMs to minimize EMF impacts and would employ HVAC transmission, which generally produces lower intensity EMF than HVDC. All transmission cables would be contained in grounded metallic shielding to minimize electrical field effects and buried to target depths of 4 to 6 feet (1.2 to 1.8 m) in soft-bottom benthic habitat and other areas where burial is possible. Cable segments that cross unavoidable hard substrates and other offshore infrastructure would not be buried and would be laid on the seafloor surface covered with a concrete mattress or other form of cable armoring for further protection. EMF effects in these areas would be greater than for buried cable segments. The maximum possible magnetic field, directly adjacent to unburied sections of the RWEC (8.8 miles), is expected to be 1,071 mG, which diminishes to 91 mG at a distance of 3.3 feet (1 m) (see Table 3.6-10) (Exponent 2023). Rapid dissipation of EMF over distance therefore means that the effects are highly localized.

Hughes et al. (2015) and Emeana et al. (2016) evaluated the thermal effects of buried and exposed electrical transmission cables on the surrounding environment. They determined that heat from exposed cable segments would dissipate rapidly without measurably heating the underlying sediments. In contrast, the typical HVAC cable buried in sand and mixed sand and mud (i.e., soft-bottom benthic habitat) can heat sediments within 1.3 to 2 feet (0.4 to 0.6 m) of the cable surface by +10 to 20°C. The anticipated extent of EMF and substrate heating effects from Project operations are the same as those summarized for benthic invertebrates in Section 3.6.2.3.2.

Substrate heating impacts generated by the IAC and RWEC are not likely to significantly affect finfish for the same reasons described for invertebrates in Section 3.6.2.3.2. Targeted research conducted by Hughes et al. (2015) and Emeana et al. (2016) indicate that substrate heating effects from buried cable segments at the minimum depths proposed for the Project are unlikely to be measurable within 2 feet of the seafloor surface. As such, these effects would not be detectable to fish on or burrowed into the seafloor surface at depths less than 2 feet. Substrate heating effects could reach the seafloor surface at transition points between buried and exposed cable segments. However, these transition areas and exposed cable segments would be covered by porous concrete mattresses or other forms of cable protection, limiting fish access. Small fishes using the interstitial spaces within the mattresses may be able to detect some cable heating effects, but only within the transition zones described.

These findings indicate that long-term EMF effects would likely be below detectable levels for finfish. Some electrosensitive species (such as sharks, skates, and rays) occurring in the immediate proximity of exposed cable segments may be able to detect EMF levels sufficient to alter their behavior, including inducing more rapid swimming, more frequent direction changes, and avoidance (Hutchison et al 2018). The exclusive use of 60 Hz AC in underwater transmission cables for offshore wind is not expected to induce significant behavioral responses in electrosensitive animals. Effects of this magnitude would occur within a few inches to feet of the cable surface, limiting these effects to a small number of individuals that occur near the cable surface. Given the short-term nature of these behavioral effects and the limited extent of exposure, effects to finfish are likely to be **minor** adverse.

Noise: The RWF would employ current generation direct drive WTG designs that generally produce less underwater noise and vibration than older generation WTGs with gearboxes. Much of our current understanding about operational noise is based on the monitoring of wind farms in Europe that use older generation designs. Although useful for generally characterizing potential noise effects, these data are not necessarily representative of the noise produced by current generation designs (Elliot et al. 2019; Tougaard et al. 2020). Typical noise levels produced by older generation geared WTGs range from 110 to 130 re 1 µPa with 1/3-octave bands in the 12.5- to 500-Hz range, sometimes louder under extreme operating conditions (Betke et al. 2004; Jansen and de Jong 2016; Madsen et al. 2006; Marmo et al. 2013; Nedwell and Howell 2004; Tougaard et al. 2009, 2020). More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects could be more intense and extensive than those considered herein, but additional research is needed.

Elliot et al. (2019) summarized findings of operational noise monitoring from the BIWF. The BIWF employs five 6-MW direct drive WTGs. Operational noise from the direct drive WTGs at the BIWF were generally lower than older, lower capacity WTGs at European wind farms. Operational noise levels typically ranged from 110 to 125 re 1 µPa, occasionally reaching as high as 128 re 1 µPa, mostly at low frequencies ranging from 10 Hz to 8 kHz. Particle acceleration effects on the order of 10 to 30 dB re 1 $\mu m/s^2$ at a reference distance of 50 meters. These values are considered usefully representative of the underwater noise effects likely to result from RWF operations.

Cod and other hearing specialist species are also potentially sensitive to particle motion effects. Elliot et al. (2019) compared observed particle motion effects at 164 feet (50 m) from an operational BIWF turbine foundation to current research on particle motion sensitivity in fish. They concluded that particle motion effects could occasionally exceed the lower limit of observed behavioral responses in Atlantic cod and flatfish within these limits. However, the documented use of complex habitats created by the structures by cod, black sea bass, and other hearing specialist species at the BIWF and European wind farms (Hutchison et al. 2020b; Methratta and Dardick 2019; Wilber et al. 2022a) indicates that low-level operational noise effects are not causing avoidance responses in hearing specialist species. These observational studies are supported by experimental research. For example, Kastelein et al. (2008) observed no apparent behavioral changes in cod exposed to experimental sounds comparable to operational noise from WTGs within a contained environment. As stated previously (see Section 3.16.2.2.1), Atlantic cod can be sensitive to changes in the ambient noise environment during spawning (Andersson et al. 2012; Dean et al. 2012; Engås et al. 1996; Mueller-Blenke et al. 2010; Rowe and Hutchings 2006). Although, a recent study investigating the impacts of intense low-frequency impulsive sound exposure (i.e., seismic air gun surveys) on spawning cod observed temporary disruption of spawning activity followed by rapid resumption of spawning activity at the same location once the stressor was removed (McQueen et al. 2022). They speculated that strong site affinity could explain the lack of a significant behavioral response to an otherwise intensive stressor. These contrasting findings suggest that short-term periods of disturbance may not necessarily result in adverse effects on Atlantic cod spawning.

Popper and Hawkins (2018) conclude that Atlantic cod, and probably many other fish species in the hearing specialist group, are sensitive to both sound pressure and particle motion and use both aspects of sound to assess and orient themselves in the three-dimensional aquatic environment. This ability likely enables fishes to locate particular sources of sound, such as prey or potential mates, and may also assist them in identifying and locating sounds from a particular source within the general ambient noise environment. The low-frequency operational noise produced by WTGs overlaps the communication frequencies used by cod and other hearing specialist species like haddock (Stanley et al. 2017). In theory, operational noise and particle motion effects from WTG operations could alter the background noise environment in ways that negatively impact the ability of hearing specialist fish species to characterize the ambient noise environment. However, hearing specialist species like Atlantic cod and black seabass readily use the BIWF and surroundings (Wilber et al. 2022a, 2022b), indicating that operational noise effects have not dissuaded hearing specialist species from using these environments. Some degree of habituation to these operational noise and particle motion effects is to be anticipated. Bedjer et al. (2009) argue that habituation of organisms to ongoing low-level disturbance is not necessarily a neutral or benign process. For example, habituation to particle motion effects could make individual finfish less aware of approaching predators, or could cause masking effects that interfere with communication, mating, or other important behaviors. Because of the limited number of studies using offshore wind farm noise, it is not known whether auditory masking actually occurs and has an effect on survival and reproduction within a wind farm area (Mooney et al. 2020).

Collectively, these findings suggest that Project operations could have limited adverse effects on habitat suitability for EFH species within a certain distance of each monopile foundation. The extent of these effects is difficult to quantify because they are likely to vary depending on wind speed, water temperature, ambient noise conditions, and other factors.

Revolution Wind (Tech Environmental 2023) has estimated that Project O&M would involve up to four CTV and two SOV trips per month, or 2,280 vessel trips over the life of the Project (see Section 3.15 for CTV and SOV operational noise details). Noise levels generated by the CTV are expected to be on the order of 160 dB re 1 $\mu Pa/sec^2$ at a reference distance of 1 meter based on observed noise levels generated by working commercial vessels of similar size and class to the CTVs (Kipple and Gabriele 2003; Takahashi et al. 2019). The SOV would produce similar noise levels to those described by Denes et al. (2021), on the order of 170 dB re 1 $\mu Pa/sec^2$. These values are below identified injury thresholds for all finfish hearing groups, indicating that CTV noise is unlikely to cause injury-level effects on any fish species. These values do exceed the 158-dB threshold for TTS effects on hearing specialist fish species, but this threshold assumes 24 hours of continuous exposure. An individual fish is unlikely to remain close enough to the moving vessel hull long enough for any risk of injury to occur. The 160 and 170 re 1 $\mu Pa/sec^2$ source levels could exceed the behavioral effects threshold for fish in proximity to the vessels in some cases, but those effects would be short term in duration and limited in extent. The low-frequency noise produced by the vessel engine could also cause similar auditory masking effects as those described above for WTG operations. However, these effects must be considered against the baseline levels of vessel traffic. In this context, O&M vessel use is not likely to significantly alter the ambient noise environment relative to the existing baseline.

Additionally, the relatively low-intensity, low-frequency sounds produced by Project survey vessels are unlikely to result in direct injury, hearing impairment, or other trauma to marine fish. Vessel noise could induce physiological stress responses or avoidance behaviors and could result in auditory masking of biologically significant sounds. However, due to the expected brief periods of exposure to vessel noise, BOEM anticipates that short-term exposure to vessel noise would not measurably alter normal behavior patterns and would therefore be **negligible** adverse.

These findings indicate that measurable operational noise would result from the Proposed Action, producing effects detectable by finfish. Those effects are likely to vary in significance by species depending on hearing sensitivity. Effects on species that lack a swim bladder, like sharks, rays, and flatfish, and hearing generalist species like ocean pout, sturgeon, butterfish, scup, and tunas, are likely to be biologically insignificant and therefore negligible. Operational noise could reduce the ability of hearing specialist species, like Atlantic cod, haddock, Atlantic pollock, and hake, to communicate effectively. However, this impact would only be expected to occur within a few hundred feet of each turbine (HDR 2019), and the likelihood of effects (e.g., negative effects on reproduction and survival) in the wild around operational offshore wind farms is unknown (Mooney et al. 2020). Therefore, the effects could range from negligible to minor adverse based on currently available information.

Decommissioning of the RWF and RWEC would lead to impacts similar to but less than those generated during construction because there would be no pile-driving impacts. During decommissioning, the monopile foundations would be cut below the seafloor surface using a cable saw. Pangerc et al. (2016) found that underwater noise levels produced by this type of equipment are difficult to distinguish from the associated construction vessel noise and are below levels that would cause injury or behavioral effects on fish. The impacts of short-term seafloor disturbance and water quality effects on fish would be similar to those caused by construction: **negligible** to **minor** adverse.

<u>Presence of structures</u>: The presence of monopile foundations and scour protection during Project O&M would create an artificial reef effect. The attractive effect of these artificial reefs on finfish is well documented (Degraer et al. 2020; Hutchison et al. 2020a; Kramer et al. 2015; Wilber et al. 2022a). In a meta-analysis of studies on wind farm reef effects, Methratta and Dardick (2019) observed an increase in the abundance of epibenthic and demersal fish species, while effects on pelagic species are less clear. Increased fish abundance around wind farm structures can also attract predators like seals (Russel et al. 2014).

Hutchison et al. (2020b) and Wilber et al. (2022a) documented a significant increase in the abundance of black sea bass, an EFH species, around the BIWF. This species is known to associate with complex benthic habitat and artificial reef structures and is clearly benefiting from the habitat and foraging opportunities created by the artificial reef effect. Several other fish species have also been observed in abundance, including EFH species like Atlantic cod, scup, bluefish, monkfish, winter flounder, and dogfish (Hutchison et al. 2020b; Wilber et al. 2022a). Atlantic striped bass and tautog, highly valued commercial and recreational fish species, have also been observed in abundance around the structures (Hutchison et al. 2020b; Wilber et al. 2022a). Similar changes in fish community structure would likely occur at the RWF as the reef effect matures. Degraer et al. (2020) indicate that the finfish community around artificial structures differs significantly from the surrounding natural habitat, as would be expected with the introduction of vertical hard structure available to biogenic (e.g., bivalve) habitat formation. While this is a subject of ongoing inquiry, this indicates that although full recovery of complex benthic habitats damaged by Project construction could take several years to potentially a decade or more, those impacts could be offset over a shorter period of time by beneficial reef effects to other species (see Section 3.6).

The RWF is in the vicinity of, and overlaps Cox Ledge, an area of complex benthic habitat that supports several commercially and recreationally important species. The observations at the BIWF and other European wind farms (Hutchison et al. 2020a; Methratta and Dardick 2019) indicate that commercially valuable species like black sea bass, Atlantic cod, and Atlantic pollock are likely to be attracted to the increased biological productivity these structures would create. While the available evidence to date suggests that the effects of long-term habitat alteration from wind farm development on finfish are generally beneficial at local and regional scales, considerable uncertainty remains about the potential for broader effects at population scales (Degraer et al. 2020). This could result in beneficial, neutral, or potentially negative effects. For example, increased feeding opportunities could translate to faster growth, increased fitness and survival, and increased reproductive success. Greater habitat productivity could also increase larval and juvenile survival within and around the affected habitats due to increased food availability and the protection offered by complex physical habitat. Wind farms could also create “ecological traps” that compel fish to remain in habitats that are unfavorable for spawning and larval survival (Degraer et al. 2020). The latter could also have negative consequences if vulnerable populations of fish are concentrated together with their predators and/or increased fishing effort. Habitat use of European wind farms by cod and Atlantic pollock has largely been seasonal (Reubens et al. 2013), indicating that negative effects on migratory and spawning behavior is unlikely, at least for these species.

A principal concern raised about offshore wind development is how the presence of numerous WTGs could affect the circulation and stratification patterns that form the environmental conditions relied upon by finfish and other marine organisms. BOEM recognizes that the potential for negative impacts—referred to here as hydrodynamic effects—are a focus of interest for cooperating agencies and stakeholders considering the RWF and other planned and potential future projects in the region. Specific concerns include the potential for disruption of the circulation and stratification patterns that maintain the Mid-Atlantic Bight cold pool, the alteration of stratification patterns that support the base of the marine food web, and the potential for changes in circulation patterns to negatively affect the reproductive success of numerous finfish species (Chen et al. 2016; Johnson et al. 2021). As mentioned previously, a growing body of research has demonstrated that offshore wind farms could have observable effects on oceanographic conditions up to tens of miles downfield from wind farm sites (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorrell et al. 2022; Floeter et al. 2022; Raghukumar et al. 2022), although the extent of these effects and resulting significance on biological processes are likely to vary considerably between different oceanographic environments (van Berkel et al. 2020). Van Berkel et al. (2020) and Schultze et al. (2020) note that environments characterized by strong seasonal stratification, such as the Mid-Atlantic Bight, are likely to be less sensitive to changes and disruptions to oceanographic processes from wind farm effects.

Offshore wind farms can influence hydrodynamic conditions through two mechanisms: turbulent effects on mixing and stratification patterns caused by current flow around structures in the water column, and changes in surface wave and current patterns caused by wind field effects (i.e., the extraction of wind energy from the atmosphere) (Johnson et al. 2021; van Berkel et al. 2020). Van Berkel et al. (2020) reviewed observed hydrodynamic effects from European offshore wind farms and characterized how these effects varied in significance in different oceanographic environments. Notably, van Berkel et al. (2020) observed that turbulent effects in environments having strong seasonal stratification were typically localized and less pronounced than those in other types of environments. Measurable effects on mixing and stratification patterns were typically limited to within 600 to 1,300 feet downcurrent of each monopile. In contrast, the combined wind field effects of a WTG array are typically more extensive, extending tens of miles downfield from the wind farm array (Johnson et al. 2021; van Berkel et al. 2020).

In addition to potential indirect effects to stratification, monopiles can also influence current speed and direction. Monopile wakes have been observed and modeled at the kilometer scale (Cazenave et al. 2016; Vanhellemont and Ruddick 2014). The turbulence of tidal current wakes resulting from the presence of the monopile was found to decrease logarithmically moving away from the monopile (Li et al. 2014). Therefore, although impacts to current speed and direction decrease rapidly, there is evidence of hydrodynamic effects out to a kilometer away from a monopile.

The northern Mid-Atlantic Bight is characterized by strong seasonal stratification that contributes to the formation of a seasonal oceanographic feature known as the cold pool (Chen 2018; Lentz 2017). The cold pool is a mass of relatively cool water that forms at depth in the shallow waters of the OCS in the spring and is maintained through the summer by stratification. The cold pool is regional in scale and supports a diversity of marine finfish species that are usually found farther north but thrive in the cooler waters it provides (Chen 2018; Lentz 2017). Changes in the size and seasonal duration of the cold pool over the past 5 decades are associated with shifts in the fish community composition of the Mid-Atlantic Bight (Chen 2018; Saba and Munroe 2019). The RWF is located on the approximate northern boundary of the cold pool.

As mentioned previously, BOEM conducted a modeling study to predict how planned offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions northern Mid-Atlantic Bight (Johnson et al. 2021). This modeling study determined that the partial and full build-out scenarios considered would be unlikely to negatively affect, and may even strengthen, the stratification patterns that contribute to the formation and retention of the cold pool and food web productivity (Johnson et al. 2021). The BOEM modeling results determined that small but measurable changes in current speed, wave height, and sediment transport would occur across the northern Mid-Atlantic Bight. As stated, these effects are of potential concern because they could change how the planktonic eggs and larvae of many marine species are dispersed across the region. Changing larval dispersal pathways can disrupt connectivity between populations and the processes of larval settlement and recruitment (Sinclair 1988). Unfavorable changes can create a condition where a reproductively isolated population is negatively affected by a prolonged reduction in larval survival (Sinclair 1988). This could result in negative impacts on species like Atlantic cod that return to the same spawning habitats year after year and rely on relatively consistent oceanographic conditions to disperse planktonic eggs to areas favorable for larval and juvenile survival (Dean et al. 2022). However, insufficient information is available to determine the source populations of cod larvae and juveniles occurring in southern New England waters, and it is uncertain if the area is fully supported by self-recruitment (NEFMC 2022). Given this, hydrodynamic effects on these species could be more significant, but the available information does not suggest that such effects are likely.

The BOEM modeling study evaluated potential hydrodynamic effects of wind energy development on egg and larval dispersal for several commercially valuable finfish species. Johnson et al. (2021) found that the partial and full build-out of the RI/MA and MA WEAs would lead to localized changes in planktonic egg and larval dispersal patterns, with less extensive effects at lower levels of build-out. Although this study did not consider Atlantic cod, the findings for other finfish species are instructive. Johnson et al. (2021) determined that the larval dispersal patterns of each species, expressed as changes in predicted larval settlement density, would shift at scales of the order of miles to tens of miles. They concluded that these localized and effects are unlikely to be biologically significant at population levels for species like hake and scallops that spawn over broad areas across the region (Johnson et al. 2021). However, source and sink effects could occur for species that spawn in specific areas and rely on dispersal of larvae to favorable habitats. These effects could be positive, negative, or neutral, varying by species and depending on specific project effects.

Degraer et al. (2020) commented that the future decommissioning of offshore wind facilities could become controversial if they are shown to support high-value fish species. Although this potential is acknowledged, this EIS considers decommissioning as a component of the Proposed Action as required by BOEM for COP approval. Project decommissioning would remove the monopile foundations and scour and cable protection from the environment, reversing the artificial reef effect provided by these structures. Portions of the Project footprint, primarily along the RWEC corridor, would return to near pre-Project conditions, as influenced by ongoing environmental trends. As documented in Sections 3.6.2.3.2 and 3.6.2.4.2, benthic recovery is a complex process that involves both the reformation of benthic features, such as biogenic depressions and sand ripples, and recolonization of disturbed areas by habitat-forming invertebrates. Soft-bottom benthic habitats would likely recover to full habitat function within 18 to 30 months of disturbance while full recovery of habitat-forming organisms on complex benthic habitats could take several years to decades to fully recover (Auster and Langton 1999; Collie et al. 2005; Tamsett et al. 2010). A recent study (BOEM 2023e) found that after 6 years, complex habitats (i.e., epifuana/mussels/shell hash and sand/gravel/shell hash) within existing HAPCs on Georges Bank exposed to scallop dredging recovered to near 100% of epifaunal coverage and species diversity. Individual fish species (e.g., small fish sheltering in epibenthic structure on the monopiles) could be injured or killed during removal. The fish community that formed around the reef effect would be dispersed, and individuals that are unable to locate new suitable habitats might not survive. While the significance of these future effects for individual finfish species is difficult to predict, measurable long-term impacts on some species are almost certain to occur. Impacts of this duration and magnitude would constitute a moderate adverse effect on finfish.

In summary, the potential effects to finfish resulting from the presence of structures are likely to vary by species and could be beneficial, neutral, or negative. The available evidence suggests that some demersal fish species are likely to benefit from increased habitat structure and biological productivity while pelagic fishes may also benefit to a lesser extent. Thus, some finfish and EFH species could benefit from the effects of habitat conversion from Project construction and the presence of structures, whereas other species could be negatively impacted, depending on their habitat preferences. However, considerable uncertainty remains about the broader effects of this type of habitat alteration at population scales (Degraer et al. 2020). Wilber et al. (2022b) observed some shifts in the dietary composition of hake and winter flounder that associate with BIWF in comparison to those in reference areas, but there were no apparent negative effects on fish condition or other trophic metrics. However, BIWF is small in scale compared to the RWF Project. Broader-scale reef effects from larger projects could noticeably influence food web productivity and predator-prey relationships that could in turn lead to beneficial, neutral, or negative effects on finfish, varying by species based on habitat preferences and response of prey organisms to the presence of structures. These effects could become more significant when combined with those from other planned offshore wind energy projects in the future. On this basis, habitat alteration on finfish resulting from the Proposed Action are expected to be long term in duration and **moderate** beneficial to **moderate** adverse in significance, varying by species. The hydrodynamic impacts of the Proposed Action could affect the productivity of finfish species that rely on planktonic dispersal of eggs and larvae. Localized shifts in larval settlement density are likely to occur; however, it is not clear that those shifts would measurably alter larval survival sufficiently to have a measurable effect at the population level. Changes in larval settlement patterns in the absence of population-level effects would constitute a **minor** to **moderate** impact on this resource, potentially positive or negative and varying by species.

<u>Sediment deposition and burial</u>: Cable protection maintenance would produce similar effects on finfish as those described for Project construction, although reduced in extent and spread out over time. These effects would range from short-term behavioral disturbance and displacement of demersal and pelagic fish accustomed to naturally high rates of sediment deposition to injury and mortality of benthic eggs and larvae subject to burial effects greater than 0.4 inch (10 mm). The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSS into the water column.

The resulting effects from O&M and decommissioning would be similar in nature but lesser in magnitude than those resulting from Project construction and would therefore be **minor** adverse.

#### 3.13.2.4.3 Cumulative Impacts

#### Offshore Activities and Facilities

<u>Accidental releases and discharges</u>: The Proposed Action in combination with other past, present, and reasonably foreseeable future activities could result in an increase in accidental releases of petroleum products and other toxic substances that could adversely affect finfish. As discussed in Section 3.21.2.2.3, BOEM estimates that the Project when combined with other future offshore wind projects would result in approximately 34 million gallons of coolants, fuel, oils, and lubricants cumulatively stored within WTGs and OSSs within the finfish GAA. All vessels associated with offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. Additionally, training and awareness of EPMs (see Table F-1 in Appendix F) proposed for waste management and marine debris would be required of RWF Project personnel. Such releases would occur infrequently at discrete locations and vary widely in space and time. For this reason, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts on finfish ranging from short term to long term in duration.

<u>Anchoring and new cable emplacement/maintenance</u>: The Proposed Action would result in localized short-term minor adverse impacts to finfish through an estimated 7,150 acres of seafloor disturbance in the GAA. These actions would increase suspended sediment and potentially disturb, displace, or injure finfish, resulting in noticeable minor to moderate adverse impacts to finfish through an estimated 3,204 acres of general vessel anchoring and mooring-related disturbance and 4,009 acres of cabling-related seafloor disturbance. BOEM estimates a cumulative total of 11,631 acres of anchoring and mooring-related disturbance and 105,390 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the finfish GAA. While the suspended sediment effects from this seafloor disturbance are not known, they are expected to be similar in magnitude and extent to those described for the Proposed Action. More extensive suspended sediment and deposition effects could occur in areas where mud and silts are more prevalent in seafloor sediments, although species inhabiting soft sediment habitats are generally adapted to episodic and localized increases in turbidity (such as during storms). When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would result in minor adverse impacts. Those impacts would combine with stressors from other ongoing activities and environmental trends, including commercial and recreational fishing, climate change, nearshore habitat degradation, and nonnative species invasions, which are likely to have minor to moderate adverse effects on finfish. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects and other stressors would result in **minor** to **moderate** adverse cumulative impacts to finfish.

<u>Bycatch:</u> The FRMP (Revolution Wind and Inspire Environmental 2023) will be implemented under the Proposed Action (see EPM Ben-17 in Appendix F, Table F-1). The FRMP employs a variety of preconstruction and postconstruction survey methods to evaluate the effect of RWF construction and operations on benthic habitat structure and commercially and recreationally valuable finfish species. The FRMP includes a combination of methods to capture finfish for direct study. These methods described in Table 3.13-8 could directly or indirectly impact finfish during the specified study periods.

**Table 3.13-8. Survey Methods**

| Method | Description |
|---|---|
| Ventless trap surveys | Used to evaluate changes in the distribution and abundance of lobster and Jonah crab in the RWF and adjacent reference areas, and Jonah crab, lobster, whelk (Buccinidae), and finfish along the RWEC corridor and adjacent reference areas; these areas would be surveyed 12 times per month for 7 months each for 2 years prior to and at least 2 years following completion of Project construction (4 years total) |
| Otter trawl surveys | Used to assess abundance and distribution of target fish and invertebrate species within the RWF; trawls could impact a variety of finfish species as target or bycatch four times per year for 2 years prior to and at least 2 years following completion of Project construction |
| Acoustic telemetry | Revolution Wind will provide funding, equipment, and support to expand ongoing acoustic telemetry survey efforts in and near the RI/MA WEA. Partnering entities include the Massachusetts Division of Marine Fisheries, University of Massachusetts Dartmouth School for Marine Science and Technology, NOAA, Woods Hole Oceanographic Institution, the Nature Conservancy, INSPIRE Environmental, and the Anderson Cabot Center for Ocean Life at the New England Aquarium. These efforts are monitoring the presence and persistence of Atlantic cod, highly migratory species, and other fish species of interest within and in proximity to MA/RI WEA. Revolution Wind has funded the purchase of six VR2W telemetry receivers to complement the existing receiver array, funded the deployment of an additional 150 acoustic transmitters for highly migratory species, and will fund an additional 5 years of data collection for these ongoing survey efforts. Revolution Wind will tag up to 100 Atlantic cod with acoustic transmitters as part of the FRMP to support the ongoing, BOEM-funded Atlantic cod spawning study in southern New England as well. |

These surveys involve similar methods to and would complement other survey efforts conducted by various state, federal, and university entities supporting regional fisheries research and management.

The surveys would target specific invertebrate species using methods and equipment commonly employed in regional commercial fisheries. Finfish could be impacted if captured as bycatch or by being injured or killed when survey equipment contacts the seafloor or during acoustic transmitter tagging of Atlantic cod. Non-target organisms would be returned to the environment where practicable, but some of these organisms would likely not survive. While the FRMP would result in unavoidable impacts to individual finfish, the extent of habitat disturbance and the number of organisms affected would be small in comparison to the baseline level of impacts from commercial fisheries and would not measurably impact the viability of any species at the population level. Randomized sampling distribution means that repeated disturbance of the same habitat is unlikely. As such, all habitat impacts from FRMP implementation would be short term in duration. The intensity and duration of impacts anticipated from FRMP implementation would constitute a **minor** adverse cumulative effect on finfish.

<u>Climate change</u>: The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action, but the Proposed Action could contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would be expected to help reduce climate change impacts over the life of the Project. When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would have a noticeable effect on climate change, but climate change would continue to generate **moderate** adverse cumulative impacts on finfish.

EMF: The Proposed Action is not expected to produce significant EMF effects, as discussed in Section 3.13.2.2.2. BOEM anticipates that future offshore wind energy projects in the GAA would use HVAC transmission and apply similar design measures to avoid and minimize EMF effects on the environment. While uncertainties remain, future actions that produce EMF effects on the order of those generated by the Proposed Action are unlikely to have significant cumulative effects on finfish. Additive effects from multiple cables are likely to be limited to specific areas where cable routes cross. The Project's network of submarine cable (i.e., RWEC, IAC, and OSS-link cable) and cables from other planned and potential future projects could cross existing submarine assets, resulting in cables on the seafloor surface with secondary protection. EMF levels sufficient to cause limited behavioral effects on finfish could occur in highly localized areas. These effects would be unlikely to significantly alter finfish behavior in ways that measurably affect any species at the population level. Cumulative EMF impacts resulting from the Proposed Action in combination with past, present, and reasonably foreseeable activities would therefore result in **minor** adverse effects on finfish from exposure to detectable levels of EMF in limited areas if HVAC is used, or **moderate** adverse if HVDC is used. However, as stated previously, future offshore wind energy projects are anticipated to use HVAC transmission, which produce lower EMF than HVDC transmission. Much of the available research on EMF exposure, including some of the more current science, considers the effects of HVDC. The effects presented here would be the worst case.

Noise: The Proposed Action would result in noticeable short-term negligible to moderate adverse impacts to finfish through the generation of underwater noise during construction and installation. The Proposed Action would produce injury or behavioral-level noise effects on fish extending up to 38,625 feet from construction and installation–related impact pile-driving activities. For the protection of finfish, TOY restrictions would be established through the permitting process. Revolution Wind would adhere to the TOY restrictions imposed on the various elements of the Project through the permitting process (see Appendix F, Table F-1). These effects could be additive to areas ensonified by other temporally or spatially overlapping future activities. BOEM estimates that underwater noise from the construction of other future offshore wind facilities would result in short-term injury or behavioral effects on finfish. Vessel noise from construction and installation, as well as O&M activities, could cause startle and avoidance responses in fish but would not cause injury. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** to **moderate** adverse.

The most significant impact for individual Atlantic sturgeon would be underwater noise from pile driving; however, Project effects to individual Atlantic sturgeon would be limited to short-term minor adverse behavioral effects and disturbance that would be undetectable at population levels. For this reason, Proposed Action cumulative impacts when combined with past, present, and reasonably foreseeable future activities would also be **minor** adverse and not anticipated to result in adverse population-level consequences.

The Proposed Action and other planned and future offshore wind energy projects would include fisheries and benthic habitat monitoring plans to gather information about the effects of wind energy development on finfish and other marine resources. These activities would increase knowledge about finfish use of the Mid-Atlantic OCS and the structure and composition of their habitats. This information could lead to improved management of finfish species and key habitats. This would constitute a **minor** beneficial cumulative effect on finfish resources.

Presence of structures: The Proposed Action would result in long-term alteration of water column and seafloor habitats, resulting in diverse effects on finfish. The monopile foundations and other hard surfaces installed as part of the Proposed Action would create an artificial reef effect. The new offshore structures would also cause localized hydrodynamic effects that would influence primary and secondary productivity within and around this artificial reef. The reef effect would alter biological community structure, producing an array of effects on finfish, including several EFH species.

BOEM estimates the Proposed Action and other planned future projects would result in the development of 3,190 WTG and OSS foundations in the GAA for finfish that could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential significance of broader cumulative effects on finfish resulting from the formation of multiple large-scale artificial reefs in the region and the biological hotspots they support.

As mentioned previously, BOEM conducted a modeling study to predict how planned offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions in the northern Mid-Atlantic Bight. BOEM determined that small but measurable changes in current speed, wave height, and sediment transport in the northern Mid-Atlantic Bight would occur. In addition, small changes in stratification could occur, leading to prolonged retention of cold water near the seafloor within the WEAs during spring and summer. However, these localized and small effects are unlikely to be biologically significant at population levels (Johnson et al. 2021).

While modeled hydrodynamic effects from even the fully developed scenario considered by Johnson et al. (2021) are expected to be small in themselves, it is not clear how these effects would interact with the additional impact of the placement of artificial structures on finfish populations and communities. The expected shifts to fish community structure induced by the presence of a large number of artificial structures are likely to confound the projected hydrodynamic impacts. Collectively, these two modes of offshore wind development are likely to result in permanent and potentially significant impacts on larger scales. Collectively, cumulative impacts from the combined reef and hydrodynamic effects of multiple offshore wind energy projects on finfish could be positive or negative, varying by species, and would likely range from **moderate** adverse to **moderate** beneficial in significance, varying by species.

Sediment deposition and burial: The Proposed Action in combination with future offshore wind projects would generate similar sediment deposition and burial effects to those described in Section 3.13.2.2.1. Impacts would be short term and would have limited significant burial effects relative to the amount of habitat available; therefore, burial effects on benthic eggs and larvae would be minor adverse. Cumulative impacts would be more extensive and distributed across the GAA. As stated, these effects would be short term in duration and would range in severity from negligible to minor adverse at any given location. Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any finfish species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse.

#### 3.13.2.4.4 Conclusions

Project construction and installation, O&M, and decommissioning would impact finfish by causing short-term habitat disturbance; permanent habitat conversion; and behavioral changes, injury, and mortality of finfish. Effects to finfish resulting from the Proposed Action would vary by IPF and would vary depending on finfish exposure to those effects, individual habitat requirements, species, and life stage–specific sensitivity to Project-related impacts. Activities that primarily impact benthic habitat (i.e., cable installation, scour protection) are not as likely to impact species or life stages that depend on pelagic habitats. Conversely, the above-mentioned activities are likely to displace or kill benthic oriented fish species and life stages such as skates and flatfish as well as the eggs and larval stages of finfish. The continued presence of foundations could also affect pelagic habitat by leaving permanent vertical habitat that would host an altered community of benthic and associated demersal and pelagic organisms. The altered finfish community utilizing these artificial reef structures could persist beyond removal of the majority of the structures.

BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **moderate** adverse, including the presence of structures, which could result in **moderate** beneficial impacts for some finfish. Overall, the impacts of Proposed Action alone on finfish would likely be **moderate** adverse. Although some of the proposed activities and/or IPFs analyzed could overlap, BOEM does not anticipate that these combined effects would alter the overall significance determination because they would not alter impacts on any species to such a degree that measurable population-level effects would occur.

The Proposed Action would be more likely to impact fish species having demersal- or benthic-oriented life stages than those that are more pelagic (i.e., water column) oriented, since the majority of Project activities impact the seafloor. However, pelagic species and life stages could be impacted by elevated suspended sediments, associated primarily with jet and mechanical plow operation. Entrainment in plow intakes would result in short-term impacts on pelagic eggs and larvae. Pile-driving noise, although short-term, could impact all benthic and pelagic life stages. The operational phase of the Proposed Action alone could lead to uncertain but possibly beneficial effects on many finfish species through reef effects. The adverse impacts associated with the construction and installation, O&M, and decommissioning of the Proposed Action alone are likely to be limited in temporal scope and/or small in proportion to the overall habitat available regionally.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts of individual IPFs under the Proposed Action would range from **negligible** to **moderate** adverse and **moderate** beneficial for some finfish. Applying the impact-level criteria in Section 3.3, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable offshore wind development activities and the effects of other ongoing activities and environmental trends would result in **moderate** adverse impacts on finfish in the GAA because a notable and measurable impact is anticipated, but the resource would likely recover completely when the impacting agents were gone and remedial or mitigating action were taken. The main drivers for this impact rating are injury and mortality from construction-related noise impacts, long-term habitat changes resulting from the presence of structures, direct mortality and habitat disturbance associated with ongoing commercial and recreational fisheries, and climate change.

Revolution Wind has committed to implement EPMs to reduce potential impacts on benthic finfish resources (see Table F-1 in Appendix F).

### 3.13.2.5 Alternative B: Impacts of the Proposed Action on Essential Fish Habitat

#### 3.13.2.5.1 Construction and Installation

##### Offshore Activities and Facilities

BOEM (2023c, 2023d) has developed a detailed assessment of the potential effects on EFH resulting from construction of the Proposed Action. The following sections describe these impact mechanisms in detail and provide examples of their potential effects on representative finfish and EFH species and their habitats. In general, effects on EFH resulting from the construction-related impact mechanisms would be similar in magnitude and extent to the effects on finfish described in Section 3.13.2, as well as the impacts to benthic habitat and invertebrates, as discussed in Section 3.6.

Accidental releases and discharges: Project compliance with discharge or disposal of solid debris into offshore waters would be as described in Section 3.13.2.2.1. Given these restrictions, the risk to EFH species and habitats from trash and debris from the Proposed Action is **negligible** adverse.

The Project would follow strict oil spill prevention and response procedures during all Project phases, effectively avoiding the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse effects to EFH species and their habitats could result.

Anchoring and new cable emplacement/maintenance: The acres of construction-related seafloor disturbance are summarized by benthic habitat type in Section 3.6.2.4.1 and Table 3.6-4 and above in Section 3.13.2.4.1. As shown, seafloor disturbance from jack-up vessels and general vessel anchoring could impact up to 3,247 acres. Seafloor disturbance from various overlapping cable installation activities, including boulder relocation, jet plow trenching for cable installation, and placement of cable protection, could impact up to 2,043 acres distributed throughout the RWF and RWEC maximum work areas.

The total acreage and distribution of anchoring impacts cannot be predicted with certainty because anchoring requirements and vessel positioning are affected by wind and current conditions in real time. The vessel anchoring plan developed by the applicant will be used to identify and avoid impacts to large-grained complex and complex benthic habitats to the greatest extent practicable. Impacts on bedforms in soft-bottom benthic habitat are expected to recover within 18 to 30 months following initial disturbance as a result of natural sediment transport processes (Daylander et al. 2012) and recolonization by habitat-forming organisms from adjacent habitats. This estimate is based on observed recovery rates from fishing-related disturbance (Grabowski et al. 2014), on cable installation impacts at the nearby BIWF (HDR 2020), and on similar seafloor disturbance impacts observed in other regions (de Marignac et al. 2008). Research obtained by BOEM (2023e) suggests that full recovery of habitat function is likely to occur within a decade of disturbance. The study in question compared the community composition and abundance of habitat-forming organisms in heavily fished areas on Georges Bank to reference sites. The findings of this long-term study demonstrated that epifaunal species damaged by repeated exposure to scallop dredging were able to recover to levels that were statistically indistinguishable from unfished reference sites within 6 years. Given the proximity of this study to the Lease Area and the similarity of disturbance, these findings suggest a similar rate of recovery is likely for Project-related construction impacts.

The estimated area of short-term disturbance from anchoring would depend on the vessel and activity. The derrick barge crane vessel used during monopile installation could disturb 9.1 acres of seafloor per monopile, due to placement of its 8-point 12-ton delta flipper anchor twice at each foundation. Vessels that use anchors (rather than spud cans) to hold position generally have a greater potential to disturb the seafloor and result in crushing or burial impacts. Aside from monopile installation activities, vessels within the RWF work area would primarily use dynamic positioning systems to hold position and would not have any crushing or burial impacts.

Seafloor preparation, cable trenching, vessel anchoring, and short-term seafloor disturbance at the sea-to-shore transition site would also directly disturb soft-bottom benthic habitat. Seafloor preparation, cable trenching, and sea-to-shore transition construction would impact up to 1,360 acres of habitat within the installation corridors for the RWF and RWEC (see Table 3.6-4). Approximately 4.8% and 22.7% of these impacts would occur in large-grained complex and complex benthic habitats, respectively, and 72.5% would occur in soft-bottom habitats (see Table 3.6-4).

Impacts to large-grained complex and complex benthic habitat from vessel anchoring, cable installation and cable protection, and seafloor preparation for foundation installation could impact managed finfish that use these habitats (e.g., monkfish) and may indirectly disturb Atlantic cod spawning. Atlantic cod spawning could be disturbed if anchoring and cable emplacement activities (e.g., grapnel runs and jet plowing) are occurring in proximity. Figure 3.13-4 shows the locations of cod observation data in relation to the Proposed Action (observations primarily observed in Zone RWC 1). Micrositing would be used during construction to minimize impacts on large-grained complex and complex benthic habitats to the greatest extent practicable. Additional measures designed to reduce impacts to complex habitats (e.g., using a boulder grab and a work-class remotely operated vehicle boulder skid for most of the boulder relocations) would minimize impacts and modifications to complex habitats that may support biological functions like spawning.

EFH within these construction footprints would be directly exposed to disturbance. On balance, these impacts would constitute short-term, long-term, and permanent adverse impacts on EFH. Long-term to permanent impacts would primarily involve the redistribution of existing complex and soft-bottomed habitats and the introduction of new hard surfaces. The affected habitats would recover to functional condition over time, such that long-term to permanent effects on the ability to support EFH would be minimal. Therefore, these impacts would be **minor to moderate** adverse.

<u>Noise:</u> The construction and installation of the RWF involves activities that would generate underwater noise exceeding established thresholds for mortality and permanent or short-term injury, TTS, and behavioral effects. Underwater noise would render the affected habitats unsuitable for EFH species over the short term and could have short-term impacts on prey availability for EFH species. The extent, duration, and severity of noise effects on EFH would vary depending on the noise source and the sensitivity of the affected EFH species and their prey to noise impacts during their life cycle. The underwater noise effects would result from such Project activities as preconstruction HRG surveys, vessel and cable installation activity, impact and vibratory pile driving, and UXO detonation and would be the

same or similar as those described above for finfish and in Section 3.6 for benthic habitat and would likely range from **minor** to **moderate** adverse.

Presence of structures: The installation of 102 monopile foundations with associated scour protection would result in the same direct disturbance to EFH species and their habitats as described previously for finfish. Seafloor preparation for foundation installation would cover approximately 731 acres, approximately 19% in large-grained complex benthic habitat, 30% in complex habitat, and 51% in soft-bottom benthic habitat. EFH within the benthic disturbance footprints for foundation installation could be exposed to crushing and burial effects similar to those described previously for anchoring and new cable emplacement/maintenance.

While placement of the monopile foundations and scour protection are also elements of Project construction and installation, these features would remain in place throughout the operational life of the Project and would have long-term effects on EFH species and habitats. These long-term effects are therefore considered in Section 3.13.2.3.2.

Sediment deposition and burial: Sediment deposition and burial effects on EFH species would be similar to those described previously for finfish. The Project would result in short-term, elevated levels of suspended sediment near major bed-disturbing activities like cable installation. Anticipated water column sediment concentrations and burial depths resulting from this impact mechanism are shown in Table 3.6-8. TSS concentrations of the magnitude and duration anticipated are below levels associated with measurable adverse effects on finfish (Wilber and Clarke 2001; Yang et al. 2017) and would therefore be negligible adverse to EFH species. While some adverse effects would undoubtedly occur, the extent of deposition and burial impacts is small relative to the amount of EFH habitat available, and the duration of those impacts would be short term (hours to days). Given the short-term nature of the impact and the limited extent of significant burial effects relative to the amount of habitat available, sediment deposition and burial effects on EFH habitat would be short term and expected to recover without remedial or mitigating action and therefore would be **minor** adverse.

#### 3.13.2.5.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

BOEM (2023c, 2023d) has developed a detailed assessment of the potential effects on EFH resulting from the O&M of the Proposed Action. The following sections describe these impact mechanisms in detail and provide examples of their potential effects on representative finfish and EFH species and their habitats.

Accidental releases and discharges: The prohibitions on releases of trash and debris and accidental spill avoidance and minimization measures described in Section 3.6.2.2.1 for Project construction would continue to apply throughout the operational life of the Project. These restrictions and measures would effectively avoid adverse effects from Project-related trash and debris and accidental spills during routine O&M activities. Therefore, the effects of this impact mechanism on EFH species and their habitats would be **negligible** adverse.

Anchoring and new cable emplacement/maintenance: Impacts to EFH species and habitats from the replacement of cable protection would be the same or similar to those described previously for finfish and habitat. These would include direct disturbance of the seafloor, suspended sediment deposition in the surrounding area, and injury and displacement of finfish using these habitats. It is anticipated that these activities would result in short-term **minor** adverse impacts to EFH species and their habitats.

EMF: The EMF and associated substrate heating effects anticipated to result from operations of the RWEC and IAC are summarized in Table 3.6-10 in Section 3.6.2.3.2. This table summarizes potential EMF and substrate heating exposure for benthic invertebrates. Those findings are also applicable to benthic-associated EFH invertebrates.

The effects of EMF and associated substrate heating on EFH species and habitats would be the same as those described previously for finfish in Section 3.13.2.2.2, wherein findings indicate that long-term EMF effects on EFH would likely be **minor** adverse along most of the lengths of the IAC, OSS-link cable, and RWEC.

Noise: Operational noise is described in Section 3.13.2.2.2. Postconstruction HRG surveys could be conducted each year for the first 4 years of Project operations. This equates to approximately 25 days of HRG survey activity per year. The related effects on finfish would be similar in nature to those described for construction-related HRG surveys in Section 3.13.2.2.1 but reduced in extent and duration. The limited behavioral responses to HRG survey equipment and vessels would be similar to those described above for general O&M vessel noise.

While HRG survey noise would exceed the behavioral effects threshold over a larger cumulative area (3,352,996 acres), the continuously moving HRG vessels would distribute those impacts over approximately 10,759 linear miles and 248 days of survey effort. The instantaneous behavioral effects exposure area around the HRG equipment would be considerably smaller, approximately 477 acres. As described for construction and installation noise in Section 3.13.2.4.1, underwater sound from vessels can cause avoidance behavior in sensitive fish species like Atlantic herring and Atlantic cod and may affect behavior of other species as well (Handegard et al. 2003; Vabø et al. 2002). However, behavioral disturbance may not necessarily translate to significant adverse effects on activities like spawning. For example, McQueen et al. (2022) observed that exposure to seismic air gun noise did not cause displacement of Atlantic cod from their spawning grounds. This suggests that exposure to underwater noise from postconstruction HRG surveys and O&M vessels would not necessarily lead to significant adverse behavioral effects. Such behavioral responses are likely to vary due to differences in sensitivity between species and other environmental factors (McQueen et al. 2022).

Operational noise impacts on hearing specialist species, like Atlantic cod, haddock, Atlantic pollock, and hake, could be more significant, but whether or not auditory masking occurs and has an effect on survival and reproduction in the wild around operational offshore wind farms is not known (Mooney et al. 2020). Studies conducted on captive cod (adults and larvae) that have found impacts to reproduction and survival (Sierra-Flores et al. 2015; Nedelec et al. 2015), although instructive, do not mimic natural conditions, and the results cannot be assumed to occur in wild animals with certainty. In Europe, some species, such as Atlantic cod, have shown no response in relation to sound levels and have shown increases in abundance close to wind turbines (Bergstrom et al. 2013). Based on the evidence presented, BOEM anticipates that operational noise from WTGs, and noise from postconstruction HRG surveys and O&M operations, would result in **negligible** to **minor** adverse effects on EFH.

Presence of structures: The artificial reef effect, as well as hydrodynamic effects, is discussed in Section 3.13.2.2.2. Foundations and scour protection would result in permanent effects on benthic and pelagic habitats on the Mid-Atlantic OCS. The benthic habitat conversion impacts are summarized by category in Table 3.13-9.

**Table 3.13-9. Long-Term Habitat Conversion Impact Area by Project Feature and Habitat Complexity Category**

| Project Feature | Element | Maximum Habitat Conversion Footprint (acres)* | Percent of Disturbance in Large-Grained Complex Habitat | Percent of Disturbance in Complex Habitat | Percent of Disturbance in Soft Bottom Habitat | Water Column ($m^3$) |
|---|---|---|---|---|---|---|
| WTG and OSS foundations | Seafloor preparation | 583 | 19.0%) | 29.7% | 51.3% | N/A |
| | Scour protection± | 62.3 | 5.6% | 30.8% | 62.6% | N/A |
| | Monopiles | 2.9 | 6.1% | 29.9% | 64.0% | 107,499‡ |
| IAC, OSS-link, RWEC | Boulder relocation | 2,314 | 6.4%) | 22.6% | 71.0%) | N/A |
| | Cable protection† | 116.2 | 6.4% | 22.7% | 70.9% | N/A |

‡ Based on WTG and monopile foundation diameter assuming an average depth of 35 meters.

± Acreage estimates include 0.07 acre per foundation of additional habitat conversion effects from cable protection system features extending beyond the scour protection footprint.

† Precise cable protection acreages required within each habitat zone are not currently known. Values are estimated based on total cable length within each zone, and the estimated percentage of cable length requiring protection as presented in the COP (VHB 2023).

These benthic habitat impacts would be permanent. Similarly, impacts to pelagic habitat would result from the presence of the monopile foundations for the WTGs and OSSs. The installation of one-hundred-two 39-foot-diameter (12-m-diameter) monopile foundations would introduce approximately 12,000 to 16,000 m² of new hard surfaces to the water column, respectively, extending from the seafloor to the water surface. These vertical structures would alter pelagic habitats used by EFH species and their prey and forage. Over time these new hard surfaces will become colonized by sessile organisms, creating complex habitats that effectively serve as artificial reefs. The artificial reef effect created by offshore structures like WTGs is well documented and can have an attractive effect on many marine species (Langhamer 2012; Peterson and Malm 2006; Reubens et al. 2013; Wilhelmsson et al. 2006). This can lead to localized increases in fish abundance and changes in community structure. The net effect of WTGs on pelagic EFH species and habitat is likely to be neutral to beneficial depending on species-specific responses, with the recognition that beneficial effects could be negated should these structures inadvertently promote the establishment of invasive species on the Mid-Atlantic OCS.

In addition to reef effects, the hydrodynamic effects of the RWF could have localized effects on food web productivity and on the dispersal patterns of EFH species having pelagic eggs and larvae. As discussed in Section 3.13.2.2.2, reef and hydrodynamic effects on EFH species could be positive, negative, or neutral depending on a variety of factors. In theory, long-term hydrodynamic and reef effects could influence future changes to existing EFH and HAPC designations. For example, changes in egg and larval dispersal patterns caused by the hydrodynamic effects of the Proposed Action could affect the abundance and productivity of certain EFH species and change the importance of some habitats. Hydrodynamic effects could also lead to shifts in egg and larval dispersal patterns that change the importance of existing habitats. This could in turn lead to changes in HAPC designations to include new areas that are shown to provide productive habitat.

With regard to reef effects, the presence of offshore wind structures and the complex habitats they support are expected to affect EFH in ways that may be difficult to predict. The complex structure and biological productivity supported by reef effects been shown to attract and support increased abundance of many finfish and invertebrates, including EFH species, as well as their predators (see Sections 3.6.2.2.2 and 3.13.2.3.2). These changes are likely to lead to changes in food web dynamics. While localized effects are possible, ecosystem modeling studies of a European wind farm showed little difference in key food web indicators before and after construction and installation (Raoux et al. 2017). Even though the biomass of certain taxa increased in proximity to the wind farm, trophic group structure was functionally similar between the before and after scenarios. Thus, regional-scale changes in food web dynamics are not anticipated.

On balance, the presence of structures is likely to result in a range of effects on EFH species and habitats. Those effects could be **minor** to **moderate** in significance and adverse, beneficial, or neutral, and would vary by species depending on individual habitat requirements.

Sediment deposition and burial: Cable protection maintenance would produce similar effects on EFH species as those described for Project construction and installation, although reduced in extent and spread out over time. The resulting effects from O&M and decommissioning would be similar in nature but lesser in magnitude than those resulting from Project construction and would therefore be **minor** adverse.

#### 3.13.2.5.3 Cumulative Impacts

### Offshore Activities and Facilities

Accidental releases and discharges: Section 13.2.2.3 estimates potential coolants, fuel, oils, and lubricants cumulatively stored within WTGs and OSSs within the EFH GAA and discusses measures that would be implemented to prevent and control oil and fuel spills. Based on that analysis, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts on EFH ranging from short term to long term in duration.

Anchoring and new cable emplacement/maintenance: Section 13.2.2.3 estimates Proposed Action and cumulative cabling-related disturbance within the EFH GAA. The Proposed Action would increase suspended sediment and potentially disturb, displace, or injure individual EFH species, resulting in localized **minor** to **moderate** adverse impacts. Cumulatively, while the suspended sediment effects from this seafloor disturbance are not known, they are expected to be similar in magnitude and extent to those described for the Proposed Action. More extensive suspended sediment and deposition effects could occur in areas where mud and silts are more prevalent in seafloor sediments. Some projects could also include dredging for O&M facility development or related port improvements, which could contribute to suspended sediment and deposition effects. When combined with other past, present, and reasonably foreseeable actions the Proposed Action would result in **moderate** adverse cumulative impacts.

Bycatch: EFH impacts due to bycatch would be as discussed in Section 3.13.2.2.3. The intensity and duration of impacts anticipated from FRMP implementation would constitute a **minor** adverse cumulative effect on EFH. These impacts would be offset by an improved understanding of the effects of offshore wind development on regional fish species and their habitats. This could in turn contribute to improved management of EFH species and their habitats.

Climate change: EFH impacts due to climate change would be as discussed in Section 3.13.2.2.3. Climate change would result in **moderate** adverse cumulative impacts even when the offsetting effects of the Proposed Action are combined with those from other past, present, and reasonably foreseeable projects.

EMF: The Proposed Action is not expected to produce significant EMF effects, as discussed in 3.13.2.2.3. Cumulative EMF impacts resulting from the Proposed Action in combination with past, present, and reasonably foreseeable activities would be **minor** adverse if HVAC is used, or **moderate** adverse if HVDC is used.

Noise: The Proposed Action would result in noticeable short-term **negligible** to **moderate** adverse impacts to EFH species and their habitat through the generation of underwater noise during construction and installation, as described in Section 3.13.2.2.3. The Proposed Action would produce injury or behavioral-level noise effects on fish extending up to 39,380 feet from construction and installation–related impact pile-driving activities. Periodic noise from O&M vessels and continuous or near-continuous WTG operational noise exceeding behavioral effects thresholds for EFH species would occur within a few hundred feet of each source (see Section 3.13.2.5.2). These effects would occur over the life of the Project through decommissioning. These localized and short-term to permanent cumulative impacts from the Proposed Action would combine with similar localized impacts from other past, present, and reasonably foreseeable activities, resulting in **negligible** to **minor** adverse effects on EFH.

Presence of structures: Cumulative to EFH, expressed in terms of effects on benthic habitat, invertebrates, and finfish and their habitats are described in Sections 3.6.2.2.3, 3.6.2.3.3, and 3.13.2.2.3, respectively.

BOEM estimates the Proposed Action and other planned future projects would result in the development of 3,190 WTG and OSS foundations in the EFH GAA. Depending on how these are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential significance of broader cumulative effects on EFH species and habitat. Collectively, cumulative impacts from the combined reef and hydrodynamic effects of multiple offshore wind energy projects on EFH could be positive or negative, varying by species, and would likely range from **moderate** adverse to **moderate** beneficial in significance, varying by species.

Collectively, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** beneficial cumulative effects on EFH species from removal of derelict fishing gear and marine debris.

Sediment deposition and burial: The Proposed Action in combination with future offshore wind projects would generate similar sediment deposition and burial effects to those described in Section 3.13.2.2.3. As stated, these effects would be short term in duration. Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any EFH species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse.

#### 3.13.2.5.4 Conclusions

Over 40 species of finfish with designated EFH and HAPC occur within the RWF Lease Area and the RWEC Project easement. The Proposed Action includes construction and installation, O&M, and decommissioning of the Project components. Project decommissioning would occur at the end of the 35-year operating period of the Project and would be subject to a separate EFH consultation at that time.

Project construction and installation would result in short-term adverse effects on the environment that could affect habitat suitability for managed species. Short-term adverse effects include construction and installation–related underwater noise impacts; crushing, burial, and entrainment effects; and disturbance of bottom substrates resulting in increased turbidity and sedimentation. These effects would occur intermittently at varying locations in the RWF Lease Area and the RWEC project easement over the duration of Project construction and installation but are not expected to cause permanent effects on EFH habitat quality. Depending on the nature, extent, and severity of each effect, this may temporarily reduce the suitability of EFH habitat for managed species, which would result in short-term adverse effects on EFH habitat for those species. For example, the Proposed Action would result in the full build-out of the entire Lease Area, including areas of large-grained complex and complex habitats that recent data indicate support spawning Atlantic cod (Van Hoeck et al. 2023). This would result in underwater noise from pile driving and disturbances from anchoring, cable emplacement, and seafloor preparation for foundations that could temporarily render the affected habitats unsuitable as EFH for multiple life stages of Atlantic cod (e.g., spawning adult cod present in Zones RWF 1 and 2). However, EPMs committed to by Revolution Wind (see Table F-1, Appendix F), including ramp-up/soft starts and TOY restrictions for pile-driving activity (January through April), would reduce the magnitude and temporal extent of impacts to Atlantic cod spawning, which existing data indicate is occurring both within (primarily in Zone RWF 1) and outside the Lease Area between October and March (DeCelles et al. 2017; Inspire Environmental 2019a, 2020; Van Hoeck et al. 2023). In addition, Revolution Wind would coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and would adhere to requirements imposed by these agencies (e.g., TOY restrictions to avoid and/or minimize impacts to winter flounder).

The O&M of the RWF, RWEC, and O&M facility would result in intermediate to long-term adverse effects on EFH habitat for some life stages of EFH species. Long-term adverse effects are those that would last over the approximately 35-year operating period of the Project, so would be effectively permanent. These impacts include alteration of water column and benthic habitats, operational noise, EMF and heat effects, hydrodynamic effects, and food web effects. Monopile foundations, scour protection, and cable protection would alter habitat. Benthic habitat areas mapped within the Lease Area consist of 17,945 acres of complex, 11,128 acres of large-grained complex, and 29,563 acres of soft-bottom benthic habitat. Foundation piles would displace approximately 0.6 acre of large-grained complex, 0.8 acre of complex, and 1.5 acres of soft-bottom benthic habitat within the maximum monopile footprint. An additional estimated 15.8 acres of large-grained complex, 23.8 acres of complex, and 39.5 acres of soft-bottom benthic habitat would be modified by placement of scour protection around the foundations and IAC protection. Approximately 14.5 acres of large-grained complex, 34.2 acres of complex, 90.4 acres of soft-bottom benthic habitat would be modified by IAC and OSS-link scour protection anticipated to be surface-laid. IAC and OSS-link boulder relocation would modify approximately 309.7 acres of large-grained complex, 701.7 acres of complex, and 90.4 acres of soft-bottom benthic habitat. The potential increase in abundance of epibenthic and demersal fishes resulting from the reef effect may offset some impacts to EFH of those species over the life of the Project, although it may take a decade or more for the reef effect to fully develop. Analyses of habitat impacts are found in Section 5. The implementation of EPMs would likely result in the avoidance and minimization of some of the intermediate to long-term (permanent) Project impacts to EFH species and their habitat described above. Overall, the construction and installation, O&M, and decommissioning of the Project would be expected to result in effects that range from **moderate** adverse to **moderate** beneficial (O&M, presence of structures) to **negligible** to **minor** adverse (for HVAC) and **moderate** adverse (for HVDC).

### 3.13.2.6 Alternatives C, D, E, and F: Finfish

#### 3.13.2.6.1 Construction and Installation

#### Offshore Activities and Facilities

Noise: Alternatives C through F would result in similar noise impacts to finfish from WTG and OSS foundation installation to those described in Section 3.13.2.2.1 for the Proposed Action, but the duration and extent of those impacts would be reduced due to the reduced number of WTG and OSS foundations. These impacts would vary based on the reduced number of WTGs and/or OSS foundations installed under each alternative, depending on the configuration selected. Reducing the number of structures could also reduce the required extent of HRG surveys under each alternative relative to the Proposed Action, but BOEM has insufficient information to determine if this is the case. Similarly, it is not possible to determine if changes in foundation layout would alter the UXO detonation requirements relative to the Proposed Action because the probable area of occurrence within the RWF is large and centrally located within the wind farm footprint. Therefore, impacts to finfish from HRG surveys and UXO detonation are considered to be the same across all alternatives.

Differences in underwater noise impacts on finfish between the Proposed Action and the different configurations proposed for Alternatives C through E are summarized in Table 3.13-10, Table 3.13-11, and Table 3.13-12, respectively. These tables display the differences in the number of impact pile-driving sites and the estimated total duration of potentially harmful noise effects from pile-driving activities. While the alternatives would vary in terms of the number of impact pile-driving sites and total duration of pile-driving activities, the magnitude of impacts and general scale of effects would be similar to those under the Proposed Action.

Impact pile driving used to install the RWF monopile foundations and UXO detonation is the most intense source of noise resulting from the Project and would produce the most significant and extensive noise effects on fish. Pile-driving noise would exceed the cumulative injury and behavioral effects thresholds for finfish from 354 to 2,749 feet and nearly 35,000 feet (6.6 miles) from each foundation installation, respectively. These effects would occur at 64 to 93 sites for 22 to 31 days under Alternatives C through F, varying by the alternative configuration selected. Although the extent and duration of effects would vary between alternatives, the level of impact would be similar. However, configurations of Alternative C would reduce the level of activity and associated construction noise, such as pile driving, relative to the Proposed Action and Alternatives D, E (i.e., E2), and F. Alternative C configurations would also lead to less extensive impacts on areas within the Lease Area where Atlantic cod spawning activity has primarily been observed (i.e., Zone RWF 1) (Van Hoeck et al. 2023). Combining Alternatives C and F would result in further reductions of noise impacts due to the reduction in turbines and associated reductions in construction and installation activities that produce noise in areas that support spawning

Atlantic cod and other managed species that use large-grained complex and complex habitats. The EPMs committed to by Revolution Wind (see Table F-1, Appendix F) to reduce construction-related noise impacts would be the same as those described for Alternative B (e.g., TOY restrictions).

As stated, Revolution Wind has determined that all 16 UXOs identified in the RWEC corridor can be safely avoided without the need for detonation by shifting the installation route (Orsted 2023). However, it is possible that additional devices could be discovered in preconstruction surveys or during construction that cannot be avoided or safely relocated. BOEM has concluded that the need for UXO detonation cannot be entirely ruled out; therefore, the potential effects of this activity are considered. As stated in Table 3.13-5, UXO detonation could result in injury-level effects to finfish and fish eggs and larvae potentially extending up to 951 and 1,384 feet from the source, respectively. Therefore, construction noise effects on finfish resulting from Alternatives C through F would be the same as those under the Proposed Action, ranging from negligible to minor adverse.

Similar impacts as described for the Proposed Action for intermittent non-impulsive noise associated with vibratory pile driving, HRG surveys, and construction vessels would result from Alternatives C through F and would have a **negligible** to **minor** adverse impact. Potential effects to ESA-listed Atlantic sturgeon and giant manta ray under Alternatives C through F would be similar in intensity as those described for the Proposed Action but reduced in extent and therefore **negligible** to **minor** adverse.

Sediment deposition and burial: Alternatives C through F would result in similar sediment deposition and burial impacts on finfish to those described in Section 3.13.2.3.1 for the Proposed Action, but those impacts would be reduced in extent and the total area exposed would vary depending on the configuration selected. Differences in potential sediment deposition and burial exposure between the Proposed Action and the different configurations proposed for Alternatives C, D, and E are summarized in Table 3.6-23, Table 3.6-24, and Table 3.6-25 in Section 3.6.2.5.1, respectively, in terms of the estimated total acres exposed to sediment deposition and burial effects greater than 0.4 inch (10 mm) for each cable component.

**Table 3.13-10. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration by Fish Hearing Group from Revolution Wind Farm Wind Turbine Generator Foundation Installation, the Proposed Action, and Proposed Configurations for Alternative C***

| Noise Exposure Type | Hearing Group | Threshold Distance (feet)† | Proposed Action (number of sites/days) | C1 (number of sites/days) | C2 (number of sites/days) |
|---|---|---|---|---|---|
| Peak injury | Fish–Swim bladder involved in hearing | 348 | 100 sites/ 35 days | 64 sites/ 22 days | 65 sites/ 22 days |
| | Fish–Swim bladder not involved in hearing | 348 | | | |
| | Fish–No swim bladder | 59 | | | |
| | Eggs and larvae | 348 | | | |
| Cumulative injury | Fish–Swim bladder involved in hearing | 2,749 | | | |
| | Fish–Swim bladder not involved in hearing | 1,680 | | | |
| | Fish–No swim bladder | 354 | | | |
| | Eggs and larvae | 1,680 | | | |
| TTS | All fish | 30,961 | | | |
| Behavioral effects | All fish | 34,987 | | | |

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10-dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites and seasonal conditions.

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**Table 3.13-11. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration by Fish Hearing Group from Revolution Wind Farm WTG Foundation Installation, the Proposed Action, and Proposed Configurations for Alternative D***

| Exposure Type | Hearing Group | Threshold Distance (feet)[†] | Proposed Action (number of sites/days) | D1 (number of sites/days) | D2 (number of sites/days) | D3 (number of sites/days) | D1+D2 (number of sites/days) | D1+D3 (number of sites/days) | D2+D3 (number of sites/days) | D1+D2+D3 (number of sites/days) |
|---|---|---|---|---|---|---|---|---|---|---|
| Peak injury | Fish–Swim bladder involved in hearing | 348 | 100 sites/ 35 days | 93 sites/ 31 days | 92 sites/ 31 days | 93 sites/ 31 days | 85 sites/ 28 days | 86 sites/ 29 days | 85 sites/ 28 days | 78 sites/ 26 days |
| | Fish–Swim bladder not involved in hearing | 348 | | | | | | | | |
| | Fish–No swim bladder | 59 | | | | | | | | |
| | Eggs and larvae | 348 | | | | | | | | |
| Cumulative Injury | Fish–Swim bladder involved in hearing | 2,749 | | | | | | | | |
| | Fish–Swim bladder not involved in hearing | 1,680 | | | | | | | | |
| | Fish–No swim bladder | 354 | | | | | | | | |
| | Eggs and larvae | 1,680 | | | | | | | | |
| TTS | All fish | 30,961 | | | | | | | | |
| Behavioral effects | All fish | 34,987 | | | | | | | | |

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10-dB sound source reduction.

[†] Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites and seasonal conditions.

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**Table 3.13-12. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration by Fish Hearing Group from Revolution Wind Farm Wind Turbine Generator Foundation Installation and Unexploded Ordnance Detonation, the Proposed Action, and Proposed Configurations for Alternative E***

| Noise Exposure Type | Hearing Group | Threshold Distance (feet)† | Proposed Action (number of sites/days) | E1 (number of sites/days) | E2 (number of sites/days) |
|---|---|---|---|---|---|
| Peak injury | Fish–Swim bladder involved in hearing | 348 | 100 sites/<br>35 days | 64 sites/<br>22 days | 81 sites/<br>27 days |
| | Fish–Swim bladder not involved in hearing | 348 | | | |
| | Fish–No swim bladder | 59 | | | |
| | Eggs and larvae | 348 | | | |
| Cumulative Injury | Fish–Swim bladder involved in hearing | 2,749 | | | |
| | Fish–Swim bladder not involved in hearing | 1,680 | | | |
| | Fish–No swim bladder | 354 | | | |
| | Eggs and larvae | 1,680 | | | |
| TTS | All fish | 30,961 | | | |
| Behavioral effects | All fish | 34,987 | | | |

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10-dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites and seasonal conditions.

The various configurations of Alternatives C through F would modify the installation length for the IAC. This would reduce the extent of sediment deposition and burial effects for IAC installation relative to the Proposed Action. Alternative C would also alter the distribution of sediment deposition impacts by avoiding large blocks of complex and large-grained complex habitat, meaning that finfish associated with those habitats would be less likely to experience deposition effects. Alternatives C through F would not change the proposed configurations of the OSS-link cable and RWEC; therefore, sediment deposition and burial effects for these Project components would not change. While this alternative would result in a slightly smaller area exposed to potentially harmful sediment deposition impacts, overall impacts would not change relative to the Proposed Action and would range from **negligible** to **minor** adverse.

#### 3.13.2.6.2 Operations and Maintenance and Decommissioning

#### Offshore Activities and Facilities

Presence of structures: As discussed for benthic habitat in Section 3.6.2.4.2, Alternatives C through F would result in the installation of fewer monopile foundations than the Proposed Action and would reduce the total length of IAC. This would noticeably reduce the extent of long-term to permanent impacts on finfish, particularly those species that associate with benthic habitats within the RWF maximum work area.

Differences between the Proposed Action and alternate configurations of Alternatives C through E in benthic habitat acreage occupied by new structures are illustrated in Section 3.6.2.4.2, Table 3.6-17, Table 3.6-18, and Table 3.6-19. Alternative F would employ one of the proposed Alternative C through E configurations and would otherwise be identical except that it would use higher capacity WTGs. As such, impacts from this IPF on finfish habitat would be identical to those described for the selected alternative configuration. As shown, Alternatives C through F would reduce the number of WTG foundations and the total acres of IAC relative to the Proposed Action. This would result in a commensurate reduction in the acres of benthic habitat exposed to short- and long-term impacts from the presence of foundations and scour and cable protection, resulting effects on finfish that associate with these habitats.

Alternatives C through F would produce reef and hydrodynamic effects from structure presence similar in nature but reduced in extent relative to those described for the Proposed Action in Section 3.6.2.3.2. The resulting effects on finfish, invertebrates, and other organisms would be reduced in extent under each alternative configuration commensurate with the number of structures and acres of cable protection installed (see Table 3.6-14, Table 3.6-15, and Table 3.6-16 for Alternatives C through E) but would be of the same general scale and overall impact as those produced by the Proposed Action. These effects would therefore range from **minor** to **moderate** adverse or **moderate** beneficial, as measured by potential effects on the broader biological community associated with benthic habitats using the significance criteria defined in Section 3.3, Table 3.3-2.

As discussed for Project construction, these impact determinations do not differentiate potentially important differences in impacts between alternatives. Specifically, the proposed configurations of Alternative C were specifically selected to avoid and minimize impacts to large-grained complex and complex habitats of value for certain fish species of concern. This would in turn reduce the extent of impacts for species, such as Atlantic cod, that associate with specific complex benthic habitats on Cox Ledge within the proposed RWF footprint. As discussed in Section 3.13.2.3.2, the Proposed Action is likely to result in complex reef and hydrodynamic effects that could influence habitat conditions for a variety of finfish species that occur in the region. Many of these effects are uncertain and could be positive, negative, or neutral depending on the fish species in question and the alternative-specific nature of the effects. For example, the hydrodynamic effects of the Proposed Action are likely to have noticeable effects on the dispersal patterns of silver hake eggs and larvae (Johnson et al. 2021). However, the resulting localized shifts in larval settlement density are likely to be biologically insignificant given that this species spawns in large aggregations and disperses larvae over broad areas at regional scales (Johnson et al. 2021). In contrast, changes in egg and larvae dispersal patterns could be more significant for species like Atlantic cod that spawn in specific areas and rely on the conditions present to carry their pelagic eggs and larvae to areas that are favorable for survival and recruitment. While hydrodynamic effects could lead to localized shifts in larval settlement density, it is not currently known if this would have any measurable effects on larval survival or population productivity. Therefore, while Alternatives C through F would reduce hydrodynamic effects by varying degrees relative to the Proposed Action, it is not possible to determine if this would result in measurable differences between alternatives in impacts to finfish.

#### 3.13.2.6.3 Cumulative Impacts

#### Offshore Activities and Facilities

The finfish cumulative impacts analysis for Alternatives C, D, E, and F is provided in Table 3.13-3.

#### 3.13.2.6.4 Conclusions

The construction and installation, O&M, and decommissioning of Alternatives C through F would impact finfish through several mechanisms, including short-term and long-term habitat disturbance, permanent habitat conversion, and changes in substrate composition and nutrient cycling from reef effects caused by colonization of structures by habitat-forming invertebrates. These effects would alter the structure and function of finfish habitats within the RWF and portions of the RWEC corridor where cable protection is used and create new biological hotspots that would benefit some fish species. Long-term to permanent habitat conversion effects on seafloor from boulder relocation and the presence of structures would constitute a **moderate** adverse effect on finfish. These adverse effects would be offset by **moderate** beneficial effects on some finfish species that benefit from reef effects. While the overall extent of effects to finfish would be reduced under Alternatives C through F relative to the Proposed Action, the significance of those effects would be the same.

### 3.13.2.7 Alternatives C, D, E, and F: Essential Fish Habitat

Table 3.13-3 provides a summary of potential construction and installation impacts to EFH and a comparison of all evaluated IPFs for EFH across alternatives. Potential construction and installation impacts to EFH elements under Alternatives C, D, E, and F are addressed in Section 3.13.2.6 Finfish, Section 3.6.2.6 Benthic Habitat, and Section 3.6.2.7 Invertebrates.

#### 3.13.2.7.1 Conclusions

The construction and installation, O&M, and decommissioning of Alternatives C through F would impact EFH through the same mechanisms described for the Proposed Action, including short-term and long-term habitat disturbance, permanent habitat conversion, and changes in substrate composition and nutrient cycling from reef effects caused by structures. Overall the construction and installation, O&M, and decommission of Alternatives C through F would be expected to result in effects that are similar to the Proposed Action and range from **moderate** beneficial (O&M, presence of structures) to **moderate** adverse. However, configurations of Alternative C would reduce the level of activity and associated construction noise, such as pile driving, relative to the Proposed Action and Alternatives D, E, and F. Alternative C configurations would also lead to less extensive impacts on areas within the Lease Area where Atlantic cod spawning activity has primarily been observed (i.e., Zone RWF 1) (Van Hoeck et al. 2023). Combining Alternatives C and F would result in further reductions of noise impacts due to the reduction in turbines and associated reductions in construction and installation activities that produce noise in areas that support spawning Atlantic cod and other managed species that use large-grained complex and complex habitats.

### 3.13.2.8 Alternative G: Impacts of the Preferred Alternative on Finfish

#### 3.13.2.8.1 Construction and Installation

Table 3.13-3 provides a comparison of all evaluated IPFs for EFH across alternatives.

**Offshore Activities and Facilities**

Noise: Construction of Alternative G would result in similar noise impacts to finfish from WTG and OSS foundation installation to those described in Section 3.13.2.2.1 for the Proposed Action and in Section 3.13.2.6.1 for Alternatives C through F, but those impacts would be reduced in extent and duration. Configurations of Alternative G would reduce the level of construction activity and associated noise due to the reduction in turbines compared to the Proposed Action and Alternatives D, E, and F, particularly in areas of complex and large-grained complex habitats that support managed finfish and cod spawning (i.e., reduced construction noise impacts in Zones RWF 1 and 2). Alternative G1 would result in slight reductions of construction noise in the central portion of Zone RWF 1 compared to Alternatives G, G2, and G3, where most of the recent cod spawning activity within the Lease Area has been observed (Van Hoeck et al. 2023). However, Alternative G1 would still result in construction noise that would overlap areas in Zone RWF 1 observed to support spawning cod relative to Alternative C, which avoids the placement of any WTGs in RWF Zone 1 and throughout most of Zone RWF 2.

EPMs committed to by Revolution Wind (see Table F-1, Appendix F), including ramp-up/soft starts and TOY restrictions for pile-driving activity (January through April), would reduce the magnitude and temporal extent of impacts to Atlantic cod spawning, which existing data indicate is occurring both within (primarily in Zone RWF 1) and outside the Lease Area between October and March (DeCelles et al. 2017; Inspire Environmental 2019a, 2020; Van Hoeck et al. 2023). In addition, Revolution Wind would coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies (e.g., TOY restrictions to avoid and/or minimize impacts to winter flounder). Given this, construction noise effects on finfish resulting from Alternative G would be the same as the Proposed Action, ranging from **minor** to **moderate** adverse.

UXO detonation may be required during site preparation for construction, and the largest UXO devices are most likely to be found within the central portion of the RWF and in state waters on the RWEC corridor at the mouth and outside of Narragansett Bay (Ordtek 2021). This probable area of occurrence covers a large enough portion of the RWF such that it is not currently possible to assess potential differences in associated noise impacts between alternatives and the area of potential adverse effects from

UXO detonation would be the same across alternatives. Similarly, although reducing the number of foundations and IAC length would also likely reduce HRG survey requirements, insufficient information is available to quantify differences in noise exposure area between alternatives. However, any difference in UXO- or HRG-related noise exposure would not be sufficient to alter the noise impact determination for finfish. Applying the impact criteria defined in Section 3.3, Table 3.3-2, construction noise effects on finfish from Alternative G would be the same as the Proposed Action: **minor** to **moderate** adverse.

Similar impacts as described for the Proposed Action for intermittent non-impulsive noise associated with vibratory pile driving, HRG surveys, and construction vessels would result from Alternative G and would have a **negligible** to **minor** adverse impact. Potential effects to ESA-listed Atlantic sturgeon, giant manta ray, and shortnose sturgeon under Alternative G would be similar in intensity as those described for the Proposed Action but reduced in extent and therefore **negligible** to **minor** adverse.

<u>Sediment deposition and burial</u>: Alternative G would result in similar sediment deposition and burial impacts on finfish to those described in Section 3.13.2.3.1 for the Proposed Action and in Section 3.13.2.6.1 for Alternatives C through F, but reduced in extent. Alternative G would reduce total IAC length, reducing the overall footprint of sediment impacts. Alternative G would also reduce cable installation length in sediments with a high proportion of mud and silt from 3.2 to 2.8 miles relative to the Proposed Action.

Differences in potential sediment deposition and burial exposure between the Proposed Action and Alternative G are summarized in Table 3.6-33 in terms of the estimated total acres exposed to sediment deposition and burial effects greater than 0.4 inch (10 mm) for each cable component. As shown, Alternative G would reduce the total acreage exposed to sediment deposition and burial effects above this threshold from 217 to 162 acres relative to the Proposed Action, commensurately reducing the extent of biologically significant sediment burial effects. Alternative G would also alter the distribution of sediment deposition impacts by avoiding large blocks of complex and large-grained complex habitat, meaning that finfish associated with those habitats would be less likely to experience deposition effects. As currently designed, Alternative G would not change the proposed configurations of the OSS-link cable and RWEC; therefore, sediment deposition and burial effects for these Project components would be similar to those produced by the Proposed Action. Although these alternatives would result in a slightly smaller area exposed to potentially harmful sediment deposition impacts, the level of impact would be the same as under the Proposed Action. Therefore, short-term sediment deposition and burial effects on finfish would range from **negligible** to **minor** adverse.

#### 3.13.2.8.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

<u>Presence of structures</u>: As discussed for benthic habitat in Section 3.6.2.4.2 and in Section 3.13.2.6.2 for Alternatives C through F, Alternative G would result in the installation of fewer monopile foundations within sensitive habitats important to EFH species than the Proposed Action and Alternatives D, E, and F and would reduce the total length of IAC. This would noticeably reduce the extent of long-term to permanent impacts on finfish, particularly those species that associate with benthic habitats within the RWF maximum work area.

Alternative G would produce reef and hydrodynamic effects from structure presence similar in nature but reduced in extent relative to those described for the Proposed Action in Section 3.6.2.3.2 and in Section 3.13.2.6.2 for Alternatives D, E, and F. Reef and hydrodynamic effects from structure presence would be increased under Alternative G in areas that support Atlantic cod spawning relative to Alternative C, which would remove all WTGs from Zone RWF 1 and most of the WTGs in Zone RWF 2. Alternative G1 would result in slightly fewer effects due to the presence of structures in the central portion of Zone RWF 1 compared to the Proposed Action and Alternatives D, E, F, and G (i.e., G, G2, and G3). Most of the Atlantic cod spawning observations have been recorded in these areas (Van Hoeck et al. 2023). Differences between the Proposed Action and Alternative G in terms of benthic habitat occupied by new structures are shown in Section 3.6.2.8.2, Table 3.6-33. The resulting effects on finfish and other organisms would be reduced in extent but would be of the same general scale and overall impact as those produced by the Proposed Action. These effects would therefore range from **minor** to **moderate** adverse or **moderate** beneficial, as measured by potential effects on the broader biological community associated with benthic habitats using the significance criteria defined in Section 3.3, Table 3.3-2.

As discussed for Project construction, these impact determinations do not differentiate potentially important differences in impacts between alternatives. Alternative G would avoid portions of the RWF comprising predominantly large-grained complex and complex habitats of value for certain fish species of concern. Alternative G1 would result in fewer long-term to permanent impacts compared to Alternatives G2 and G3 because the presence of structures in the central portion of Zone RWF 1 under Alternatives G2 and G3 are where most of the recent cod spawning activity within the Lease Area has been observed (Van Hoeck et al. 2023). Avoiding these areas would reduce the extent of impacts for finfish species, including Atlantic cod, that associate with complex benthic habitat compared to the Proposed Action. These potential benefits are acknowledged and discussed in greater detail in terms of potential effects on habitat suitability for certain finfish and EFH invertebrate species of concern in Sections 3.13.2.4.1.

#### 3.13.2.8.3 Cumulative Impacts

### Offshore Activities and Facilities

Accidental releases and discharges: Based on compliance with environmental regulations, Alternative G when combined with past, present, and reasonably foreseeable projects would result in in **negligible** to **minor** adverse cumulative impacts on EFH ranging from short term to long term in duration. The rationale for this conclusion is the same as described for the Proposed Action.

When the Project is combined with other future offshore wind projects, up to approximately 34 million gallons of coolants, fuels, oils, and lubricants could cumulatively be stored within WTGs and the OSSs within the finfish GAA. All vessels associated with the Project and other offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. Additionally, training and awareness of EPMs (see Table G-1 in Appendix G) proposed for waste management and marine debris would be required of RWF Project personnel. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and impacts would be minimized through planned EPMs and other mitigation measures detailed in Tables F-1 and F-2, respectively, in Appendix F. Although unlikely, unanticipated events could result in larger spill events, leading to cumulative impacts of greater severity and duration, similar to those described for the Proposed Action.

Anchoring and new cable emplacement/maintenance: BOEM estimates a cumulative total of 10,525 acres of anchoring and mooring-related disturbance and 104,781 acres of cabling-related disturbance for Alternative G plus all other future offshore wind projects within the GAA. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated finfish species would be expected to fully recover within 18 to 30 months, whereas impacts on complex benthic habitats could take up to a decade to fully recover.

On this basis, Alternative G when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to finfish and on benthic habitat structure through impacts to habitat-forming invertebrates.

Bycatch: Like the Proposed Action, Alternative G would include implementation of the FRMP proposed to evaluate the effects of Project construction and O&M on economically valuable fish resources (Revolution Wind and Inspire Environmental 2023). No revisions to the FRMP are proposed based on changes in alternative configuration. Given this, cumulative impacts from bycatch associated with monitoring activities under the Proposed Action in combination with other planned and future offshore wind projects would be **minor** adverse, with the impacts ranging from short term to long term in duration.

Climate change: Cumulative impacts to habitat structure from climate change under Alternative G are expected to be of similar magnitude to those described for the Proposed Action. Under the Proposed Action, the intensity of climate change cumulative impacts on finfish are uncertain but are likely to result in **moderate** adverse effects that vary considerably between species.

Noise: Alternative G would generate underwater noise effects during Project construction, throughout the operational life of the Project, and during Project decommissioning. Those impacts would be similar in magnitude and distribution but reduced in extent relative to the Proposed Action. These effects would combine with similar effects resulting from the construction, O&M, and decommissioning of other planned offshore wind projects on the Mid-Atlantic OCS. Sound-sensitive finfish species occurring in proximity to impact or vibratory pile driving and/or UXO detonation could suffer noise-related injury to sensory cells, resulting in reduced survival. The number of individuals affected is unlikely to have any measurable effect on those species at the population level. Less sensitive species may be temporarily disturbed by vibration effects, but any such effects would be short term in duration and are unlikely to have a measurable effect on any population. On this basis, cumulative effects on finfish resulting from underwater noise caused by Alternative G are likely to be **negligible** to **minor** adverse, varying by species.

Presence of structures: Alternative G would result in the long-term alteration of water column and seafloor habitats, resulting in a diversity of effects on finfish, including EFH species. The 67 monopile foundations and other hard surfaces proposed under the four configurations of Alternative G would create an artificial reef effect and cause hydrodynamic effects. The long-term to permanent effects of these structures would influence primary and secondary productivity within and around the artificial reef and influence the distribution and productivity of planktonic invertebrates, eggs, and larvae. Reef effects would alter biological community structure, producing an array of effects on finfish. Those cumulative effects could be beneficial or adverse, varying by species, and would likely range from **moderate** adverse to **moderate** beneficial in terms of overall impact.

Sediment deposition and burial: Alternative G in combination with future offshore wind projects would generate similar sediment deposition and burial effects to those described in Section 3.13.2.2.3. When combined with other past, present, and reasonably foreseeable actions, Alternative G would result in **minor** adverse cumulative impacts on finfish.

##### 3.13.2.8.4 Conclusions

The construction and installation, O&M, and decommissioning of Alternative G would impact finfish through several mechanisms, including short-term and long-term habitat disturbance, permanent habitat conversion, and changes in substrate composition and nutrient cycling from reef effects caused by colonization of structures by habitat-forming invertebrates. These effects would alter the structure and function of finfish habitats within the RWF and portions of the RWEC corridor where cable protection is used and create new biological hotspots that would benefit some fish species. Long-term to permanent habitat conversion effects on seafloor from boulder relocation and the presence of structures would constitute a **moderate** adverse effect on finfish. These adverse effects would be offset by **moderate** beneficial effects on some finfish species that benefit from reef effects. Although the overall extent of effects to finfish would be reduced under Alternative G, relative to the Proposed Action and Alternatives D, E, and F, the significance of those effects would be the same. The extent of potential effects (e.g., disruptions to spawning activity from construction noise and anchoring/cable emplacement/seafloor preparation) to spawning Atlantic cod would be increased under Alternative G relative to Alternative C, which removes all WTGs from Zone RWF 1 and most of the WTGs from Zone RWF 2.

#### 3.13.2.9 Alternative G: Impacts of the Preferred Alternative on Essential Fish Habitat

Table 3.13-3 provides a summary of potential construction and installation impacts to EFH and a comparison of all evaluated IPFs for EFH across alternatives. Potential construction and installation impacts to EFH elements under Alternative G are also addressed in Section 3.13.2.8 Finfish, Section 3.6.2.8 Benthic Habitat, and Section 3.6.2.9 Invertebrates.

##### 3.13.2.9.1 Conclusions

The construction and installation, O&M, and decommissioning of Alternative G would impact EFH through the same mechanisms described for the Proposed Action, including short-term and long-term habitat disturbance, permanent habitat conversion, and changes in substrate composition and nutrient cycling from reef effects caused by structures. Overall, the construction and installation, O&M, and decommission of Alternative G would be expected to result in effects that are similar to the Proposed Action and range from **moderate** beneficial (O&M, presence of structures) to **moderate** adverse. Although the overall extent of effects to EFH would be reduced under Alternative G, relative to the Proposed Action and Alternatives D, E, and F, the significance of those effects would be the same. The extent of effects to areas of contiguous, large-grained complex and complex habitats between Zone RWF 1 and Zone RWF 2 that support Atlantic cod spawning and managed finfish would be increased under Alternative G (all configurations) relative to Alternative C, which removes all WTGs from Zone RWF 1 and most of the WTGs from Zone RWF 2. This would include reductions in IACs and associated effects.

Long-term to permanent habitat disturbance effects on an estimated 1,740 acres of large-grained complex and complex habitats from vessel anchoring, cable installation and cable protection, seafloor preparation for foundation installation, and the presence of foundations and scour protection would result from

Alternative G. An estimated 125 acres of soft-bottomed habitat would be converted to hard bottom by the presence of structures, scour protection, and cable protection compared to 131 acres for Alternative G. Collectively, these effects would constitute a **moderate** adverse effect on EFH habitat, resulting from habitat conversion and long-term impacts to certain types of habitat-forming organisms. These adverse effects would be partially offset by **moderate** beneficial effects on EFH habitat structure and productivity resulting from reef effects. The colonization of artificial structures by a complex community of habitat-forming organisms would increase the structural complexity of benthic habitat in and around WTG and OSS foundations. Some EFH habitat effects could persist even after the Project is decommissioned. For example, reef effects would result in shell hash accumulation around foundations that would remain after the structures are removed. This would alter the composition of sediments within the RWF beyond the life of the Project but would not be expected to negatively affect the ability of benthic habitats to support ecosystem function after the Project is decommissioned.

Collectively, BOEM anticipates that the overall impacts from offshore activities associated with the Proposed Action when combined other with past, present, and reasonably foreseeable activities would result in notable and measurable impacts on benthic habitat. Some of these impacts could persist after the Project is decommissioned, but they would not prevent full recovery of ecosystem function. These findings would constitute a **moderate** adverse impact on EFH habitat composition and **moderate** adverse to **moderate** beneficial effects on EFH habitat structure in the GAA.

#### 3.13.2.10 Mitigation

Mitigation measures resulting from agency consultations for finfish and EFH are identified in Appendix F, Table F-2, and addressed in Table 3.13-13. Additional mitigation measures identified by BOEM and cooperating agencies are described in detail in Appendix F, Table F-3, and addressed in Table 3.13-14. If one or more of the measures analyzed below are adopted by BOEM and/or cooperating agencies, some adverse impacts could be further reduced.

**Table 3.13-13. Mitigation and Monitoring Measures Resulting from Consultations for Finfish and Essential Fish Habitat (Appendix F, Table F-2)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| DRAFT NMFS BiOp Reasonable and Prudent Measures (RPMs) and Terms and Conditions (T&Cs)* | Draft NMFS Biological Opinion Proposed Reasonable and Prudent Measures were issued to BOEM for consideration on June 16, 2023.<br>Final NMFS Biological Opinion Proposed Reasonable and Prudent Measures to be issued to BOEM for consideration on July 21, 2023.<br>RPMs and Terms and Conditions to minimize the impact of incidental take of ESA-listed species were documented in excerpts from the Draft NMFS Biological Opinion dated June 16, 2023. These measures include adherence to mitigation measures to minimize impacts to ESA-listed Atlantic sturgeon from pile driving and UXO detonation; compliance with requirements for vessel operations within the Delaware River and Delaware Bay included in the Incidental Take Statements provided with the Paulsboro Marine Terminal Biological Opinion (dated July 19, 2022) to minimize vessel impacts to ESA listed sturgeon; reporting requirements related to effects to, or interactions with, ESA listed species; submittal of required plans (e.g., PSO Training Plan for Trawl Surveys, Cofferdam Installation and Removal Monitoring Plan, Sound Field Verification Plan), to NMFS GARFO with sufficient time for review, comment and approval; and conducting on-site observation and inspection to gather information on the effectiveness and implementation of measures to minimize and monitor incidental take. | These RPMs and Terms and Conditions would minimize the exposure of ESA-listed species to pile driving noise and the effects of UXO detonation. These RPMs and Terms and Conditions would also ensure that all incidental take that occurs is documented and reported to NMFS in a timely manner and that any incidentally taken individual specimens are properly handled, resuscitated if necessary, transported for additional care or reporting, or returned to the sea. Reporting requirements to document take would improve accountability for documenting take associated with the Proposed Action. In some cases, these RPMs and Terms and Conditions provide additional detail or clarification of measures that are included as part of the Proposed Action. Implementation of these RPMs and Terms and Conditions would provide incremental reductions in impacts on finfish, invertebrates, and sensitive habitats, including EFH, and would improve accountability, but would not alter the overall impact determination of the Proposed Action. |
| NMFS EFH Conservation Recommendations | NMFS EFH Conservation Recommendations were issued to BOEM for consideration on June 16, 2023 (NMFS 2023).<br>EFH Conservation Recommendations for activities under BOEM's jurisdiction were provided identifying proposed removal and relocation (micrositing) of selected WTG foundations and cable segments removal and relocation; construction timing restrictions to avoid potential adverse impacts to Atlantic cod; habitat alteration minimization; noise mitigation; and minimization of impacts during construction, O&M, and decommissioning. EFH Conservation Recommendations for activities under USACE's jurisdiction were provided for in-water work; offshore impact minimization; impact to scientific surveys minimization; and | Implementation of Conservation Recommendations, including eliminating WTG foundations, micrositing WTGs and cable segments, scour protection avoidance, anchoring avoidance, minimizing boulder/cobble relocation distance, and cable re-routing, would minimize known or reasonably foreseeable adverse impacts on EFH, including large-grained complex and complex benthic habitats on Cox Ledge, and identified Atlantic cod spawning sites. Conservation recommendations for timing restrictions on all construction activity in the Lease Area from November 1 to April 30, and noise mitigation during |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | identification and facilitated access to mapping of relocated boulders, berms, scour, and cable protection. | construction, such as soft starts, use of noise-dampening equipment, and noise mitigation protocols in consultation with resource agencies prior to construction activities, would avoid and minimize potential noise impacts on EFH species and habitat. Implementation of Conservation Recommendations to revise the Fisheries and Benthic Habitat Monitoring Plan and develop monitoring plans for EMF and operational noise and vibration effects would benefit EFH habitats and species by ensuring robust experimental design, methods, and data collection/analysis to assess changes in habitat conditions. Although implementation of the Conservation Recommendations would provide incremental reductions in impacts on large-grained complex and complex habitats and associated EFH, reductions in the overall impact rating are not anticipated for any of the Proposed Action's IPFs. |
| Live and hard-bottom impact monitoring | Revolution Wind would develop and implement a monitoring plan for live and hard-bottom features that may be impacted by proposed activities. The monitoring plan would also include assessing the recovery time for these sensitive habitats. BOEM recommends that all monitoring reports classify substrate conditions following Coastal and Marine Ecological Classification Standard (CMECS) standards, including live bottoms (e.g., submerged aquatic vegetation and corals and topographic features). The plan would also include a means of recording observations of any increased coverage of invasive species in the impacted hard-bottom areas. | This measure would not modify the impact determination for finfish or EFH or reduce the potential impacts from the project, but it would provide information that can be used to inform the development of future mitigations and/or monitoring programs for the Project and other projects in the region. |
| Live and hard-bottom habitat mapping and avoidance | Vessel operators would be provided with maps of sensitive hard-bottom habitat in OSW project areas, as well as a proposed anchoring plan that would avoid or minimize impacts on the hard-bottom habitat to the greatest extent practicable. These plans | This measure would not modify the impact determination for finfish or EFH, but it would reduce impacts to sensitive and slow-to-recover large-grained complex and complex habitats used by EFH species. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | would be provided for all anchoring activity, including construction, maintenance, and decommissioning. | |
| Atlantic cod spawning monitoring plan | At least 90 days prior to IAC installation (e.g., boulder relocation, pre-cut trenching, cable crossing installation, cable lay and burial) and foundation site preparation (e.g., scour protection installation), BOEM would require Revolution Wind to provide DOI with a plan to monitor for Atlantic cod aggregations that are indicative of spawning behavior during the above-listed activities between November 1 and March 30 of each year (Plan). The objective of the Plan is to detect Atlantic cod aggregations and avoid or minimize the above-listed activities in any area with aggregations of Atlantic cod indicative of spawning behavior, as technically and economically feasible. Revolution Wind must include in the Plan details on detection thresholds (e.g., density and location) of spawning Atlantic cod aggregations that would trigger the adaptive management of activities described in this paragraph, including any restrictions on activities in any area with aggregations of Atlantic cod indicative of spawning behavior, and analysis of technical and/or economic infeasibility. | This measure would not modify the impact determination for construction noise effects on finfish or EFH, but it would identify spawning cod aggregations and reduce impacts during spawning periods to ensure that that these effects do not exceed the levels analyzed herein. |
| Anchoring plan | BOEM would require Revolution Wind to develop an anchoring plan to avoid or minimize adverse impacts on benthic habitat during Project construction and from O&M activities throughout the life of the Project. The anchoring plan must delineate sensitive large-grained complex and complex habitats, including eelgrass and kelp beds, and identify areas where anchoring activities are restricted. | This measure would not modify the impact determination for finfish or EFH, but it would reduce impacts to sensitive and slow-to-recover large-grained complex and complex habitats used by EFH species. |
| Marine debris awareness training | The Lessee would ensure that vessel operators, employees, and contractors engaged in offshore activities pursuant to the approved COP complete marine trash and debris awareness training annually. The training consists of two parts: 1) viewing a marine trash and debris training video or slide show (described below) and 2) receiving an explanation from management personnel that emphasizes their commitment to the requirements. The marine trash and debris training videos, training slide packs, and other marine debris related educational material may be obtained at | This measure would not modify the impact determination for finfish or EFH, but it would provide the training, reporting, and enforcement mechanisms necessary to ensure that effects from accidental releases and discharges do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | https://www.bsee.gov/debris or by contacting BSEE. The training videos, slides, and related material may be downloaded directly from the website. Operators engaged in marine survey activities must continue to develop and use a marine trash and debris awareness training and certification process that reasonably assures that their employees and contractors are in fact trained. The training process must include the following elements:<br>• Viewing of either a video or slide show by the personnel specified above<br>• An explanation from management personnel that emphasizes their commitment to the requirements<br>• Attendance measures (initial and annual)<br>• Recordkeeping and the availability of records for inspection by DOI<br>By January 31 of each year, the Lessee would submit to the DOI an annual report that describes its marine trash and debris awareness training process and certifies that the training process has been followed for the previous calendar year. The Lessee would send the reports via email to BOEM (at renewable_reporting@boem.gov) and to BSEE via TIMSWeb with a notification email (at marinedebris@bsee.gov). | |
| Marine debris elimination | Materials, equipment, tools, containers, and other items used in OCS activities that could be lost or discarded overboard must be clearly marked with the vessel or facility identification. All markings must clearly identify the owner and must be durable enough to resist the effects of the environmental conditions to which they may be exposed. Materials, equipment, tools, containers, and other items used in OCS activities which could be lost or discarded overboard must be properly secured to prevent loss overboard. | This measure would not modify the impact determination for finfish or EFH, but it would provide an enforcement mechanism to ensure that effects from accidental releases and discharges do not exceed the levels analyzed herein. |
| Data collection BA BMPs | BOEM and BSEE would ensure that all Project design criteria and best management practices incorporated in the Atlantic Data Collection Consultation for Offshore Wind Activities (BOEM 2021b) | This measure would not modify the impact determination for finfish or EFH, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | shall be applied to activities associated with the construction, maintenance and operations of the Project as applicable. | |
| Sampling gear | All sampling gear would be hauled out at least once every 30 days, and all gear must be removed from the water and all gear must be removed from the water and stored on land between survey seasons to minimize risk of entanglement. | This measure would not modify the impact determination for finfish or EFH, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |
| Lost survey gear | If any survey gear is lost, all reasonable efforts that do not compromise human safety must be undertaken to recover the gear. All lost gear must be reported to NMFS (nmfs.gar.incidental-take@noaa.gov) and BSEE (via TIMSWeb and notification email at marinedebris@bsee.gov) within 24 hours of the documented time of missing or lost gear. This report must include information on any markings on the gear and any efforts undertaken or planned to recover the gear. | This measure would not modify the impact determination for finfish or EFH, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |
| Survey training | At least one of the survey staff onboard the trawl surveys and ventless trap surveys must have completed Northeast Fisheries Observer Program (NEFOP) observer training (within the last 5 years) or other training in protected species identification and safe handling (inclusive of taking genetic samples from Atlantic sturgeon). Reference materials for identification, disentanglement, safe handling, and genetic sampling procedures must be available on board each survey vessel. BOEM and BSEE would ensure that Revolution Wind prepares a training plan that addresses how this requirement would be met and that the plan is submitted to NMFS in advance of any trawl or trap surveys. This requirement is in place for any trips where gear is set or hauled. | This measure would not modify the impact determination for finfish or EFH, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |
| Sea turtle/Atlantic sturgeon identification and data collection | Any sea turtles or Atlantic sturgeon caught and/or retrieved in any fisheries' survey gear must first be identified to species or species group. Each ESA-listed species caught and/or retrieved must then be properly documented using appropriate equipment and data collection forms. Biological data, samples, and tagging must occur as outlined below. Live, uninjured animals should be returned to | This measure would not modify the impact determination for finfish or EFH, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | the water as quickly as possible after completing the required handling and documentation.<br>a. The *Sturgeon and Sea Turtle Take Standard Operating Procedures* must be followed (NOAA 2021a; https://media.fisheries.noaa.gov/dammigration/sturgeon_&_sea_turtle_take_sops_external.pdf).).<br>b. Survey vessels must have a passive integrated transponder (PIT) tag reader onboard capable of reading 134.2-kilohertz and 125-kilohertz encrypted tags (e.g., Biomark GPR Plus Handheld PIT Tag Reader), and this reader be used to scan any captured sea turtles and sturgeon for tags. Any recorded tags must be recorded on the take reporting form (see below).<br>c. Genetic samples must be taken from all captured Atlantic sturgeon (alive or dead) to allow for identification of the distinct population segment (DPS) of origin of captured individuals and tracking of the amount of incidental take. This must be done in accordance with the *Procedure for Obtaining Fin Clips from Sturgeon for Genetic Analysis* (NOAA 2019; https://media.fisheries.noaa.gov/dammigration/sturgeon_genetics_sampling_revised_june_2019.pdf).<br>i. Fin clips must be sent to a NMFS-approved laboratory capable of performing genetic analysis and assignment to DPS of origin. To the extent authorized by law, BOEM is responsible for the cost of the genetic analysis. Arrangements must be made for shipping and analysis in advance of submission of any samples; these arrangements must be confirmed in writing to NMFS within 60 days of the receipt of this incidental take statement (ITS). Results of genetic analysis, including assigned DPS of origin, must be submitted to NMFS within 6 months of the sample collection. | |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | ii. Subsamples of all fin clips and accompanying metadata forms must be held and submitted to a tissue repository (e.g., the Atlantic Coast Sturgeon Tissue Research Repository) on a quarterly basis. The Sturgeon Genetic Sample Submission Form is available for download at https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-take-reporting-programmatics-greater-atlantic.<br>d. All captured sea turtles and Atlantic sturgeon must be documented with required measurements and photographs. The animal's condition and any marks or injuries must be described. This information must be entered as part of the record for each incidental take. A NMFS Take Report Form would be filled out for each individual sturgeon and sea turtle (download at: https://media.fisheries.noaa.gov/2021-11/Sturgeon-Sea-Turtle-Take-SOPs-external-11032021.pdf). | |
| Sea turtle/Atlantic sturgeon handling and resuscitation guidelines | Any sea turtles or Atlantic sturgeon caught and retrieved in gear used in fisheries surveys must be handled and resuscitated (if unresponsive) according to established protocols and whenever at-sea conditions are safe for those handling and resuscitating the animal(s) to do so. Specifically:<br>a. Priority must be given to the handling and resuscitation of any sea turtles or sturgeon that are captured in the gear being used, if conditions at sea are safe to do so. Handling times for these species should be minimized (i.e., kept to 15 minutes or less) to limit the amount of stress placed on the animals.<br>b. All survey vessels must have copies of the sea turtle handling and resuscitation requirements found at 50 CFR 223.206(d)(1) prior to the commencement of any on-water activity (download at: https://media.fisheries.noaa.gov/dammigration/sea_turtle_handling_and_resuscitation_measures.pdf). These handling and resuscitation procedures | This measure would not modify the impact determination for finfish or EFH, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | must be carried out any time a sea turtle is incidentally captured and brought onboard the vessel during the proposed actions.<br>c. If any sea turtles that appear injured, sick, or distressed, are caught and retrieved in fisheries survey gear, survey staff must immediately contact the Greater Atlantic Region Marine Animal Hotline at 866-755-6622 for further instructions and guidance on handling the animal, and potential coordination of transfer to a rehabilitation facility. If unable to contact the hotline (e.g., due to distance from shore or lack of ability to communicate via phone), the USCG should be contacted via VHF marine radio on Channel 16. If required, hard-shelled sea turtles (i.e., non- leatherbacks) may be held on board for up to 24 hours following handling instructions provided by the Hotline, prior to transfer to a rehabilitation facility.<br>d. Attempts must be made to resuscitate any Atlantic sturgeon that are unresponsive or comatose by providing a running source of water over the gills as described in the sturgeon resuscitation guidelines (NOAA 2020; https://media.fisheries.noaa.gov/dammigration-miss/Resuscitation-Cards-120513.pdf).<br>e. Provided that appropriate cold storage facilities are available on the survey vessel, following the report of a dead sea turtle or sturgeon to NMFS, and if NMFS requests, any dead sea turtle or Atlantic sturgeon must be retained on board the survey vessel for transfer to an appropriately permitted partner or facility on shore as safe to do so.<br>f. Any live sea turtles or Atlantic sturgeon caught and retrieved in gear used in any fisheries survey must ultimately be released according to established protocols and whenever at-sea conditions are safe for those releasing the animal(s) to do so. | |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| Take notification | GARFO Protected Resources Division (PRD) and BSEE must be notified as soon as possible of all observed takes of sea turtles and Atlantic sturgeon occurring as a result of any fisheries survey. Specifically:<br>a. GARFO PRD and DOI (BOEM and BSEE) must be notified within 24 hours of any interaction with a sea turtle or sturgeon (nmfs.gar.incidental- take@noaa.gov and DOI via TIMSWeb and notification email at protectedspecies@bsee.gov). The report must include at a minimum 1) survey name and applicable information (e.g., vessel name, station number); 2) GPS coordinates describing the location of the interaction (in decimal degrees); 3) gear type involved (e.g., bottom trawl, longline); 4) soak time, gear configuration, and any other pertinent gear information; 5) time and date of the interaction; and 6) identification of the animal to the species level. Additionally, the email must transmit a copy of the NMFS Take Report Form (download at: https://media.fisheries.noaa.gov/2021-07/Take%20Report%20Form%2007162021.pdf?null) and a link to or acknowledgement that a clear photograph or video of the animal was taken (multiple photographs are suggested, including at least one photograph of the head scutes). If reporting within 24 hours is not possible due to distance from shore or lack of ability to communicate via telephone, fax, or email, reports must be submitted as soon as possible; late reports must be submitted with an explanation for the delay.<br>b. At the end of each survey season, a report must be sent to NMFS that compiles all information on any observations and interactions with ESA-listed species. This report must also contain information on all survey activities that took place during the season including location of gear set, duration of soak/trawl, and total effort. The report on survey activities must be comprehensive of all activities, regardless of whether ESA-listed species were observed. | This measure would not modify the impact determination for finfish or EFH, but it would provide the information and reporting and enforcement mechanisms necessary to ensure that effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| Monthly/ annual reporting requirements | BOEM and BSEE would ensure that Revolution Wind submits regular reports (in consultation with NMFS) necessary to document the amount or extent of take that occurs during all phases of the proposed action. Details of reporting must be coordinated between Revolution Wind, NMFS, BOEM, and BSEE. All reports would be sent to: nmfs.gar.incidental- take@noaa.gov and BSEE via TIMSWeb and notification email at protectedspecies@bsee.gov. | This measure would not modify the impact determination for finfish or EFH, but it would provide the information and reporting and enforcement mechanisms necessary to ensure that effects do not exceed the levels analyzed herein. |
| Scour and cable protection | To the extent technically and economically feasible, the Lessee must ensure that all materials used for scour and cable protection consist of natural or engineered stone that does not inhibit epibenthic growth. The materials selected for protective purposes should mirror the natural environment and provide similar habitat functions. | This measure would not modify the impact determination for finfish or EFH, but it would enhance the quality of artificial habitats created by the installation of scour and cable protection through the support of epibenthic growth and the addition of three-dimensional complexity in height and interstitial spaces. |
| Post-installation cable monitoring | Revolution Wind would be required to inspect all cables after construction is completed to document exact location, burial depth, and post-installation benthic habitat conditions. Inspections must be completed within 6 months of Project commissioning, annually for the first 3 years following construction and as needed following major storm events. Monitoring reports must be submitted to BOEM within 45 days of survey completion. | This measure would not modify the impact determination for finfish or EFH, but it would validate the location and burial depth of installed cables and allow for the timely identification of cables that become unburied and pose shallow hazard risks. |
| Atlantic cod spawning monitoring plan | At least 90 days prior to inter-array cable installation (e.g., boulder relocation, pre-cut trenching, cable crossing installation, cable lay and burial) and foundation site preparation (e.g., scour protection installation), BOEM would require the Lessee to provide DOI with a plan to monitor for Atlantic cod aggregations that are indicative of spawning behavior during the above-listed activities between November 1 and March 30 of each year (Plan). The objective of the Plan is to detect Atlantic cod aggregations and avoid or minimize the above-listed activities in any area with aggregations of Atlantic cod indicative of spawning behavior, as technically and economically feasible. The Lessee must include in the Plan details on detection thresholds (e.g., density and location) of spawning Atlantic cod aggregations that would trigger the adaptive | This measure would not modify the impact determination for finfish or EFH, but it would provide the information and a reporting and enforcement mechanism to ensure that construction impacts on spawning Atlantic cod do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | management of activities described in this paragraph, including any restrictions on activities in any area with aggregations of Atlantic cod indicative of spawning behavior, and analysis of technical and/or economic infeasibility. | |
| Periodic underwater surveys, reporting of monofilament and other fishing gear around WTG foundations | The Lessee must monitor potential loss of fishing gear near WTG foundations by surveying at least 10%Revolution Wind must report the results of the surveys to BOEM (at renewable_reporting@boem.gov) and BSEE (at marinedebris@bsee.gov) in an annual report, submitted by April 30 for the preceding calendar year. Annual reports must be submitted in Microsoft Word format. Photographic and videographic materials must be provided on a portable drive in a lossless format such as TIFF or Motion JPEG 2000. Annual reports must include survey reports that include the survey date; contact information of the operator; the location and pile identification number; photographic and/or video documentation of the survey and debris encountered; any animals sighted; and the disposition of any located debris (i.e., removed or left in place). Required data and reports may be archived, analyzed, published, and disseminated by BOEM. | This measure would not modify the impact determination for finfish or EFH, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |
| Sound field verification (SFV) | BOEM must require Revolution Wind to develop an SFV plan. The purpose of SFV is to document that modeled acoustic injury threshold distances and associated monitoring requirements are sufficiently protective for sensitive marine species.<br>The SFV process must be sufficient to assess sound propagation from each foundation and attenuation distances to potential injury and behavioral effects thresholds for marine mammals, sea turtles, and fish.<br>To validate the estimated sound field, SFV measurements must be conducted during pile driving of the first three monopiles installed over the course of the Project, with noise attenuation activated. A SFV plan must be submitted to NMFS, BOEM, USACE, and BSEE for review and approval preferably 180 days but no later than 120 days prior to planned start of pile driving. This plan must describe how Revolution Wind must ensure that the first three monopile | This measure would not modify the impact determination for finfish or EFH, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | installation sites selected for sound field are representative of the rest of the monopile installation sites and, in the case that they are not, how additional sites must be selected for SFV. This plan must also include methodology for collecting, analyzing, and preparing SFV data for submission to NMFS. The plan must describe how the effectiveness of the sound attenuation methodology must be evaluated based on the results. In the event that Revolution Wind obtains technical information that indicates a subsequent monopile is likely to produce larger sound fields, SFV must be conducted for those subsequent monopiles. | |
| Passive acoustic monitoring (PAM) plan | BOEM, BSEE, and USACE would ensure that Revolution Wind prepares a PAM plan that describes all proposed equipment, deployment locations, detection review methodology and other procedures, and protocols related to the required use of PAM for monitoring. This plan must be submitted to NMFS, BOEM (at renewable_reporting@boem.gov), and BSEE (via TIMSWeb with a notification email at protectedspecies@bsee.gov) for review and concurrence preferably 180 days but no later than 120 days prior to the planned start of pile driving. | This measure would not modify the impact determination for construction noise effects on finfish or EFH but ensure that those effects remain within the levels described in this FEIS. |
| Passive acoustic monitoring, long-term | Use PAM buoys or autonomous PAM devices to record ambient noise, marine mammals, and cod vocalizations in the Lease Area before, during, and immediately after construction (at least 25 years of operation (or as may be extended) to monitor Project noise. The archival recorders must have a minimum capability of detecting and storing acoustic data on anthropogenic noise sources (such as vessel noise, pile driving, WTG operation, and whale detections), marine mammals, and cod vocalizations in the Lease Area. Monitoring would also occur during the decommissioning phase. The total number of PAM stations and array configuration will depend on the size of the zone to be monitored, the amount of noise expected in the area, and the characteristics of the signals being monitored to accomplish both monitoring during constructions, and also meet post-construction monitoring needs. Results must be provided within 90 days of construction completion and again within 90 days of the 1-year, 2-year, and 3-year | This measure would not modify the impact determination for construction and operational noise effects on finfish or EFH but would improve understanding of these impacts on specific resources (e.g., Atlantic cod) and inform future management and mitigation measures. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | anniversary of collection. The underwater acoustic monitoring must follow standardized measurement and processing methods and visualization metrics developed by the Atlantic Deepwater Ecosystem Observatory Network (ADEON) for the U.S. Mid- and South Atlantic OCS (see https://adeon.unh.edu/). At least two buoys must be independently deployed within or bordering the Lease Area or one or more buoys must be deployed in coordination with other acoustic monitoring efforts in the RI/MA and MA WEAs.<br>As an alternative to conducting PAM in its project area, the lessee may opt to meet this monitoring requirement through an annual deposit to BOEM's Environmental Studies Program in support of its Partnership for an Offshore Wind Energy Regional Observation Network (POWERON) initiative. The lessee's contribution would cover activities within its lease area, such as the purchase of instruments, annual deployments and refurbishment, data processing, and long-term data archiving. Funding from BOEM, other partners, and potentially other lessees will support long-term PAM throughout the region which will enable broader-scale analyses on cumulative effects to marine species. Under this option, the lessee will be expected to cooperate with the POWERON team to facilitate deployment and retrieval of instruments within the project area. If necessary, the lessee may request temporary withholding of the public release of acoustic data that has been collected within its project area. | |
| Long-term PAM | Long-term monitoring of ambient noise, marine mammal, and cod vocalizations in the Lease Area before, during, and following construction. Continuous recording must occur at least 30 days prior to pile driving, during foundation pile driving, initial operation, and for at least 3 full calendar years of operation to monitor for potential impacts. At least three devices must be independently deployed within the lease area to maximize spatial coverage of the project area based on 10-kilometer spacing between deployment locations or as otherwise agreed between BOEM and the Lessee. The locations of the three buoys must be coordinated with the Regional Wildlife Science Collaborative prior to the plan being | This measure would not modify the impact determination for construction and operational noise effects on finfish or EFH but would improve understanding of these impacts on specific resources (e.g., Atlantic cod) and inform future management and mitigation measures. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | submitted to BOEM and BSEE. Devices may be moved to new locations during the recording period, if existing PAM devices will be present in the lease area providing continuous recording. The archival recorders must have a minimum capability of continuously detecting and storing acoustic data on vessel noise, pile-driving, WTG operation, baleen whale vocalizations, and cod vocalizations in the lease area. No later than 180 days prior to buoy deployment, the Lessee must submit to BOEM and BSEE (renewable_reporting@boem.gov and OSWsubmittals@bsee.gov) the PAM plan, which describes all proposed equipment, deployment locations, detection review methodology, and other procedures and protocols related to the required use of PAM for monitoring.<br>The PAM plan must detail mooring best practices, data management, storage, measurement, and data processing best practices that are required by BOEM for long-term PAM monitoring. Refer to Regional Wildlife Science Collaborative for Offshore Wind Data Management & Storage Best Practices for Long-term and Archival Passive Acoustic Monitoring (PAM) Data. Other best practices consistent with COP approval should be detailed in the plan. The long-term PAM Plan must include the proposed equipment, sample rate, mooring design, deployment locations, methods for baleen whale and cod detections, and metrics for ambient noise analysis. The long-term PAM plan must be submitted to BOEM and BSEE (at renewable_reporting@boem.gov and OSWsubmittals@bsee.gov) for review and concurrence. BOEM and BSEE will review the long-term PAM Plan and provide comments, if any, on the plan within 45 calendar days, but no later than 90 days of its submittal. The plan must satisfy all outstanding comments to BOEM's and BSEE's satisfaction. The Lessee will receive written concurrence from DOI upon acceptance of the final long-term PAM plan. If DOI does not provide comments on the long-term PAM Plan within 90 calendar days of its submittal, the Lessee may conclusively presume DOI's concurrence with the long-term PAM Plan. | |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | Long-term PAM monitoring results must be provided within 180 days of buoy collection and again within 180 days of the annual anniversaries of each the PAM device deployments. All raw data must be sent to NCEI for archiving no later than 6 months following the date of each recorder recovery.<br>As an alternative to conducting long-term PAM in its project area, the lessee may opt to meet this monitoring requirement through an annual deposit to BOEM's Environmental Studies Program in support of its Partnership for an Offshore Wind Energy Regional Observation Network (POWERON) initiative. The lessee's contribution would cover activities within the area of potential effect of the project, such as the purchase of instruments, annual deployments and refurbishment, data processing, and long-term data archiving. Funding from BOEM, other partners, and potentially other lessees will support long-term PAM throughout the region which will enable broader-scale analyses on cumulative effects to marine species. Under this option, the Lessee will be expected to cooperate with the POWERON team to facilitate deployment and retrieval of instruments within the project area. If necessary, the Lessee may request temporary withholding of the public release of acoustic data that has been collected within its project area. Record long-term measurements of ambient noise, marine mammal, and cod vocalizations in the Lease Area before, during, and following construction. | |
| Sound field verification (SFV) | NMFS, BOEM, BSEE, and USACE would ensure that if the clearance and/or shutdown zones are expanded, PSO coverage is sufficient to reliably monitor the expanded clearance and/or shutdown zones. Additional observers must be deployed on additional platforms for every 1,500 m that a clearance or shutdown zone is expanded beyond the distances modeled prior to verification.<br>To validate the estimated sound field, SFV measurements would be conducted during pile driving of the first three monopiles installed over the course of the Project, with noise attenuation activated. A SFV plan would be submitted to NMFS, BOEM, USACE, and BSEE for review and approval preferably 180 days but no later than 120 days | This measure would not modify the impact determination for construction noise effects on finfish or EFH but would provide a mechanism for ensuring that those impacts remain within levels considered in this FEIS. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | prior to planned start of pile driving. This plan would describe how Revolution Wind would ensure that the first three monopile installation sites selected for sound field are representative of the rest of the monopile installation sites and, in the case that they are not, how additional sites would be selected for SFV. This plan would also include methodology for collecting, analyzing, and preparing SFV data for submission to NMFS. The plan would describe how the effectiveness of the sound attenuation methodology would be evaluated based on the results. In the event that Revolution Wind obtains technical information that indicates a subsequent monopile is likely to produce larger sound fields, SFV would be conducted for those subsequent monopiles. | |

* Information in these rows was taken directly from NMFS (2023) and has not been edited.

**Table 3.13-14. Additional Mitigation and Monitoring Measures Under Consideration for Finfish and Essential Fish Habitat (Appendix F, Table F-3)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Boulder relocation plan | To minimize the number of potential seafloor obstructions that may interact with bottom trawl fisheries, the Lessee must submit to BOEM a boulder relocation plan that will include the following:<br>1) Identification of areas of active (within last 5 years) bottom trawl fishing, areas where boulders > 2 m in diameter are anticipated to occur, and areas where boulders are expected to be relocated for Project purposes<br>2) Methods to minimize the quantity of seafloor obstructions from relocated boulders in areas of active bottom trawl fishing, as identified in #1<br><br>The plan must be submitted to BOEM at least 90 days prior to inter-array cable corridor preparation and cable installation (e.g., boulder relocation, pre-cut trenching, cable crossing installation, cable lay and | This measure would not modify the impact determinations for finfish or EFH but would provide a process and information useful for monitoring impacts to EFH and sensitive species and their recovery. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | burial) and foundation site preparation (e.g., scour protection installation). | |
| Post-installation cable monitoring | Revolution Wind must provide BOEM with a cable monitoring report following each IAC and export cable inspection to determine cable location, burial depths, state of the cable, and site conditions. An inspection of the IAC and export cable is expected to include high-resolution geophysical (HRG) methods, such as a multi-beam bathymetric survey equipment, and is expected to identify seafloor features, natural and human-made hazards, and site conditions along federal sections of the cable routing.<br>In federal waters, the initial IAC and export cable inspection would be carried out within 6 months of commissioning, and subsequent inspections would be carried out at years 1, 2, and every 3 thereafter and after a major storm event. Major storm events are defined as when metocean conditions at the facility meet or exceed the 1 in 50-year return period calculated in the metocean design basis, to be submitted to BOEM with the facility design report (FDR). If conditions warrant adjustment to the frequency of inspections following the Year 2 survey, a revised monitoring plan may be provided to BOEM for review.<br>In addition to inspection, the export cable would be monitored continuously with the as-built Distributed Temperature Sensing System. If distributed temperature sensing data indicate that burial conditions have deteriorated or changed significantly and remedial actions are warranted, the distributed temperature sensing data, a seafloor stability analysis, and report of remedial actions taken or scheduled must be provided to BOEM within 45 calendar days of the observations.<br>The Distributed Temperature Sensing data, cable monitoring survey data, and cable conditions analysis for each year must be provided to BOEM as part of the annual compliance reports, required by 30 CFR 285.633(b). | This measure would not modify the impact determinations for finfish or EFH but would provide a process to ensure that impacts to these resources are limited to the levels considered in this Final EIS. |
| Anchoring plan | BOEM requires Revolution Wind to develop an anchoring plan to ensure anchoring is avoided and minimized in complex habitats, archaeological | This measure requires that anchoring plan implementation covers O&M and decommissioning |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | resources, and UXOs during Project construction and all O&M activities throughout the operational life of the Project. The anchoring plan is required to be provided for review and comment prior to BOEM approval. | activities. It would not modify the impact determination for finfish or EFH, but it would help to ensure that long-term impacts to large-grained complex and complex habitats and benthic habitat structure are effectively minimized. |

#### 3.13.2.10.1 Measures Incorporated into the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits listed in Table 3.13-13 and Table F-2 in Appendix F (Mitigation and Monitoring) are incorporated into Alternative G (Preferred Alternative). As specified in Table 3.13-13, BOEM is considering the reasonable and prudent measures (RPMs) and terms and conditions (T&Cs) identified in the draft NMFS Biological Opinion to avoid and minimize take of ESA-listed Atlantic sturgeon. These measures are described in Appendix F, Table F-2. BOEM will require compliance with the negotiated RPMs and T&Cs in the final Biological Opinion to be issued on July 21, 2023. Implementation of the mitigation measures in Table 3.13-13 would ensure the effectiveness of, and compliance with, the EPMs analyzed as part of the Proposed Action. This would ensure that impacts to finfish and EFH are limited to the levels described in this Final EIS. In addition, as stated in Table 3.13-13, BOEM is considering the conservation recommendations identified by NMFS in the EFH determination letter for the Project dated June 16, 2023 (NMFS, NOAA, GARFO 2023). These measures, detailed in Table F-2 in Appendix F, would: further avoid and minimize impacts to large-grained complex and complex habitat, with emphasis on habitats used by Atlantic cod for spawning; impose additional timing restrictions to avoid and minimize construction impacts on Atlantic cod; and eliminate or substantially reroute components of the RWF and RWEC to avoid and minimize impacts to sensitive habitats in the Lease Area and the RWEC-RI corridor.

BOEM has also identified additional measures in Table 13.13-14. These measures, if adopted, would have the effect of reducing the magnitude and extent of impacts to large-grained complex and complex habitats used by EFH species within the RWEC and RWF, minimize the potential for construction-related activities (i.e., pile driving during monopile installation and IAC installation and foundation site preparation activities) to disturb Atlantic cod spawning aggregations, and provide valuable information that could inform future management and mitigation measures.

## 3.14 Land Use and Coastal Infrastructure

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to land use and coastal infrastructure from implementation of the Proposed Action and other considered alternatives.

# 3.15 Marine Mammals

## 3.15.1 Description of the Affected Environment for Marine Mammals

This section evaluates marine mammal resources within the GAA. Because the GAA is extensive (224,314,908 acres, Figure 3.15-1), the analysis focuses on marine mammals that would likely occur in and near the proposed RWF and RWEC on an at least infrequent basis and could be impacted by Project activities. The impact levels used to describe effects on marine mammals are defined in Tables 3.3-2 and 3.3-3 in Section 3.3. This impact terminology differs from the effect determinations used by NMFS in ESA Section 7 consultation and the take terminology used for Marine Mammal Protection Act (MMPA) compliance; therefore, the impact levels presented in the BA (BOEM 2023a, 2023b) and ITA for the Project, if issued by NMFS, will differ.

Geographic analysis area: The intent of the GAAs used in this EIS is to define a reasonable boundary for assessing the potential effects, including cumulative effects, resulting from the development of an offshore wind energy industry on the Mid-Atlantic OCS. GAAs for marine biological resources are necessarily large because marine populations range broadly and cumulative impacts can be expressed over broad areas. GAAs are not used as a basis for analyzing the effects of the Proposed Action, which represent a subset of these broader effects and are expressed over a smaller area. These impacts are analyzed specific to each IPF.

The GAA for marine mammals comprises the Scotian Shelf, Northeast Shelf, and Southeast Shelf Large Marine Ecosystems, as shown in Figure 3.15-1. This area encompasses the migratory range of marine mammal populations that could occur within or near the RWF and RWEC during the construction and installation, O&M, and decommissioning of the Project.

Affected environment: A diverse marine mammal community inhabits the Northwest Atlantic OCS region (the region). Twenty-seven species, comprising six baleen whale species; 18 species of toothed whales, dolphins, and porpoises; two species of seals; and the West Indian manatee (*Trichechus manatus*), could occur, or are known to occur, in the region (BOEM 2014; CSA Ocean Sciences Inc. 2023). All these species are protected under the federal MMPA, and five are listed as endangered under the ESA. One species, West Indian manatee, is listed as threatened under the ESA. Of the six marine mammals listed under the ESA, critical habitat has been designated for only NARW and West Indian manatee. Manatee occurrence in the RWF and RWEC, while conceivable, is unlikely.

Table 3.15-1 identifies species known or expected to occur in the region and their likelihood and timing of occurrence in the RWF and RWEC. COP Appendix Z1 (CSA Ocean Associates 2023) provides detailed species descriptions and life history information for all marine mammal species likely to occur in the GAA. NOAA has summarized the most current information about marine mammal population status, occurrence, and use of the region in their 2021 final and 2022 draft stock assessment reports for the Atlantic OCS and Gulf of Mexico (Hayes et al. 2022, 2023).

The EIS analysis focuses on 18 marine mammal species that are known to regularly occur in and around the RWF and RFEC. Several of these species are highly migratory and only occur seasonally, some are present year-round, and some could be present year-round but display distinct seasonal peaks. The ESA-listed species expected to occur are NARW (*Eubalaena glacialis*), fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*) (Davis et al. 2020; Kraus et al. 2016; NEFSC and Southeast Fisheries Science Center [SEFSC] 2018). Several other marine mammal species could occur in the general vicinity, including the ESA-listed blue whale (*Balaenoptera musculus*), which is known to occur in the region but primarily in waters along the edge of the OCS that are at least 75 miles from the proposed RWF and RWEC. Species occurrence on the OCS and likelihood of occurrence in the RWF and RWEC maximum work area are summarized in Table 3.15-1 (the maximum work area is shown in Figure 2.1-1). Table 3.15-2 provides a summary of the current status and population trends for marine mammal species that are expected to be exposed to the effects of the alternatives considered herein and the effect of baseline environmental stressors on each population. The impact analyses presented herein consider the incremental impacts of each alternative above and beyond existing conditions.

BOEM acknowledges the Mashpee Wampanoag Tribe's reverence for the NARW and has given careful consideration to the potential impacts to NARWs throughout development of the EIS. BOEM is also consulting with NMFS under the ESA and would require compliance with all mitigation and reporting measures in the NMFS biological opinion if the COP were approved or approved with modification.

Construction and operational noise are IPFs of particular concern. Thus, consistent with NOAA (2018) guidance, marine mammals have been organized into different hearing groups for the purpose of evaluating underwater noise impacts based on how they hear and their sensitivity to different types of noise. Low-frequency cetaceans (LFCs) considered in this analysis comprise baleen whales in the order *Mysticeti* (also referred to as mystecetes). This group includes NARW and other baleen whales with hearing sensitivity and communication concentrated in low-frequency bands from 7 Hz to 35 kHz. Mid-frequency cetaceans (MFCs) considered in this analysis include dolphins and other toothed whales in the order *Odontoceti* (also referred to as odontocetes). The hearing sensitivity of this group is concentrated in the 150-Hz to 160-kHz range. High-frequency cetaceans (HFCs) comprise the true porpoises, such as harbor porpoise, and other odontocetes with hearing sensitivity concentrated in the 275-Hz to 160-kHz range. Phocid pinnipeds (i.e., earless/true seals) hear in the 50-Hz to 86-kHz range. BOEM is relying on the current NOAA guidance to assess underwater noise impacts but recognizes that marine mammal hearing is an evolving science. Improved understanding (e.g., Southall et al. 2019) could lead to future refinements of species-specific hearing ranges and sound sensitivity thresholds. An overview of underwater noise impacts on marine mammals is provided in Appendix G.

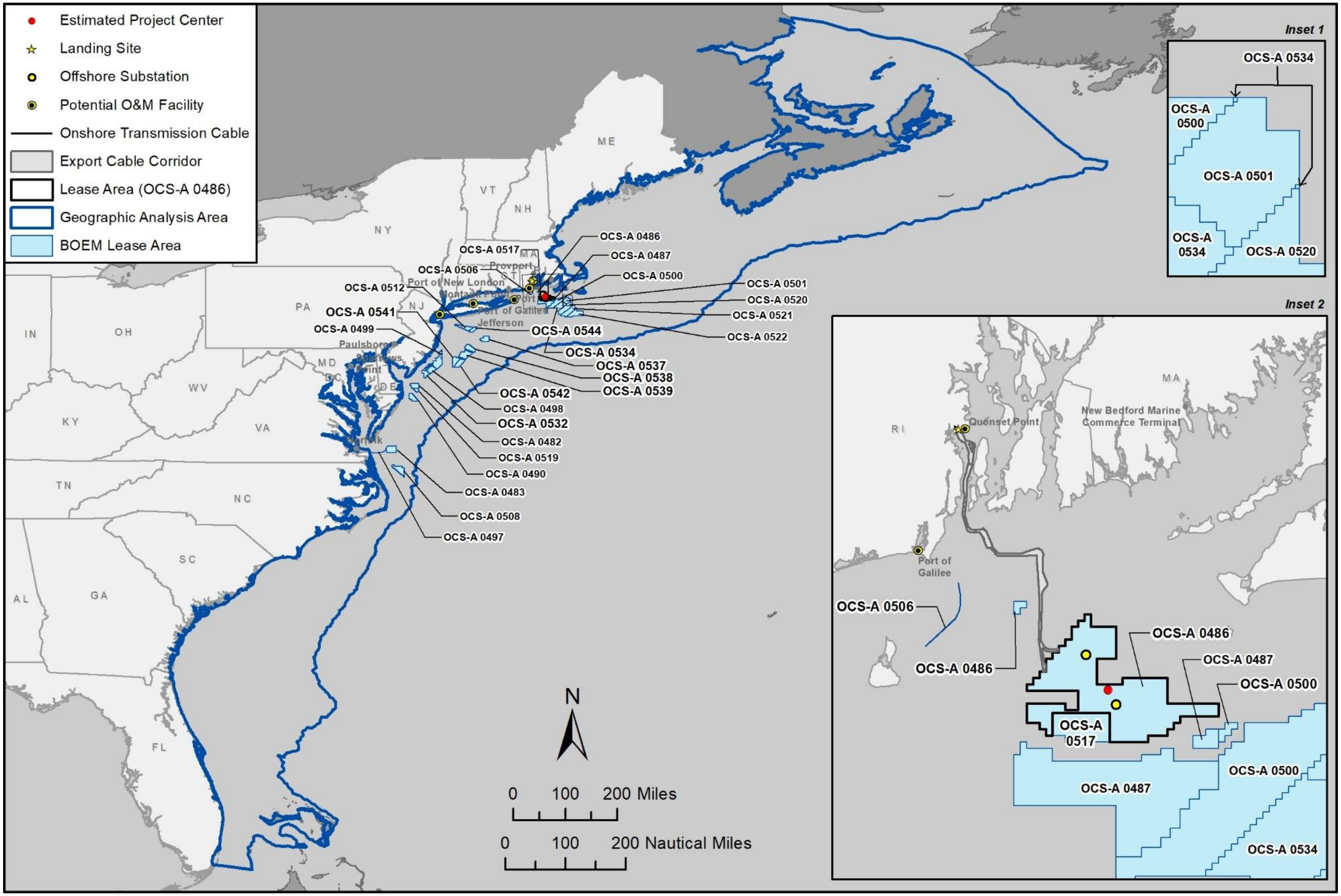


Figure 3.15-1. Geographic analysis area for marine mammals.

**Table 3.15-1. Frequency of Marine Mammal Species Occurrence in Northwest Atlantic Outer Continental Shelf and Likelihood of Occurrence in the Revolution Wind Farm and Revolution Wind Farm Export Cable Corridor**

| Common Name | Scientific Name | ESA/MMPA Status*,† | Occurrence in Northwest Atlantic OCS‡ | Annual (peak) Occurrence§ | Species Occurs in RWF and RWEC‡,§,¶,# | Critical Habitat Occurs in the RWF and RWEC** |
|---|---|---|---|---|---|---|
| **Baleen Whales – Suborder Mysticeti, Family Balaenopteridae** | | | | | | |
| NARW | *Eubalaena glacialis* | E/D | Common | YR (W-Sp) | Yes | No |
| Blue whale | *Balaenoptera musculus* | E/D | Uncommon | YR (W-Sp) | Yes | Not yet designated |
| Sei whale | *B. borealis* | E/D | Uncommon | YR (Sp) | Yes | Not yet designated |
| Fin whale | *B. physalus* | E/D | Common | YR | Yes | Not yet designated |
| Minke whale | *B. acutorostrata* | None/N | Common | YR (Su-F) | Yes | Not applicable (N/A) |
| Humpback whale | *Megaptera novaeanglia* | None/N | Common | YR (W-Sp) | Yes | N/A |
| **Toothed Whales – Suborder Odontoceti, Family Physeteridae** | | | | | | |
| Sperm whale | *Physeter macrocephalus* | E/D | Common | YR (Su-F) | Yes | N/A |
| **Toothed Whales – Family Kogiidae** | | | | | | |
| Dwarf sperm whale | *Kogia sima* | None/N | Rare | Su | No | N/A |
| Pygmy sperm whale | *K. breviceps* | None/S | Not expected | Su | No | N/A |
| **Toothed Whales – Family Ziphiidae** | | | | | | |
| Blainville's beaked whale | *Mesoplodon densirostris* | None/S | Not expected | YR | No | N/A |
| Cuvier's beaked whale | *Ziphius cavirostris* | None/S | Rare | YR | No | N/A |
| Gervais' beaked whale | *M. europaeus* | None/S | Not expected | YR | No | N/A |
| Sowerby's beaked whale | *M. bidens* | None/S | Not expected | YR | No | N/A |
| True's beaked whale | *M. mirus* | None/S | Not expected | YR | No | N/A |
| **Toothed Whales – Family Delphinidae** | | | | | | |
| Risso's dolphin | *Grampus griseus* | None/N | Common§ | YR (Sp-F) | Yes | N/A |
| Long-finned pilot whale | *Globicephala melas* | None/S | Common§ | YR (Sp-Su) | Yes | N/A |
| Short-finned pilot whale | *Globicephala macrorhynchus* | None/N | Rare‡ | YR (Sp-Su) | No | N/A |
| White-beaked dolphin | *Lagenorhynchus albirostris* | None/N | Regular (north of Cape Cod)§ | Sp | No | N/A |
| Atlantic white-sided dolphin | *L. acutus* | None/N | Regular§ | YR (Sp-F) | Yes | N/A |
| Atlantic spotted dolphin | *Stenella frontalis* | None/N | Uncommon | Sp-F | No | N/A |
| Striped dolphin | *S. coeruleoalba* | None/N | Rare‡,§ | YR | No | N/A |
| Short-beaked common dolphin | *Delphinus delphis* | None/N | Common | YR (Su-F) | Yes | N/A |
| Bottlenose dolphin | *Tursiops truncatus* | None/D†† | Rare | YR | Yes | N/A |

| Common Name | Scientific Name | ESA/MMPA Status*,† | Occurrence in Northwest Atlantic OCS‡ | Annual (peak) Occurrence§ | Species Occurs in RWF and RWEC‡,§,¶,# | Critical Habitat Occurs in the RWF and RWEC** |
|---|---|---|---|---|---|---|
| **Toothed Whales – Family Phococenidae** | | | | | | |
| Harbor porpoise | *Phocoena phocoena* | None/N | Common | YR (F-Sp) | Yes | N/A |
| **Earless Seals – Order Carnivora, Suborder Caniformia, Family Phocidae** | | | | | | |
| Harbor seal | *Phoca vitulina concolor* | None/N | Regular | YR (F-Sp) | Yes | N/A |
| Gray seal | *Halichoerus grypus* | None/N | Regular | YR | Yes | N/A |
| **Order Sirenia** | | | | | | |
| West Indian manatee | *Trichechus manatus* | Threatened/S | Not expected# | Unknown | No | No |

Source: BOEM (2014); Curtice et al. (2018); Hayes et al. (2020, 2021, 2022); Kraus et al. (2016); NEFSC and SEFSC (2018); O'Brien et al. (2021a, 2021b); Quintana et al. (2019); Roberts et al. (2021).

Note: Species that do not occur in the RWF and RWEC are unexpected to be affected by the Project and are not considered further in this EIS.

* ESA status: E = Endangered.

† MMPA status: S = Strategic; N = Not Strategic; D = Depleted.

‡ Data from LGL (2022). Common = occurring consistently in moderate to large numbers; regular = occurring in low to moderate numbers on regular basis or seasonally; uncommon = occurring in low numbers or on regular basis; rare = records for some years but limited; not expected = range includes the RWF and RWEC corridor, but due to habitat preferences and distribution info, species are not expected to occur.

§ Data from NEFSC and SEFSC (2018) and Davis et al. (2020). YR = year-round; W = winter; Sp = spring; Su = summer; F = fall.

¶ Data from Kraus et al. (2016); O'Brien et al. (2021a, 2021b); Quintana et al. (2019).

\# Data from CSA Ocean Sciences Inc. (2023).

** Construction vessels traveling to the analysis area could conceivably travel through NARW critical habitat (81 *Federal Register* 4838). However, specific ports of origin and travel routes are not currently known and will be determined by the Project contractor.

†† There are two stocks of bottlenose dolphins identified in the area. The Northern Migratory Coastal stock is depleted. The Atlantic offshore stock is not depleted.

**Table 3.15-2. Population Status, Trend, and Effect of Human-Caused Mortality on Marine Mammal Species Likely to Occur in the Revolution Wind Farm and Revolution Wind Farm Export Cable**

| Marine Mammal Hearing Group* | Common Name | Scientific Name | Stock | Population Estimate† | Population Trend‡ | Annual Human-Caused Mortality§ | Effect of U.S. Human-Caused Mortality¶ | Baseline Impact Determination^Δ | Reference Source |
|---|---|---|---|---|---|---|---|---|---|
| Mysticetes - low-frequency cetaceans (LFC) | NARW# | *Eubalaena glacialis* | Western North Atlantic | 2019–2020: 339-723<br>2020–2021: 336–368<br>2022: 338 | Decreasing | 8.15 | Significant | Major adverse | Pettis et al. (2021); Hayes et al. (2022); Hayes et al. (2023) |
| | Blue whale | *Balaenoptera musculus* | Western North Atlantic | 402 | Unavailable | Unknown | Unknown | Minor adverse | Hayes et al. (2022) |
| | Fin whale# | *B. physalus* | Western North Atlantic | 6,802 | Unavailable | 2.35 | Significant | Moderate adverse | Hayes et al. (2022) |
| | Sei whale# | *B. borealis* | Nova Scotia | 6,292 | Unavailable | 1.2 | Significant | Moderate adverse | Hayes et al. (2022) |
| | Minke whale | *B. acutorostrata* | Canadian East Coast | 21,968 | Unavailable | 10.55 | Insignificant | Minor adverse | Hayes et al. (2022) |
| | Humpback whale | *Megaptera novaeanglia* | Gulf of Maine | 1,393 | +2.8%/year | 15.25 | Significant | Minor adverse | Hayes et al. (2022) |

| Marine Mammal Hearing Group* | Common Name | Scientific Name | Stock | Population Estimate† | Population Trend‡ | Annual Human-Caused Mortality§ | Effect of U.S. Human-Caused Mortality¶ | Baseline Impact Determination∆ | Reference Source |
|---|---|---|---|---|---|---|---|---|---|
| Odontocetes - mid-frequency cetaceans (MFC) | Sperm whale¶ | *Physeter macrocephalus* | North Atlantic | 4,349 | Unavailable | Unknown | Unknown | Moderate adverse | Hayes et al. (2022) |
| | Risso's dolphin | *Grampus griseus* | Western North Atlantic | 35,215 | Unavailable | 53.9 | Significant | Moderate adverse | Hayes et al. (2022) |
| | Long-finned pilot whale | *Globicephala melas* | Western North Atlantic | 39,215 | Unavailable | 21 | Insignificant | Minor adverse | Hayes et al. (2022) |
| | Short-finned pilot whale | *Globicephala macrorhynchus* | Western North Atlantic | 28,924 | Unavailable | Unknown | Insignificant | Minor adverse | Hayes et al. (2022) |
| | Atlantic white-sided dolphin | *Lagenorhynchus acutus* | Western North Atlantic | 93,233 | Unavailable | 26 | Insignificant | Minor adverse | Hayes et al. (2022) |
| | Atlantic spotted dolphin | *Stenella frontalis* | Western North Atlantic | 39,921 | Decreasing | 0 | Insignificant | Minor adverse | Hayes et al. (2022) |
| | Short-beaked common dolphin | *Delphinus delphis* | Western North Atlantic | 172,974 | Unavailable | 399 | Significant | Moderate adverse | Hayes et al. (2022) |
| | Bottlenose dolphin | *Tursiops truncatus* | Western North Atlantic - Offshore | 62,851 | Unavailable | 28 | Insignificant | Minor adverse | Hayes et al. (2022) |
| | | | Western North Atlantic – Northern Coastal Migratory | 6,639 | Decreasing | 12.2 to 21.5 | Insignificant | Minor adverse | Hayes et al. (2022) |
| Odontocetes - high-frequency cetaceans (HFC) | Harbor porpoise | *Phocoena phocoena* | Gulf of Maine/Bay of Fundy | 95,543 | Unavailable | 150 | Significant | Moderate adverse | Hayes et al. (2022) |
| Phocid pinnipeds (Phocids) | Harbor seal | *Phoca vitulina concolor* | Western North Atlantic | 61,336 | Unavailable | 365 | Significant | Moderate adverse | Hayes et al. (2022) |
| | Gray seal | *Halichoerus grypus* | Western North Atlantic (U.S. population) | 27,300 | Increasing | 953 | Significant | Minor adverse | Hayes et al. (2022) |

* Marine mammal hearing groups defined by NOAA (2018).

† Most recently available stock size estimate, per cited reference.

‡ Increasing = beneficial trend, not quantified; Decreasing = adverse trend, not quantified; Unavailable = population trend analysis not conducted on this species.

§ Based on annual human-caused mortality as a percentage of potential biological removal (PBR): Significant = > 10% of PBR; Insignificant = < 10% of PBR. Statistic based on fishing-related mortality with inferred contribution from other sources (e.g., vessel collisions).

∆ Impact determination for the effect of existing environmental conditions on the identified marine mammal population applying the impact criteria defined in Section 3.2. This determination considers the projected impacts of human-caused mortality and other factors, including climate change, on the population in the absence of each alternative considered in this EIS. In the case of NARW, the population is in severe decline, and human-caused mortality is known to be a significant contributor to population status; therefore, the impact of the baseline conditions is major. For other species, if human-caused mortality is insignificant as a percentage of PBR, BOEM concludes the impact of baseline conditions is minor. If human-caused mortality is significant and the population is decreasing in abundance or abundance is unknown, BOEM considers the impact of the baseline condition to be moderate. If the population is increasing in abundance, BOEM considers the impact of human activities on baseline conditions to be minor.

¶ Reflects human-caused mortality from all known sources, including fishing-related, vessel collisions, and other/unspecified. Per cited reference.

\# Species is ESA listed.

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## 3.15.2 Environmental Consequences

### 3.15.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

The analysis presented in this section considers the impacts resulting from the maximum-case scenario under the PDE approach developed by BOEM to support offshore wind project development (Rowe et al. 2017). The maximum design size specifications defined in Appendix D, Table D-1, are PDE parameters used to conduct this analysis. Several Project parameters could change during the development of the final Project configuration, potentially reducing the extent and/or intensity of impacts resulting from the associated IPFs.

The Project design parameters in Table 3.15-3 would result in reduced impacts relative to those generated by the design elements considered under the PDE.

**Table 3.15-3. Project Design Parameters That Could Reduce Impacts**

| Parameter | Description |
|---|---|
| The permitting and installation of fewer WTGs | This would result in fewer offshore structures and reduced IAC cable length. This would reduce the extent of short-term to permanent impacts on marine mammals by<br>reducing the extent and duration of underwater noise impacts from WTG foundation installation, and<br>reducing the extent of reef and hydrodynamic effects resulting from structure presence. |
| The Project could use a casing pipe method to construct the RWEC sea-to-shore transition | This would result in less acoustic impact than vibratory pile driving to construct a cofferdam (Zeddies 2021). |
| The use of a temporary cofferdam for RWEC sea-to-shore transition construction | This would reduce suspended sediment effects on marine mammals. |

IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E2, Table E2-5. Where feasible, calculations for specific alternative impacts are provided in Appendix E, Attachment E4, to facilitate reader comparison across alternatives.

Table 3.15-4 summarizes the IPFs and impact findings carried forward for analysis in this section. Each alternative analysis considers impacts resulting from the construction and installation phase, the O&M phase, and the decommissioning phase of the Project, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts to marine mammals. These EPMs are summarized in Appendix F, Table F-1.

A detailed analysis of the impacts of the Proposed Action on marine mammals is provided in the following section. The impact analyses presented for the other action alternatives focus only on those IPFs that would differ measurably in extent, duration, and/or magnitude between alternatives, resulting in substantially different impacts on marine mammals when compared to the Proposed Action. Offshore and onshore IPFs are addressed separately as appropriate for each resource; not all IPFs have both an offshore and onshore component. For marine mammals, onshore Project activities would not result in impacts to marine resources. Therefore, onshore impacts would have no measurable effects on relevant habitats or species and are not evaluated below.

The Conclusion section for each alternative analysis provides a rationale for each effect determination. The overall effect determination for each alternative is **moderate** adverse for marine mammals.

**Table 3.15-4. Alternative Comparison Summary for Marine Mammals**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| Anchoring and new cable emplacement/ maintenance | **Offshore**: Under the No Action Alternative, BOEM would not approve the COP. Various stressors associated with the construction, operations, and maintenance of the Project would not occur, and there would be no incremental impact to environmental baseline conditions from this IPF. Anchoring or mooring activities and cable installation from construction of other approved wind energy projects (SFWF and Vineyard Wind) could result in seafloor disturbance and suspended sediment impacts within the GAA for marine mammals. Only larger construction and O&M vessels would anchor to the seafloor, using large heavy anchor chains. No lines or rigging are anticipated for cable installation, and transmission cables and jet plow umbilicals are large in diameter, relatively inflexible, and under constant tension, resulting in limited risk for entanglement. While suspended sediment impacts would vary in extent and intensity depending on project and site-specific conditions, measurable impacts are likely to be on the order of 500 mg/L or lower, lasting for minutes to hours, and limited in extent to within a few feet vertically and a few hundred feet horizontally from the point of disturbance. The resulting effects of anchoring and cable emplacement on marine mammals would likely be **negligible** to **minor** adverse because of the temporary and localized nature of the impacts. | **Offshore**: Anchoring and cable emplacement effects could lead to short-term adverse effects on invertebrate and finfish prey species. However, these impacts are not likely to significantly affect the availability of prey and forage resources for any marine mammal species. Therefore, anchoring and cable emplacement during construction would have **negligible** adverse effects on marine mammals.<br>Effects to marine mammals from cable O&M and decommissioning and O&M vessel anchoring would be similar in nature but lesser in scale and magnitude than those resulting from Project construction. As such, seafloor disturbance impacts would have **negligible** adverse effects on marine mammals.<br>Vessel anchoring and cable emplacement during construction, O&M, and decommissioning are not anticipated to involve equipment, lines, or rigging that could pose a potential entanglement risk to marine mammals. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative effects on marine mammals. | **Offshore**: Alternatives C through F would result in the installation of a reduced total length of IAC and a reduced extent of anchoring impacts relative to the Proposed Action. This would proportionally reduce the extent of construction-related impacts on marine mammals. Consistent with the Proposed Action, anchoring and cable emplacement during construction, O&M, and decommissioning would have **negligible** adverse effects on marine mammals for the duration of the construction activities.<br>While suspended sediment impacts would vary in extent and intensity depending on Project and site-specific conditions, measurable impacts are likely to be on the order of 500 mg/L or lower, lasting for minutes to hours, and limited in extent to within a few feet vertically and a few hundred feet horizontally from the point of disturbance. No population-level effects on marine mammals are expected from reduced water quality. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative effects on marine mammals. | | | | **Offshore**: Similar to Alternatives C through F, Alternative G would result in the installation of a reduced total length of IAC and a reduced extent of anchoring impacts relative to the Proposed Action. This would proportionally reduce the extent of construction-related impacts on marine mammals. Consistent with the Proposed Action, anchoring and cable emplacement during construction, O&M, and decommissioning would have **negligible** adverse effects on marine mammals for the duration of the construction activities.<br>Although suspended sediment impacts would vary in extent and intensity depending on Project and site-specific conditions, measurable impacts are likely to be on the order of 500 mg/L or lower, lasting for minutes to hours, and limited in extent to within a few feet vertically and a few hundred feet horizontally from the point of disturbance. No population-level effects on marine mammals are expected from reduced water quality. Therefore, Alternatives G when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative effects on marine mammals. |
| Climate change | **Offshore**: The nature and potential significance of climate change effects to marine mammals are unknown but likely to range from **minor** to **moderate** adverse. Effects to individual species, such as NARW, would depend on a number of complex factors, including the nature and extent of climate change impacts on the availability and distribution of forage and | **Offshore**: The Proposed Action in combination with existing and planned future actions would result in the development of a network of artificial reefs distributed across the GAA. The biological hotspots created by these artificial reefs are expected to influence fish and invertebrate community structure at local scales and could also influence the ability of certain fish and invertebrate species to shift and expand their | **Offshore**: Climate change–related impacts to marine mammals under Alternatives C through F would be similar to those described for the Proposed Action. Ongoing trends associated with climate change, including increases in water temperature, ocean acidification, changes in runoff and circulation patterns, and species range shifts, are expected to continue. The intensity of climate change impacts on marine mammals is uncertain but likely to range from **minor** to **moderate** adverse. Effects to individual species, such as NARW, would depend on a number of complex factors, including the nature and extent of climate change impacts on the availability and distribution of forage and suitable habitat, the ability of the species to adapt to these impacts, and the status and resilience of the affected population. | | | | **Offshore**: Similar to Alternatives C through F, climate change–related impacts to marine mammals under Alternative G would be similar to the Proposed Action, i.e., uncertain but likely to range from **minor** to **moderate** adverse. Effects to individual species, such as NARW, would depend on a number of complex factors, including the nature and extent of climate change impacts on the availability and |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | suitable habitat, the ability of the species to adapt to these impacts, and the status and resilience of the affected population. | ranges in response to climate change. This could in turn result in cumulative effects on marine mammals that could be beneficial or adverse depending on a number of complex factors. The nature and potential significance of these effects to marine mammals are unknown but likely to range from **minor** to **moderate** adverse. Effects to individual species, such as NARW, would depend on a number of complex factors, including the nature and extent of climate change impacts on the availability and distribution of forage and suitable habitat, the ability of the species to adapt to these impacts, and the status and resilience of the affected population. | | | | | distribution of forage and suitable habitat, the ability of the species to adapt to these impacts, and the status and resilience of the affected population. |
| Noise | **Offshore**: Under the No Action Alternative, BOEM would not approve the COP. Various stressors associated with the construction, operations, and maintenance of the Project would not occur, and there would be no incremental impact to environmental baseline conditions from this IPF. Sound sources such as impact pile driving, construction vessels, and HRG survey noise associated with other offshore wind energy development could adversely affect marine mammals. All approved offshore wind actions are expected to include EPMs to avoid and minimize impacts on marine mammals. When these factors are considered, the effects of noise exposure on marine mammals under the No Action Alternative would range from **minor** to **moderate** adverse. Effects to specific marine mammal species are uncertain and would depend on the number of individuals exposed to injury and behavioral-level noise effects, the significance of those effects to survival and reproductive productivity, and the status and sensitivity of the affected population to effects to individuals. Noise and disturbance effects on marine mammals from aircraft operations under the No Action Alternative are expected to be **negligible** adverse because of | **Offshore**: Construction of the RWF and RWEC would produce short-term underwater and airborne noise with the potential to affect marine mammals. Overall, underwater noise during impact pile-driving activities would have a **minor** to **moderate** adverse effect on marine mammals, depending on the species. Noise impacts from construction would result in **minor** impacts to marine mammals in the MFC, HFC, and phocid pinniped hearing groups, and **minor** to **moderate** impacts to marine mammals in the LFC hearing group. NARW and humpback whale could experience **moderate** impacts based on the proportion of the stock exposed to potential behavioral effects, and in the case of NARW, greater sensitivity to those effects.<br>The indirect effect of this underwater noise on marine mammals through impacts to prey species would be short term and **negligible** adverse due to the availability of prey resources for marine mammals on the OCS. Likewise, airborne pile-driving noise would be **negligible** adverse because of established EPMs and likely avoidance response.<br>While some individual marine mammals could experience short-term behavioral and auditory effects from vessel noise exposure, these effects would be short term in duration and broader stock or population-level impacts would be unlikely. Therefore, construction vessel noise impacts on marine mammals would likely be **minor** adverse. Noise and disturbance effects on | **Offshore**: See Section 3.15.2.3.1 for construction impacts.<br>Operational noise impacts under Alternatives C through F would be similar to those described for the Proposed Action (**negligible** to **moderate** adverse) but reduced in extent. See Section 3.15.2.4 for a comparison of pile-driving noise impacts amongst the alternatives. Offshore WTGs produce continuous non-impulsive underwater noise during operations, mostly in lower frequency bands below 8 kHz. The low-frequency sounds produced by WTGs are within the range of hearing sensitivity and audible communication frequencies used by many species of marine mammals (NOAA 2018), indicating that this impact mechanism could be a potential source of behavioral and auditory masking effects on marine mammal species. However, the maximum predicted operational noise level would attenuate below the behavioral harassment threshold for marine mammals within 120 feet of each turbine foundation, suggesting that behavioral and masking effects would occur within a small radius around each turbine. Impacts to marine mammals in the LFC hearing group, including NARW, that use or attempt to use habitats in the RWF could rise to **moderate** adverse. In contrast, operational noise impacts on phocid pinnipeds are likely to be negligible to minor because these species are not as dependent on sound for communication.<br>Vessels used for Project monitoring, comparable to vessels typical for trawl fisheries, would produce noise, but the noise levels generated by these smaller Project vessels are below the hearing injury threshold of marine mammals; therefore, vessel noise from Project monitoring activities is not expected to result in injury-level effects. The associated disturbance from decommissioning would be similar to construction, with the exception that pile driving would not be required. Monopiles would be cut below the bed surface with equipment-producing noise levels generally indistinguishable from engine noise (Pangerc et al. 2016).<br>Due to the higher capacity of the turbines, there is potential for greater operational noise impacts around each individual turbine for Alternative F, although specifics of these impacts are not certain.<br>Effects from Alternatives C through F would combine with similar effects resulting from the construction and installation, O&M, and decommissioning of other planned offshore wind projects on the Mid-Atlantic OCS. Up to 3,146 to 3,183 new offshore structures associated with offshore wind development would be installed on the GAA under these alternatives. The installation of these structures would likely involve impact pile driving, an intense source of underwater noise with the potential to impact marine mammals. Alternatives C through F | | | | **Offshore**: See Section 3.15.2.3.1 for construction impacts.<br>Similar to Alternatives C through F, operational noise impacts under Alternative G would be similar in magnitude and by hearing group to those from the Proposed Action (**negligible** to **moderate** adverse) but reduced in extent. See Section 3.15.2.4 for a comparison of pile-driving noise impacts amongst the alternatives.<br>Effects from Alternative G would combine with similar effects resulting from the construction and installation, O&M, and decommissioning of other planned offshore wind projects on the Mid-Atlantic OCS. Up to 3,155 new offshore structures associated with offshore wind development would be installed on the GAA under Alternative G. The installation of these structures would likely involve impact pile driving, an intense source of underwater noise with the potential to impact marine mammals. Alternative G would contribute an appreciable increase in underwater noise due to the installation of 65 foundations. HRG surveys, vessel engines, and operational noise from the WTGs would also contribute non-impulsive noise that could result in behavioral effects or displacement of marine mammals. On this basis, cumulative adverse effects on marine mammals resulting from underwater noise are likely to be **minor** to **moderate** adverse, with impacts by species group similar to but likely |

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|---|---|---|---|---|---|---|---|
| | protective regulations and temporary nature of the impacts. | marine mammals from aircraft operations are also expected to be **minor** adverse because of protective regulations and the temporary nature of the impact.<br>Offshore WTGs produce continuous non-impulsive underwater noise during operations, mostly in lower frequency bands below 8 kHz. This localized, long-term impact would constitute a **moderate** adverse effect on marine mammals belonging to the low-frequency cetacean hearing group, including NARW. Operational noise effects on marine mammals in other hearing groups would be **minor** adverse because of the lack of overlap with the frequencies used for hearing and communication.<br>Noise levels generated by the larger SOVs would be similar to those for Project construction vessels and would result in short-term **minor** adverse noise effects that would occur periodically throughout the life of the Project.<br>Noise effects from vessels associated with monitoring efforts and decommissioning would result in **negligible** adverse impacts to marine mammals because any exposure would be limited in duration and similar to baseline noise levels generated by existing vessel traffic.<br>BOEM anticipates that future MMPA approvals would consider the known status of individual marine mammal stocks and populations, indirectly incorporating the potential combined effects of future projects. Therefore, BOEM concludes that the cumulative effects of construction noise on marine mammals would be **moderate** adverse because of the potential for PTS impact to some species, and temporary threshold shift (TTS) and behavioral effect exposure to other species during construction activities.<br>While the potential for broader effects is unclear BOEM concludes that the cumulative effects of low-level operational noise could rise to the level of **minor** adverse for certain marine mammal species. | would contribute an appreciable increase in underwater noise due to the installation of up to 93 foundations. HRG surveys, vessel engines, and operational noise from the WTGs would also contribute non-impulsive noise that could result in behavioral effects or displacement of marine mammals. On this basis, cumulative adverse effects on marine mammals resulting from underwater noise are likely to be **minor** to **moderate** adverse. As with the Proposed Action, effects to specific marine mammal species are uncertain and would depend on the number of individuals exposed to injury and behavioral-level noise effects, the significance of those effects to survival and reproductive productivity, and the status and sensitivity of the affected population to effects to individuals. | | | | less extensive than those resulting from the Proposed Action. |
| Presence of structures | **Offshore** Under the No Action Alternative, BOEM would not approve the COP. Various stressors associated with | **Offshore**: Effects on marine mammals from installation of WTG and OSS foundations construction would result primarily from underwater noise impacts related to impact pile | **Offshore**: Installation of structures for Alternatives C through F would result in similar impacts on marine mammals to those described for the Proposed Action in Section 3.15.2.2.1, but those impacts would be reduced in extent and would vary depending on the configuration selected (refer to Table 3.6-18 for configuration details). Indirect effects on the prey base of | | | | **Offshore**: Similar to Alternatives C through F, installation of structures for Alternative G would result in similar impacts on marine mammals to those described for the Proposed |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | the construction, operations, and maintenance of the Project would not occur, and there would be no incremental impact to environmental baseline conditions from this IPF. Other ongoing offshore wind projects (SFWF and Vineyard Wind) would add new WTG and OSS foundations in the GAA would result in artificial reef and hydrodynamic effects that influence primary and secondary productivity and the distribution and abundance of fish and invertebrate community structure within and in proximity to project footprints. The effect of these effects on marine mammals and their habitats could be beneficial or adverse, potentially ranging from **minor** adverse to **negligible** to **moderate** beneficial. Impacts to specific species, such as NARW, are uncertain and would depend on several factors, including species-specific displacement effects, the nature and extent of effects to forage resources, and the status of the affected population and sensitivity to effects to individuals. However, the potential interaction with fishing gear and increased risk of entanglement is considered to have a **minor** to **moderate** adverse effect on marine mammals because of the documented significance of entanglement events. In the case of NARW, continuation of baseline conditions is likely to pose a serious risk to the species based on its imperiled status. | driving and noise disturbance from associated vessel activity. Ongoing effects from the presence of structures would result from operational noise, described above, and biological and oceanographic effects resulting from the physical presence of structures.<br>RWF monopile foundations would be placed in a grid-like pattern with spacing of approximately 1.0 (0.9 to 1.1) nm between turbines. This spacing relative to animal size indicates that the physical presence of the monopile foundations is unlikely to pose a barrier to the movement of large marine mammals, and even less likely to impede the movement of smaller marine mammals. On this basis, BOEM concludes that the presence of the RWF monopile foundations would pose a **negligible** adverse risk of displacement effects on marine mammals.<br>However, long-term reef and hydrodynamic effects resulting from the Proposed Action could result in **minor** beneficial effects on fish-eating marine mammals such as dolphins and seals that benefit from increased prey abundance around the structures and **negligible** adverse effects on marine mammals that forage on plankton and forage fish, including NARW. Habitat conditions would be expected to revert back to those that existed prior to installation. Therefore, the effects of the presence of structures on marine mammals during decommissioning would be **negligible** adverse because the structures themselves would be removed from the habitat.<br>Several projects would be constructed concurrently, potentially resulting in individual marine mammals being exposed to multiple episodes of habitat displacement. It is anticipated that these projects would also employ a similar range of EPMs to avoid and minimize impacts to marine mammals, but some level of short-term displacement is likely to occur, and some individual animals are likely to be exposed to multiple episodes of displacement. The significance of these potential impacts is unclear, but when all protective measures are considered, cumulative effects are likely to range from **minor** to **moderate** adverse. Impacts to specific species, such as NARW, are uncertain and would depend | some marine mammal species (i.e., invertebrates and finfish) from the presence of structures would occur, but these would primarily be limited to long-term effects considered under the O&M and Decommissioning discussion in Section 3.15.2.2.2. Construction and installation of offshore structures would have temporary, **negligible** to **minor** adverse effects on marine mammals. Impacts to specific marine mammal species for Alternatives C through F would reduce the number of offshore wind energy structures. These structures would result in similar impacts on marine mammals to those described for the Proposed Action in Section 3.15.2.2.2, but those impacts would be reduced in extent. Over the life of the Project, the structures would alter the character of the ocean environment, and their presence could affect marine mammal behavior; however, the likelihood and significance of these effects are difficult to determine. Indirectly, marine mammals could benefit from increased prey abundance around the structures due to long-term reef and hydrodynamic effects. However, these effects would only benefit fish-eating species; effects to marine mammals that forage on plankton and forage fish would be **negligible** adverse. The increase in fish biomass could also result in an elevated risk of entanglement and interaction with commercial and recreational fishing gear, although the implementation of EPMs related to management of debris surrounding the WTGs (see Table F-1 in Appendix F) is expected to limit the risk. Following decommissioning and removal of the structures from the water column, the habitat would be expected to recover to conditions similar to those in the surrounding environment. Therefore, impacts of the presence of structures on marine mammals are expected to be **negligible** adverse to **minor** beneficial for the life of the Project. Impacts to specific species, such as NARW, are uncertain and would depend on several factors, including species-specific displacement effects, the nature and extent of effects to forage resources, and the status of the affected population and sensitivity to effects to individuals.<br>BOEM estimates that up to 3,146 to 3,183 new WTG and OSS foundations would be added in the GAA under other planned future projects, in addition to 56 to 93 WTG and two OSS foundations proposed under various configurations for Alternatives C through F. The long-term presence of WTG and OSS structures could displace marine mammals from preferred habitats or alter movement patterns, potentially changing exposure to commercial and recreational fishing activity. Addition of these foundations would also result in artificial reef and hydrodynamic effects that influence primary and secondary productivity and the distribution and abundance of fish and invertebrate community structure within and in proximity to project footprints. These effects could indirectly influence marine mammals by altering the distribution and abundance of prey species. Increased fish biomass around the structures could also attract commercial and recreational fishing activity, leading to increased risk of entanglement and interaction with fishing gear. However, BOEM anticipates that future projects would perform regular inspections to identify and remove derelict (i.e., "ghost") fishing gear and other marine debris from offshore structures, thereby reducing the associated risk to marine mammals.<br>The cumulative effects of long-term habitat alteration and hydrodynamic impacts on marine mammals are unclear, could be positive or negative, could range from **negligible** to **moderate** adverse. Impacts to specific species, such as NARW, are uncertain and would depend on several factors, including species-specific displacement effects, the nature and extent of effects to forage resources, and the status of the affected population and sensitivity to effects to individuals. There is currently no reasonable scientific basis to conclude that these impact mechanisms would result in greater than **moderate** adverse effects on any marine mammal species. | | | | Action in Section 3.15.2.2.1: temporary, **negligible** to **minor** adverse effects on marine mammals. Effects to specific species, such as NARW, would depend on the same factors described for the Proposed Action.<br>Likewise, when combined with past, present, and reasonably foreseeable activities, Alternative G would result in similar but reduced impacts on marine mammals to those described for the Proposed Action in Section 3.15.2.2.2. Over the life of the Project, the structures would alter the character of the ocean environment, and their presence could affect marine mammal behavior; however, the likelihood and significance of these effects are difficult to determine. Indirectly, marine mammals could benefit from increased prey abundance around the structures due to long-term reef and hydrodynamic effects. However, these effects would only benefit fish-eating species; effects to marine mammals that forage on plankton and forage fish would be **negligible** adverse. The increase in fish biomass could also result in an elevated risk of entanglement and interaction with commercial and recreational fishing gear, although the implementation of EPMs related to management of debris surrounding the WTGs (see Table F-1 in Appendix F) is expected to limit the risk. Following decommissioning and removal of the structures from the water column, the habitat would be expected to recover to conditions similar to those in the surrounding environment. Therefore, impacts from the presence of structures on marine mammals are expected to be **negligible** adverse to **minor** beneficial for the life of the Project. Impacts to specific species, such as NARW, are uncertain and would depend on several factors, including species-specific displacement effects, the nature and extent of effects to forage resources, and the status of the affected population and sensitivity to effects to individuals.<br>BOEM estimates that up to 3,155 new WTG and OSS foundations would be added in the GAA under other planned future projects, in |

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|---|---|---|---|---|---|---|---|
| | | on several factors, including species-specific displacement effects, the nature and extent of effects to forage resources, and the status of the affected population and sensitivity to effects to individuals.<br>In addition to effects from displacement alone, displacement resulting in increased interactions between vulnerable populations of marine mammals and commercial shipping and/or fishing activity could, in theory, have significant long-term cumulative effects. However, the potential for displacement and level of effects are uncertain and unknown, and there is currently no basis to conclude that these impacts would result in greater than **minor** adverse long-term effects on any species.<br>The cumulative effects of long-term habitat alteration and hydrodynamic impacts on marine mammals are unclear, could be beneficial or adverse, could range from **negligible** to **moderate** adverse. Impacts to specific species, such as NARW, are uncertain and would depend on several factors, including the nature and extent of effects to forage resources, the significance of these effects to individual survival and reproductive fitness, and the status of the affected population and sensitivity to effects to individuals. | | | | | addition 65 WTGs within 79 possible WTG locations and two OSS foundations proposed under various configurations for Alternative G. The long-term presence of WTG and OSS structures could displace marine mammals from preferred habitats or alter movement patterns, potentially changing exposure to commercial and recreational fishing activity. Addition of these foundations would also result in artificial reef and hydrodynamic effects that influence primary and secondary productivity and the distribution and abundance of fish and invertebrate community structure within and in proximity to project footprints. These effects could indirectly influence marine mammals by altering the distribution and abundance of prey species. Increased fish biomass around the structures could also attract commercial and recreational fishing activity, leading to increased risk of entanglement and interaction with fishing gear. However, BOEM anticipates that future projects would perform regular inspections to identify and remove derelict (i.e., "ghost") fishing gear and other marine debris from offshore structures, thereby reducing the associated risk to marine mammals.<br>The cumulative effects of long-term habitat alteration and hydrodynamic impacts on marine mammals are unclear, could be positive or negative, could range from **negligible** to **moderate** adverse, with effects to specific species dependent on the same factors described for the Proposed Action. There is currently no reasonable scientific basis to conclude that these impact mechanisms would result in greater than **moderate** adverse effects on any marine mammal species. |
| Vessel traffic | **Offshore**: Under the No Action Alternative, BOEM would not approve the COP. Various stressors associated with the construction, operations, and maintenance of the Project would not occur, and there would be no incremental impact to environmental baseline conditions from this IPF. Vessel activity | **Offshore**: Because vessel strikes are not an anticipated outcome given the relatively low number of vessel trips and EPMs to avoid encountering marine mammals, BOEM concludes vessel strikes are unlikely to occur. Therefore, there is no anticipated effect on marine mammals and collision effects would be **negligible** adverse during Project construction. However, vessel | **Offshore**: Construction of Alternatives C through F would result in similar vessel traffic impacts on marine mammals to those described for the Proposed Action, but the total number and distribution of vessel trips would be reduced by varying amounts depending on the configuration selected. Vessel traffic associated with the RWF would be expected to increase less than the 2.1% per year across transects 13-17 (Figure 3.15-2) estimated for the Proposed Action. Therefore, collision-related effects would be **negligible** adverse during Project construction. The presence of construction vessels and associated noise and disturbance could cause short-term displacement of marine mammals from preferred habitats. Vessel | | | | **Offshore**: Similar to Alternatives C through F, construction of Alternative G would result in similar vessel traffic impacts on marine mammals to those described for the Proposed Action, but the total number and distribution of vessel trips would be reduced. Therefore, collision-related effects would be **negligible** adverse during Project construction. Vessel |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | from other offshore wind projects is estimated to peak in 2025 with as many as 210 vessels involved in the construction of reasonably foreseeable projects. BOEM anticipates that traffic risks would be minimized by project-specific EPMs and compliance with additional measures required as a condition of ESA and MMPA compliance. Accordingly, effects to marine mammals from increased vessel activity could range from **minor** to **moderate** adverse. | displacement effects on marine mammals could range in significance from **minor** to **moderate** adverse depending on the species affected and the biological significance of displacement.<br>Effects of vessel traffic on marine mammals from Project O&M and decommissioning would be **negligible** to **minor** adverse because of limited exposure and implemented EPMs.<br>BOEM estimates that up to 262 construction vessels could be active within the GAA between 2022 and 2030. BOEM anticipates that all future projects would adhere to all mandatory and voluntary vessel speed restrictions in posted dynamic management areas (DMAs) and seasonal management areas (SMAs) (collectively Slow Zones) and would implement additional EPMs and measures similar to those described for the Proposed Action during construction and throughout the operational life of the Project to avoid marine mammal collisions. Therefore, the cumulative effects of increased vessel traffic on marine mammals would range from **negligible** to **moderate** adverse. | displacement effects on marine mammals could range in significance from **minor** to **moderate** adverse depending on the species affected and the biological significance of displacement, recognizing that some portion of these effects is also likely the result of construction noise, as described above.<br>O&M and decommissioning of Alternatives C through F would result in similar vessel traffic impacts on marine mammals to those described for the Proposed Action, but those impacts would be reduced in extent. For the Proposed Action, Revolution Wind (Tech Environmental 2023) has estimated that Project O&M would involve up to four CTV and two SOV trips per month for wind farm O&M, or 2,280 vessel trips over the life of the Project. It can be assumed that Alternatives C through F would require similar or slightly fewer vessel trips during O&M. O&M vessel use would represent a minimal increase in regional vessel traffic over the life of the Project, and as detailed in Appendix F, all survey vessels would comply with speed restrictions and other minimization measures to minimize risk of collision with marine mammals, making the risk of vessel strikes from Project monitoring vessels unlikely. Consistent with the Proposed Action, adverse effects on marine mammals from vessel collisions or displacement would be **negligible** to **minor** adverse for the life of the Project through decommissioning.<br>As described for the Proposed Action, BOEM anticipates that all future projects would adhere to all mandatory and voluntary vessel speed restrictions in posted DMAs and SMAs (collectively Slow Zones) and would implement additional EPMs and measures similar to those described for the Proposed Action during construction and throughout the operational life of the Project to avoid marine mammal collisions. Therefore, the cumulative effects of increased vessel traffic on marine mammals would range from **negligible** to **moderate** adverse. | | | | displacement effects on marine mammals could range in significance from **minor** to **moderate** adverse depending on the species affected and the biological significance of displacement, recognizing that some portion of these effects is also likely the result of construction noise, as described above.<br>O&M and decommissioning of Alternative G would result in similar vessel traffic impacts on marine mammals to the Proposed Action, but those impacts would be reduced in extent. Consistent with the Proposed Action, adverse effects on marine mammals from vessel collisions or displacement would be **negligible** to **minor** adverse for the life of the Project through decommissioning.<br>As described for the Proposed Action, BOEM anticipates that all future projects would adhere to all mandatory and voluntary vessel speed restrictions in posted DMAs and SMAs (collectively Slow Zones) and would implement additional EPMs and measures similar to those described for the Proposed Action during construction and throughout the operational life of the Project to avoid marine mammal collisions. Therefore, the cumulative effects of increased vessel traffic on marine mammals would range from **negligible** to **moderate** adverse. |

### 3.15.2.2 Alternative A: Impacts of the No Action Alternative on Marine Mammals

#### 3.15.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, BOEM would not approve Revolution Wind's COP and the Project would not be constructed. Given this, stressors from construction, operation, and maintenance of the Project would not occur. Baseline conditions of the existing environment and their impacts on marine mammals, the impacts of which are summarized in Table 3.15-2, would remain unchanged. Therefore, not approving the COP would have no additional incremental effect on marine mammals. Similarly, NMFS's No Action Alternative (i.e., not issuing the requested incidental take authorization) would also have no additional incremental impact on marine mammals and their habitat. Baseline conditions for marine mammals (see Section 3.15.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the geographic analysis area. IPFs and effects from the development of these planned and permitted offshore wind activities are described and analyzed in Appendix E1.

#### 3.15.2.2.2 Cumulative Impacts

This section discloses potential impacts to marine mammals associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (in the absence of the Proposed Action), is provided in Appendix E1. Cumulative impacts to marine mammals under the No Action Alternative would be incremental to and would compound the impacts of baseline conditions on each marine mammal population considered in this EIS (see Table 3.15-2).

Analysis of impacts presented below are for IPFs with the potential to produce greater than negligible effects. IPFs expected to produce negligible effects to marine mammals are addressed in Appendix E1, Table E2-5.

IPF effects from Project decommissioning are discussed where practicable, recognizing that Project decommissioning has not yet been developed and certain impacts cannot be quantified. All wind farm operators would be required to develop and submit a project-specific decommissioning plan to BOEM. Those plans would be subject to independent environmental and regulatory review and approval before decommissioning can proceed. Those reviews would consider the effects of facility removal on all marine biological resources relative to the environmental baseline conditions present at that time.

**Offshore Activities and Facilities**

<u>Anchoring and new cable emplacement/maintenance:</u> Anchoring or mooring activities from construction of future wind energy projects could result in seafloor disturbance and suspended sediment impacts within the GAA for marine mammals. It is estimated that 210 construction vessels would result in 8,427 acres of anchoring disturbance during the peak period of construction. Anchoring and mooring of these vessels would have limited adverse effects to marine mammals due to the temporary nature and relatively small area of the impact. Anticipated impacts from increased vessel traffic are discussed in full in the Vessel Traffic IPF below. Entanglement risks to marine mammals from vessel anchoring and cable emplacement are not anticipated. Only larger construction and O&M vessels would anchor to the seafloor, using large heavy anchor chains. No lines or rigging are anticipated for cable installation, and transmission cables and

jet plow umbilicals are large in diameter, relatively inflexible, and under constant tension. The likelihood of marine mammal entanglement under these conditions is discountable.

Future offshore wind projects could disturb up to 101,381 acres of seafloor while installing associated undersea cables, causing an increase in suspended sediment (see Appendix E, Attachment E4 for calculation details). Those effects would be similar in nature to those observed during construction of the BIWF (Elliot et al. 2017). While suspended sediment impacts would vary in extent and intensity depending on project and site-specific conditions, measurable impacts are likely to be on the order of 500 mg/L or lower, lasting for minutes to hours, and limited in extent to within a few feet vertically and a few hundred feet horizontally from the point of disturbance. Due to the temporary and localized nature of the impacts, the resulting effects of anchoring and cable emplacement on marine mammals would likely be **negligible** to **minor** adverse.

Climate change: Global climate change is an ongoing risk to marine mammals. Hayes et al. (2021, 2022) note that marine mammals are being forced to adapt to changes in the spatial distribution and abundance of their primary prey resources. The range of habitats for many finfish, invertebrate, and zooplankton species on the Mid-Atlantic OCS are shifting northward and toward deeper waters in response to changes in temperature regime, acidification, and other climate-driven effects on the ocean environment. The potential implications of these and other related environmental changes for marine mammals, and the ways in which they are likely to interact with the effects of regional offshore wind development, are complex and uncertain. This is particularly true when evaluating potential effects at the scale of the GAA. However, it is likely that some species would adapt to these environmental changes more effectively than others. In contrast, populations that are already vulnerable, such as NARW, could face increased risk of extinction as a consequence of climate change and other factors. The nature and potential significance of these effects to marine mammal are uncertain but likely range from **minor** to **moderate** adverse. Effects to individual species, such as NARW, would depend on a number of complex factors, including the nature and extent of climate change impacts on the availability and distribution of forage and suitable habitat, the ability of the species to adapt to these impacts, and the status and resilience of the affected population.

Noise: Numerous proposed offshore wind projects could be developed on the Mid-Atlantic OCS between 2022 to 2030 (see Appendix E). BOEM recently completed a programmatic ESA consultation for HRG survey activities supporting planned offshore wind energy development on the Mid-Atlantic OCS from June 2021 through June 2031. In addition to project-specific EPMs, BOEM would require compliance with all conditions of ESA and MMPA compliance and other federal regulations. That process is likely to result in additional measures to avoid and minimize adverse noise effects on marine mammals resulting from the various potential exposure scenarios described below.

Two types of underwater noise are considered in this assessment, impulsive and non-impulsive. Impulsive noise sources produce intermittent, short-duration, high-intensity sound pulses in rapid succession, and include sources like impact pile driving, HRG surveys, and UXO detonations. Non-impulsive sound sources are typically of lower intensity but are effectively continuous and include sources such as vibratory pile driving, construction and O&M vessel use, and WTG operations. Based on the anticipated extent of noise impacts, it is reasonable to conclude that sound sources such as impact pile driving, construction vessels, and HRG survey noise associated with offshore wind energy development could adversely affect marine mammals. In addition, construction noise impacts from future offshore projects could affect marine mammal use of the GAA and/or the availability of fish and invertebrate prey resources.

*Impulsive Noise*: The installation of up to 3,088 new offshore wind structures on the GAA under the No Action Alternative would likely involve impact pile driving, an intense source of underwater noise with the potential to impact marine mammals. Preconstruction HRG surveys conducted for these projects would also generate impulsive noise of lower intensity that is less likely to injure marine mammals but could alter their behavior. Other potential sources of impulsive noise include use of a pneumatic hammers (e.g., for landfall construction) and UXO detonation. The potential duration and extent of underwater noise effects on marine mammals from these sound sources are described below.

The planned construction of up to 3,088 new offshore wind structures would begin in 2022 and continue through 2030. Many of these structures would be installed using impact pile driving, producing high-intensity impulsive underwater noise at levels exceeding injury and behavioral harassment thresholds for marine mammals. These noise impacts could affect marine mammal use of the GAA, and/or the availability of fish and invertebrate prey resources and would vary in extent and intensity based on the scale and design of each project. Noise effects could increase in significance if individual marine mammals and/or their prey and forage resources experience repeated stressor exposures from multiple projects.

Marine mammals could experience any of the following three potential exposure scenarios under the No Action Alternative:

- Concurrent exposure to noise from two or more impact hammers, operating within the same project or in adjacent projects
- Non-concurrent exposure to noise from multiple pile-driving events within the same year
- Exposure to two or more concurrent or non-concurrent pile-driving events over multiple years

Based on currently planned project schedules, the concurrent exposure scenario could occur under the No Action Alternative. The number of potential concurrent exposure days within the RI/MA and MA WEAs, for example, is estimated to range from 76 to 441, assuming one foundation installation per project per day, and from 38 to 221 days assuming two foundations per project per day, depending on the year (based on active projects listed in Table E3-1 in Appendix E3). Behavioral avoidance of noise impacts could also indirectly affect marine mammal use of the area, even if significant impacts do not occur therein. An individual marine mammal present in either of these areas on those days could be exposed to the noise from more than one pile-driving event per day.

Concurrent pile driving within and between future projects would increase the intensity and extent of sound exposure within the respective impact areas but would decrease the total number of days of stressor exposure in any given year. It may be desirable to plan for concurrent pile driving to avoid underwater noise impacts during critical periods when sensitive or particularly vulnerable populations (e.g., NARW) are most likely to be present. However, this could result in greater exposure for marine mammal species that are more likely to be present when concurrent pile driving occurs. These individuals could be more likely to suffer noise-related permanent threshold shift (PTS) impacts and other adverse physiological and behavioral effects as a consequence. Physiological effects could include elevated chronic stress and depressed immune function (Erbe et al. 2018; Romano et al. 2004; Wright et al. 2007).

Under the non-concurrent exposure scenario, individual marine mammals could be exposed to multiple non-concurrent pile-driving activities at different times within the same year. This scenario includes concurrent neighboring projects that time their respective pile-driving activities to occur on different days. Non-concurrent pile driving would decrease the intensity and extent of impulsive noise exposure but would increase the total number of exposure days. Given that multiple future actions are proposed for construction between 2022 and 2030 (see Table E3-1 in Appendix E3), it is likely that some individual marine mammals would experience two or more impact pile-driving noise exposure days within the same year.

UXO detonation may be necessary prior to ground-breaking activities for future offshore wind projects if devices are identified that cannot be avoided or safely relocated. The potential number, size, and distribution of UXOs within the GAA is not currently known and would be assessed during preconstruction surveys. Although the shock pulse and pressure waveforms of explosive detonation is significant and distinct from impact pile driving, use of attenuation methods such as bubble curtains is expected to be effective at minimizing effects (Bellman et al. 2020, Hannay and Zykov 2022). Potential effects of UXO detonations would be fully assessed for each future proposed project, based on site-specific information.

HRG surveys would also produce mobile impulsive underwater noise. BOEM (2021a) reviewed underwater noise levels produced by the available types of HRG survey equipment as part of a programmatic biological assessment for this and other activities associated with regional offshore wind energy development. NMFS (2021) concurred with BOEM's determination that planned HRG survey activities using even the loudest available equipment types would be unlikely to injure or measurably affect the behavior of ESA-listed marine mammals. The rationale supporting this conclusion also applies to non-listed marine mammal species. Specifically, the noise levels produced by HRG survey equipment are relatively low, meaning that an individual marine mammal would have to remain close to the sound source for extended periods of time to experience PTS injury. This type of exposure is unlikely as the sound sources are continuously mobile and some sources are directional (i.e., pointed at the bottom). These measures would effectively avoid the risk of PTS (i.e., hearing injury) or TTS (i.e., temporary hearing impairment) effects on marine mammals from HRG survey activities. While individual marine mammals could be exposed to HRG survey noise sufficient to cause behavioral effects, those effects would be temporary in nature and unlikely to cause any perceptible longer-term consequences to individuals or populations.

Under the No Action Alternative, it is likely that underwater noise impacts sufficient to cause adverse effects on marine mammals could occur. This could result from direct noise impacts that adversely affect marine mammals and/or their prey species, or from behavioral effects that alter marine mammal use of the area. The extent, duration, and significance of these effects would vary based on project-specific factors. All future actions are expected to include EPMs to avoid and minimize impacts on marine mammals. When these factors are considered, the effects of impulsive noise exposure on marine mammals under the No Action Alternative would range from **minor** to **moderate** adverse because of the anticipated noise from pile driving. Impacts to specific species, such as NARW, would depend on the number of individuals exposed to injury and/or behavioral level effects and the status of the affected population.

*Non-impulsive Noise*: The construction and O&M of planned future wind projects would generate non-impulsive underwater noise from vibratory pile driving during construction, helicopters and fixed-wing aircraft noise, construction and O&M vessel engines, and operational noise from WTGs. Horizontal directional drilling proposed at the landfall site also has the potential to produce non-impulsive noise; however, analysis of noise produced by such methods suggest that levels would be low, especially compared to other activities occurring in the same location (Nedwell et al. 2012). These new sources of non-impulsive noise sources under the No Action Alternative would add to other human-made sources of non-impulsive noise that account for the majority of ambient noise pollution in the marine environment. Continuous low-frequency sound from large vessel engines, specifically ocean-going cargo, tanker, and container vessels, is the primary source of ambient noise pollution in the marine environment (Basset et al. 2012). While smaller vessels, activities such as vibratory pile driving, and offshore wind farm operations also generate non-impulsive noise, these sources are likely to account for a small percentage of ambient noise energy in the marine environment.

Construction vessels associated with planned offshore wind projects are the most likely sources of non-impulsive underwater noise impacts to occur in the GAA. Vibratory pile-driving noise from the installation of cofferdams as part of cable installation for future projects could also occur in the GAA. Non-impulsive noise impacts on marine mammals resulting from these activities would vary in location, extent, and duration, as determined by the specific design and construction requirements for each project. The resulting effects on marine mammals would similarly range from **minor** to **moderate** adverse, varying by marine mammal species.

Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct-drive systems such as those proposed for the RWF. Underwater sound pressure level ($L_{\mathrm{rms}}$ or SPL) measurements taken approximately 50 to 200 m from operating turbines were generally in the range of 115 to 125 dB re 1 µPa, in the 10-Hz to 8-kHz bandwidth at a reference distance of 164 feet (50 meters). This is consistent with the $L_{\mathrm{rms}}$ observations at the BIWF (110 to 125 dB re 1 µPa at 50 meters) (Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct-drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects on marine mammals could be more intense and extensive than those considered herein, but additional research is needed. Operational noise from offshore wind turbines on the order of 115 to 120 dB re 1 µPa at 164 feet (50 meters) would attenuate below the 120 dB re 1 µPa marine mammal behavioral harassment threshold (NMFS 2019) within approximately 35 to 165 feet of each foundation. Kraus et al. (2016) measured ambient noise conditions at three locations within and adjacent to the proposed RWF over a 3-year period and identified baseline levels of 102 to 110 dB re 1 µPa.[42] Operational noise of 115 to 120 dB re 1 µPa at 164 feet would attenuate below existing ambient noise levels within a few hundred to approximately 1,200 feet of each foundation as estimated using the cylindrical spreading model (University of Rhode Island 2021). This indicates that operational noise effects from other future actions would likely be **minor** adverse for the duration of operations because of the limited spatial extent of impacts, although uncertainty regarding operational noise effects associated with larger WTGs warrants continued attention to this issue.

[42] These are 50th and 90th percentile values for monitoring locations RI-1, RI-2, and RI-3, as reported by Kraus et al. (2016).

O&M vessels travelling through the GAA would generate underwater noise that would likely be measurable and detectable by marine mammals, but the effects would be temporary and localized. Impacts on individuals and/or their habitat would not lead to population-level effects. On this basis, the effects of underwater noise from future O&M vessel activities would likely be **minor** adverse and temporary (i.e., during vessel transit).

Planned future actions could also employ helicopters and fixed-wing aircraft for initial site surveys, establishing and monitoring protected species shutdown zones during project construction, for periodic facility inspections during project O&M, and for crew transfers. Aircraft performing these activities in the GAA could travel close to and affect marine mammals. In general, marine mammal behavioral responses to aircraft most commonly occur at distances of less than 1,000 feet, and those responses are typically limited and likely insignificant (Patenaude et al. 2002). Similarly, aircraft could disturb hauled-out seals if aircraft overflights occur within 2,000 feet of a haul-out area. BOEM would require all aircraft operations to comply with current approach regulations for any sighted NARWs or unidentified large whale. Current regulations (50 CFR 224.103I) prohibit aircraft from approaching within 1,500 feet of NARW. BOEM expects that most aircraft operations would occur above this altitude limit except under specific circumstances (e.g., helicopter landings on the service operations vessel or visual inspections of WTGs). Aircraft operations could result in temporary behavioral responses, including short surface durations, abrupt dives, and percussive behaviors (i.e., breaching and tail slapping) (Patenaude et al. 2002), but BOEM does not expect that these brief and infrequent exposures would result in measurable adverse effects on any marine mammal. On this basis, noise and disturbance effects on marine mammals from aircraft operations under the No Action Alternative are expected to be **negligible** adverse because of the protective regulations and temporary nature of the impacts.

<u>Presence of structures:</u> The future addition of up to 3,088 new WTG and OSS foundations in the GAA would result in artificial reef and hydrodynamic effects that influence primary and secondary productivity and the distribution and abundance of fish and invertebrate community structure within and in proximity to project footprints. Depending on proximity and extent, hydrodynamic and reef effects from future actions could influence the availability of prey and forage resources for marine mammals. Project-specific effects would vary, recognizing that larger and/or contiguous projects could have more significant hydrodynamic effects and broader scales. This could in turn lead to more significant effects on prey and forage resources.

A growing body of research has demonstrated that offshore wind farms could have observable effects on oceanographic conditions up to tens of miles downfield from wind farm sites (e.g., Christiansen et al. [2022]; Daewel et al. n.d. [2023]; Dorrell et al. [2022]; Floeter et al. [2022]; Raghukumar et al. [2022]), although the extent of these effects and resulting significance on biological processes are likely to vary considerably between different oceanographic environments (van Berkel et al. 2020). Van Berkel et al. (2020) and Schultze et al. (2020) note that environments characterized by strong seasonal stratification, such as the Mid-Atlantic Bight, are likely to be less sensitive to changes and disruptions to oceanographic processes from wind farm effects.

BOEM has conducted a modeling study to predict how planned offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions in the northern Mid-Atlantic Bight. Johnson et al. (2021) considered a range of development scenarios, including a large-scale build-out with a total of 1,063 WTG and OSS foundations. They determined that all scenarios would lead to small but measurable changes in current speed, wave height, and sediment transport in the northern Mid-Atlantic Bight. In addition, small changes in stratification could occur, leading to prolonged retention of cold water near the seafloor within the WEAs during spring and summer. Johnson et al. (2021) used an agent-based model to determine how hydrodynamic effects could influence the dispersal patterns of planktonic organisms. They determined that hydrodynamic effects are likely to alter the dispersal patterns of planktonic eggs and larvae, producing localized increases and decreases in larval density at scales ranging from miles to tens of miles. It is reasonable to conclude that hydrodynamic effects could influence the distribution of zooplankton and associated forage fish preyed upon by marine mammals at similar scales. When considered relative to the broader oceanographic factors that determine primary and secondary productivity in the region and seasonal and interannual variability, such localized impacts on zooplankton and fish abundance and distribution are not likely to be biologically significant for marine mammals. In theory, long-term changes in prey distribution on the order of tens of miles could contribute to displacement effects and increased interaction with fisheries; however, the likelihood and potential significance of such effects is unknown. Refer to Sections 3.6.1.1.1 and 3.13.1.1.1 for discussions of reef and hydrodynamic effects on invertebrates and finfish, respectively, from future offshore wind activities.

The long-term presence of WTG structures could displace marine mammals from preferred habitats or alter movement patterns, potentially changing exposure to commercial and recreational fishing activity. The evidence for long-term displacement is unclear and likely to differ between marine mammal species. For example, Long (2017) studied marine mammal habitat use around an ocean energy testing facility and found evidence of displacement during construction, but habitat use appeared to return to normal during facility operation. He cautioned that these findings were not definitive and additional research was needed. In contrast, Tielmann and Carstensen (2012) observed clear long-term (greater than 10 years) displacement of harbor porpoises from commercial wind farm areas in Denmark. Displacement effects remain a focus of ongoing study (Kraus et al. 2019). Other studies have documented apparent increases in marine mammal density around wind energy facilities. For example, Russel et al. (2014) found clear evidence that seals were attracted to a European wind farm, apparently by the abundant concentrations of prey supported by artificial reef effects. Gray seals are particularly susceptible to entrapment in trawl fisheries (Lyssikatos 2015). If commercial trawling were to occur near wind farms, increased interactions and resulting mortality of gray seals could occur.

Hayes et al. (2021, 2022) note that marine mammals are following shifts in the spatial distribution and abundance of their primary prey resources driven by increased water temperatures and other climate-related impacts. These range shifts are primarily oriented northward and toward deeper waters. The widespread development of offshore renewable energy facilities could facilitate climate change adaptation for certain marine mammal prey and forage species. The artificial reefs created by these structures form biological hotspots that could support species range shifts and expansions and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). In contrast, broadscale hydrodynamic impacts could alter zooplankton distribution and abundance (van Berkel et al. 2020). There is considerable uncertainty as to how these broader ecological changes would affect marine mammals in the future, and how those changes will interact with other human-caused impacts. The effect of these reef effects and hydrodynamic impacts on marine mammals and their habitats under the No Action Alternative could be beneficial or adverse, and their significance could range from **minor** adverse, negligible, or **moderate** beneficial. Impacts to specific species, such as NARW, are uncertain and would depend on several factors, including the nature and extent of effects to forage resources and the status of the affected population and sensitivity to effects to individuals.

The presence of structures could also concentrate recreational fishing around foundations, potentially increasing the risk of marine mammal entanglement in both lines and nets and increasing the risk of injury and mortality due to infection, starvation, or drowning (Moore and van der Hoop 2012). Fisheries interactions are likely to have demographic effects on marine mammal species, with estimated global mortality exceeding hundreds of thousands of individuals each year (Read et al. 2006; Reeves et al. 2013; Thomas et al. 2016). These structures could also result in fishing vessel displacement or changes in gear types that lead to changes in marine mammal exposure to fishing effects. For example, a shift from mobile gear to fixed gear could increase in the number and distribution of vertical lines and buoys in the water column, resulting in an increased risk of marine mammal interactions with fishing gear. The likelihood of such shifts and potential resulting effects to marine mammals is uncertain. However, bycatch and harmful interactions are known occur in various gillnet and trawl fisheries throughout New England and the Mid-Atlantic Coast, with hotspots driven by marine mammal density and fishing intensity (Lewison et al. 2014; Morin et al. 2018; NOAA 2021a; 86 *Federal Register* 51970). Entanglement in fishing gear has been identified as one of the leading causes of mortality in NARW and could be a limiting factor in the species' recovery (Knowlton et al. 2012). Johnson et al. (2005) report that 72% of NARWs show evidence of past entanglements. Additionally, recent literature indicates that the proportion of NARW mortality attributed to fishing gear entanglement is likely higher than previously estimated from recovered carcasses (Pettis et al. 2021). Entanglement could also be responsible for high mortality rates in other large whale species (Read et al. 2006). Abandoned or lost fishing gear could get tangled with foundations, reducing the chance that abandoned gear would cause additional harm to marine mammals and other wildlife, though debris tangled with WTG foundations could still pose a hazard to marine mammals. BOEM anticipates that future projects would perform regular inspections to identify and remove derelict fishing gear and other marine debris from offshore structures. These inspections would provide a mechanism for removing harmful marine debris, reducing associated risks to marine mammals.

Although the type and magnitude of effect from displacement and shifts in prey resources due to the presence of structures are largely unknown, the possibility of changes in distribution relative to commercial fishing activity and increased interaction with fishing gear poses the potential for increased risk of entanglement. Should such changes occur, increased risk of entanglement would constitute a **minor** to **moderate** adverse effect on marine mammals, because this stressor is a documented source of injury and mortality. Effects to each marine mammal species would depend on several factors, including the number of individual animals exposed to entanglement effects, the nature of the impact (i.e., injury or mortality), and the status and sensitivity of the affected population to those impacts. In the case of NARW, given that entanglement has been identified as a limiting factor in the species' recovery, the potential for increased exposure to entanglement could pose a significant risk; however, specific EPMs have been developed to minimize risk for NARW (including monitoring, gear identification, and marine debris management; refer to Appendix F for the full list). The risk of entanglement is therefore not considered to result in a greater than **moderate** adverse effect for NARW. It is important to stress that the likelihood of this level of effect is unclear because it is not known if the presence of structures would displace NARW and whether displacement would lead to increased fishing gear exposure. These potential long-term impacts would persist until decommissioning is complete and structures are removed.

Anticipated EPMs would help to offset the potential impact of entanglement within derelict fishing gear or marine debris.

Vessel traffic: BOEM estimates that construction of future offshore wind projects would begin in earnest in 2022 and conclude in 2030. Vessel activity could peak in 2025 with as many as 210 vessels involved in the construction of reasonably foreseeable projects (see Section 3.16.1.1).

Once future projects reach the O&M phase, they would be serviced by crew transport vessels (CTVs) and SOVs making routine trips between the wind farms and port-based O&M facilities. The number and size of CTVs and number of trips per week required for planned maintenance would vary by project based on the number of WTGs. Increased vessel traffic presents a potential increase in collision-related risks to marine mammals. BOEM anticipates that those risks would be minimized by project-specific EPMs and compliance with additional mitigation measures required as a condition of ESA and MMPA compliance. While these measures are likely to be effective in avoiding adverse effects on sensitive species like NARW, they would not eliminate risks to other marine mammal species.

Unplanned maintenance activities would require the periodic use of larger vessels of the same class used for project construction. Unplanned maintenance would occur infrequently dictated by equipment failures, accidents, or other events. Vessel requirements for unplanned maintenance would also likely vary based on overall project size. Unplanned trips would pose similar vessel-related collision risks to marine mammals as for planned trips, but the potential extent and number of animals potentially exposed cannot be determined without project-specific information. Accordingly, adverse effects to marine mammals from increased vessel activity could range from **minor** to **moderate** adverse throughout construction and O&M.

#### 3.15.2.2.3 Conclusions

Impacts of the No Action Alternative. Under the No Action Alternative, BOEM would not approve the RWF COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on marine mammals associated with the Project would not occur. Baseline conditions of the existing environment would remain unchanged. Therefore, not approving the COP would have no additional incremental effect on marine mammals. Similarly, NMFS's No Action Alternative (i.e., not issuing the requested incidental take authorization) would also have no additional incremental impact on marine mammals and their habitat.

Under the No Action Alternative, ongoing stressors and activities contributing to baseline conditions would result in a range of temporary to long-term impacts (disturbance, displacement, injury, mortality, and reduced foraging success) on marine mammals. Climate change would continue to affect marine mammal foraging and reproduction through changes to the distribution and abundance of marine mammal prey. Vessel activity (vessel collisions) and gear utilization associated with ongoing non–offshore wind activities would continue to cause long-term detectable and measurable injury and mortality to individual marine mammals. Impacts to marine mammals from the construction, O&M, and eventual decommissioning of other planned and permitted offshore wind facilities would occur. Underwater noise from pile driving during construction of those projects would result in detectable impacts on marine mammals; however, these impacts would be short term. Accidental releases and discharges, EMF, the presence of structures, cable emplacement and maintenance, port utilization, and lighting would result in long-term negligible or minor impacts on marine mammals. Although impacts on individual marine mammals and their habitat are anticipated from other offshore wind activities, the level of impacts would be minimized due to the EPMs implemented during construction, operation, and maintenance. The No Action Alternative would result in **minor to moderate** impacts on mysticetes (with the exception of NARW), odontocetes, and pinnipeds and could include **minor beneficial** impacts for some species that benefit from increased prey availability.

Because of the low population size for the NARW and continuing stressors, population-level effects on NARWs are occurring. Vessel activity (vessel collisions) and gear utilization associated with ongoing non–offshore wind activities continue to result in long-term population-level impacts. The effects of climate change further exacerbate impacts on NARW. For NARW, the No Action Alternative (in consideration of baseline conditions) would continue to result in **major** long-term impacts. Ongoing offshore wind construction, operation, and maintenance activities would be conducted with applicant-proposed and agency-required mitigation measures developed to avoid and minimize impacts on NARW; therefore, impacts from offshore wind activities are not anticipated to substantially contribute to the major impacts.

Cumulative impacts of the No Action Alternative. Under the No Action Alternative, existing environmental trends and ongoing activities would continue in addition to impacts from planned offshore wind activities. Mysticetes, odontocetes, and pinnipeds would continue to be affected by natural and human-caused IPFs. Planned non–offshore wind activities would also contribute to impacts on marine mammals. Planned non–offshore wind activities include increasing vessel traffic; new submarine cable and pipeline installation and maintenance; marine surveys; commercial and recreational fishing activities; marine minerals extraction; port expansion; channel-deepening activities; military readiness activities; and the installation of new towers, buoys, and piers. BOEM anticipates that planned non–offshore wind activities would result in moderate long-term impacts on marine mammals (with the exception of NARW) primarily driven by ongoing underwater noise impacts, vessel activity (vessel collisions), entanglement, seabed disturbance, and the lack of knowledge regarding any mitigation and monitoring requirements for these planned non–offshore wind activities. BOEM anticipates that the combined ongoing and planned activities would result in moderate impacts on marine mammals (with the exception of NARW, which would remain major). Additionally, the presence of structures could provide **beneficial** impacts on some marine mammal species.

Cumulative impacts to NARW are in many cases more severe than otherwise similar impacts to other marine mammal species. Due to the imperiled status of the population, impacts that lead to loss or reduced fitness of even one individual could compromise the viability of the species, which would constitute a major impact per the definitions provided in Section 3.3. Offshore wind construction, operation, and maintenance activities would be conducted with applicant-proposed and agency-required mitigation measures developed to minimize impacts on NARW; therefore, impacts from offshore wind activities are not anticipated to substantially contribute to the existing major impacts from baseline conditions.

On this basis, BOEM anticipates that the cumulative impacts of the No Action Alternative would result in **minor** to **moderate** impacts on mysticetes, odontocetes, and pinnipeds, with the exception of the NARW, on which impacts would be **major**. Impacts on individual NARWs could have population-level effects, and it is unknown whether the population can sufficiently recover from the loss of an individual to maintain the viability of the species.

The No Action Alternative would forgo any long-term monitoring that Revolution Wind has committed to, or would be required to perform, the results of which could provide an understanding of the effects of offshore wind development, benefit future management of these resources, and inform planning of other offshore developments. BOEM acknowledges, however, that other ongoing and future monitoring and surveys could provide similar data to support similar goals.

### 3.15.2.3 Alternative B: Impacts of the Proposed Action on Marine Mammals

Under the Proposed Action, baseline conditions for marine mammals (see Section 3.15.1) would continue to follow current regional trends within the GAA. Under Alternative B, BOEM would approve the COP for the Proposed Action. The impacts of each IPF from the construction and installation, O&M, and conceptual decommissioning of the Proposed Action would be incremental to and would compound the impacts of baseline conditions on each marine mammal population considered in this EIS (see Table 3.15-2). These effects are described below.

#### 3.15.2.3.1 Construction and Installation

#### Offshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> Effects on marine mammals from anchoring and cable emplacement activities during Project construction would primarily result from noise and disturbance related to vessel activity and exposure to suspended sediments from seafloor disturbance. Potential effects from exposure to vessel activity and suspended sediments from seafloor disturbance are described below under the vessel traffic and sediment deposition and burial IPFs, respectively. Entanglement risks to marine mammals from vessel anchoring and cable emplacement are not anticipated. Only larger construction and O&M vessels would anchor to the seafloor using large heavy anchor chains. Per the COP, no divers would be used and no lines or rigging are anticipated for cable installation and maintenance. Transmission cables and jet plow umbilicals are large in diameter, relatively inflexible, and under constant tension throughout installation. Therefore, the likelihood of marine mammal entanglement is discountable.

Anchoring and cable emplacement effects could lead to short-term adverse effects on invertebrate and finfish prey species. Effects on marine mammal prey resources are described in detail in Sections 3.6.2.2.1 and 3.13.2.2.1, respectively. While indirect effects to fish and invertebrate prey resources would occur, these impacts are not likely to significantly affect the availability of prey and forage resources for any marine mammal species and would therefore be **negligible** adverse. Therefore, anchoring and cable emplacement during construction would have **negligible** adverse effects on marine mammals.

<u>Noise:</u> Construction of the RWF and RWEC would produce short-term underwater and airborne noise with the potential to affect marine mammals. Construction noise sources include impact and vibratory pile driving, HRG surveys, UXO detonation, construction vessels, and helicopters and fixed-wing aircraft. The COP includes EPMs that the Project has committed to implementing and are described in Appendix F, Table F-1.

Impact pile driving would be used to install up to 100 RWF WTG and two OSS foundations. Vibratory pile driving could be used to construct the temporary cofferdam at the RWEC sea-to-shore transition. Construction vessels would be used throughout RWF and RWEC construction. Impact hammer installation of the RWF WTG and OSS foundations would produce underwater noise impacts with the greatest amount of exposure and highest potential to cause injury-level effects on marine mammals, based on likelihood of occurrence and extent of impacts.

Vibratory pile driving would generate intense non-impulsive noise impacts. Non-impulsive noise is less likely to cause injury to marine mammals, but the loud, continuous sound field generated by these sources can interfere with, or mask, communication and the ability to detect predators and locate prey (Hatch et al. 2012; Putland et al. 2017). When moving, construction vessels and marine mammals are moving in relation to one another. This tends to limit the duration of exposure such that injury-level effects are unlikely, but exposures exceeding behavioral harassment thresholds could still occur. In contrast, vibratory pile driving used to install the temporary cofferdam at the RWEC sea-to-shore transition site would be stationary. Vibratory pile-driving noise can cause auditory masking effects over great distances. Vessel engines also produce non-impulsive low frequency sound. While lower in intensity than vibratory pile driving, vessel engines operate continuously and can substantially alter the ambient noise environment.

UXOs could also be present within the maximum work area, and if these devices cannot be safely relocated or avoided, they may need to be detonated in place before bed-disturbing construction activities begin. Revolution Wind would follow an industry-standard process that minimizes the number of potential detonations (see COP Appendix G [Ordtek 2021]). These measures range from relocating the activity away from UXO, moving the UXO away from the activity, or cutting the UXO open to deactivate fused munitions or low-order detonation. These measures would be considered prior to in-situ UXO disposal. As of February 2023, 16 UXOs have been identified in the RWEC corridor. Revolution Wind has determined that all 16 devices can be safely avoided by shifting the cable route within the approved installation corridor without the need for detonation (Orsted 2023). However, additional devices of unknown size and location could be discovered during preconstruction surveys or construction that cannot be avoided or safely relocated. BOEM has concluded that the need for UXO detonation cannot be entirely ruled out; therefore, the potential effects of this activity on marine mammals are considered herein. The applicant has developed an assessment of potential underwater noise impacts on marine mammals, sea turtles, and finfish from UXO detonation, considering a range of warhead sizes ranging from 5 to 1,000 pounds (2.3 to 454 kg) (Hannay and Zykov 2022). The analysis presented herein considers impacts from detonation of the largest UXOs potentially occurring in the maximum work area. UXO detonation could overlap with other construction noise, but these effects have not been analyzed.

Underwater noise impacts on marine mammals are evaluated using behavioral and injury-level thresholds for different marine mammal species groups developed by NMFS (GARFO 2020; NOAA 2018) and TTS (i.e., temporary hearing impairment) exposure thresholds developed by the U.S. Navy (2017). Specific injury thresholds are defined for different marine mammal species groups based on hearing sensitivity. These thresholds are summarized in Table 3.15-5. As shown, marine mammals are organized into four groups based on hearing sensitivity, specifically the range of sound frequencies they are most sensitive to. NOAA (2018) has defined dual injury criteria for each group that can be used to evaluate the potential for hearing injury from exposure to different types of noise exposure, such as instantaneous exposure to a single pile strike, cumulative exposure to multiple pile strikes, cumulative exposure to UXO detonation, or cumulative exposure to non-impulsive sources like vibratory pile driving or vessel noise (NOAA 2018). NMFS (NOAA 2018) and the U.S. Navy (2017) have also defined threshold criteria for behavioral and TTS effects from impulsive noise sources and for behavioral effects from non-impulsive noise sources (see Table 3.15-5). The TTS thresholds are used to assess temporary hearing impairment impacts from UXO detonation; the behavioral thresholds are used to assess effects of other construction-related noise (e.g., pile driving, vessel noise).

Revolution Wind evaluated the potential for exposure to UXO-detonation-related noise impacts associated with the onset of lung and gastrointestinal (i.e., non-auditory) injuries ranging from minor up to and including potential mortality (Hannay and Zykov 2022; U.S. Navy 2017). Non-hearing-related injury thresholds are determined by equations that consider animal mass and depth at the time of exposure. Tables 3.15-6 and 3.15-7 present the animal mass estimates for different marine mammal groups and the equations used to calculate non-auditory injury thresholds for UXO detonation. The threshold formulas presented in Table 3.15-7 are based on observed onset of injuries to 1% of individuals in U.S. Navy (2017) test studies. BOEM is not presenting threshold distances for non-auditory injury and mortality from UXO detonation in Table 3.15-5, because animal size and water column position at the time of exposure will vary on a case-by-case basis. Hannay and Zykov (2022) considered a range of potential exposure scenarios and found that non-auditory threshold exposure distances for mitigated UXO detonations were less than those for auditory injury and temporary hearing impairment and within the pre-clearance zones for marine mammals proposed by Revolution Wind. Because the threshold distances for potential auditory injury and temporary hearing impairment will always be larger than those for non-auditory injury for a given marine mammal group, BOEM is relying on the latter to determine the potential for adverse noise impacts. BOEM is applying the guidance and thresholds currently accepted by NOAA (2018) to assess underwater noise impacts. BOEM also recognizes that marine mammal hearing is an evolving science, and improved understanding (e.g., Southall et al. 2019) could lead to future refinements.

**Table 3.15-5. Underwater Noise Exposure Thresholds for Permanent Hearing Injury and Behavioral Disruption by Marine Mammal Hearing Group**

| Hearing Group | Type of Effect | Type of Exposure | Value | Units |
|---|---|---|---|---|
| LFC | Permanent hearing injury | Cumulative SEL (impulsive)* | 183 | SEL dB re 1 μPa²·s |
| | | Cumulative SEL (non-impulsive) | 199 | SEL dB re 1 μPa²·s |
| | | Peak injury (impulsive)* | 219 | dB re 1 μPa |
| | Behavioral harassment/ Temporary hearing impairment | Behavioral (intermittent) | 160 | dB re 1 μPa |
| | | TTS (peak)* | 213 | dB re 1 μPa |
| | | TTS (cumulative SEL)* | 168 | SEL dB re 1 μPa²·s |
| | | Behavioral (continuous) | 120 | dB re 1 μPa²·s |
| MFC | Permanent hearing injury | Cumulative SEL (impulsive)* | 185 | SEL dB re 1 μPa²·s |
| | | Cumulative SEL (non-impulsive) | 198 | SEL dB re 1 μPa²·s |
| | | Peak injury (impulsive)* | 230 | dB re 1 μPa |
| | Behavioral harassment/ Temporary hearing impairment | Behavioral (intermittent) | 160 | dB re 1 μPa |
| | | TTS (peak)* | 224 | dB re: 1 μPa |
| | | TTS (cumulative SEL)* | 170 | SEL dB re 1 μPa²·s |

| Hearing Group | Type of Effect | Type of Exposure | Value | Units |
|---|---|---|---|---|
| | | Behavioral (continuous) | 120 | dB re 1 µPa |
| HFC | Permanent hearing injury | Cumulative SEL (impulsive)* | 155 | SEL dB re 1 µPa²·s |
| | | Cumulative SEL (non-impulsive) | 173 | SEL dB re 1 µPa²·s |
| | | Peak injury (impulsive)* | 202 | dB re 1 µPa |
| | Behavioral harassment/ Temporary hearing impairment | Behavioral (intermittent) | 160 | dB re 1 µPa |
| | | TTS (peak)* | 196 | dB re 1 µPa |
| | | TTS (cumulative SEL)* | 140 | SEL dB re 1 µPa²·s |
| | | Behavioral (continuous) | 120 | dB re 1 µPa |
| Seals and sea lions (Phocids) | Permanent hearing injury | Cumulative SEL (impulsive)* | 185 | SEL dB re 1 µPa²·s |
| | | Cumulative SEL (non-impulsive) | 198 | SEL dB re 1 µPa²·s |
| | | Peak injury (impulsive)* | 218 | dB re 1 µPa |
| | Behavioral harassment/ Temporary hearing impairment | Behavioral (intermittent) | 160 | dB re 1 µPa |
| | | TTS (peak)* | 212 | dB re 1 µPa |
| | | TTS (cumulative SEL)* | 170 | SEL dB re 1 µPa²·s |
| | | Behavioral (continuous) | 120 | dB re 1 µPa |

Source: GARFO (2020); NMFS (2018); U.S. Navy (2017).

Note: SEL = sound exposure level.

* The identified values were used in the analysis of UXO detonation effects (Hannay and Zykov 2022; U.S. Navy 2017).

**Table 3.15-6. Representative Calf/Pup and Adult Mass Estimates Used for Assessing Impulse-based Onset of Lung Injury and Mortality Threshold Exceedance Distances**

| Impulse Animal Group | Representative Species* | Calf/Pup Mass (kilograms) | Adult Mass (kilograms) |
|---|---|---|---|
| Baleen whales and sperm whale | Sei whale (*Balaenoptera borealis*)<br>Sperm whale (*Physeter macrocephalus*) | 650 | 16,000 |
| Pilot and minke whales | Minke whale (*Balaenoptera acutorostrata*) | 200 | 4,000 |
| Beaked whales | Gervais' beaked whale (*Mesoplodon europaeus*) | 49 | 366 |
| Dolphins, kogia, pinnipeds, and sea turtles | Harbor seal (*Phoca vitulina*) | 8 | 60 |
| Porpoises | Harbor porpoise (*Phocoena phocoena*) | 5 | 40 |

*Species presented here are representative for the impulse animal group as presented by U.S. Navy (2017). Some species shown and do not necessarily occur within the RWF or RWEC corridor.

**Table 3.15-7. Thresholds for Onset of Non-auditory Injury Based on Observed Effects on 1% of Exposed Animals**

| Hearing Group | Mortality (severe lung injury)* | Slight Lung Injury* | Gastrointestinal Tract Injury |
|---|---|---|---|
| All marine mammals | $103M^{1/3}\left(1+\frac{D}{10.1}\right)^{1/6}$ Pa·s | $47.5M^{1/3}\left(1+\frac{D}{10.1}\right)^{1/6}$ Pa·s | $L_{pk,flat}$: 237 dB |

Source: U.S. Navy (2017).

Notes:

M = animal (adult and/or calf/pup) mass (kilograms) (see Table C.9 in U.S. Navy [2017])

D = animal depth (meters).

* Lung injury (severe and slight) thresholds are dependent on animal mass.

Kusel et al. (2023) and Hannay and Zykov (2022) developed sound source level estimates for monopile installation and UXO detonation activities that could occur under the Proposed Action. They then used those source values to estimate the distance required for that noise to attenuate to the marine mammal exposure thresholds. LGL (2022) reported comparable sound source estimates for vibratory pile driving used for sea-to-shore transition construction. Assessment of construction vessel noise is based on the analysis presented in Denes et al. (2021). The resulting values based on summer modeling conditions, presented in Table 3.15-8, represent a radius extending around each noise source where potential injury and behavioral-level effects could occur. The single strike injury distances apply only to impact pile driving and represent how close a marine mammal would have to be to the source to be instantly injured by a single pile strike. The cumulative injury distances are based on exposure ranges that consider total estimated exposure accounting for animal movement. The behavioral and TTS values are instantaneous exposure distances, meaning that any animal within the effect radius is assumed to have experienced a temporary to short-term adverse effect.

Using the information presented in Tables 3.15-6 and 3.15-7, Hannay and Zykov (2022) also assessed the potential for non-auditory injury (i.e., lung and gastrointestinal injury). As noted, the potential for non-auditory injury is dependent on water depth, animal mass, and device size. Across the range of depths, animal mass, and device sizes assessed, the onset of lung injury may occur within 16 to 2,126 feet of a detonation, and mortality may occur within 16 to 1,158 feet of a detonation. Gastrointestinal injury may occur within 69 to 410 feet of a detonation. These distances assume use of an attenuation system achieving 10-dB sound source reduction. As evident in Table 3.15-6, the potential for auditory injury from UXO detonation typically occurs within a much larger radius around the detonation than the potential for non-auditory injury. However, depending on the device size, it is possible that an individual could experience both non-auditory and auditory injury.

**Table 3.15-8. Distance Required to Attenuate Underwater Construction Noise below Marine Mammal Injury and Behavioral Effect Thresholds by Activity and Hearing/Species Groups, based on Exposure Range (ER95%) Values**

| Construction Activity | Number of Sites | Total Days | Species Group | Distance to Peak Injury Threshold (feet) | Distance to Cumulative Injury Threshold (feet)^ | Distance to Behavioral or Cumulative TTS Effect Threshold (feet) ^ |
|---|---|---|---|---|---|---|
| 12-meter WTG monopile foundation installation* | 100 | 33 | LFC | < 33 | 4,954–8,727 | 11,909–12,336 |
| | | | MFC | – | 0–66 | 0–12,041 |
| | | | HFC | 525 | 4,396 | 11,877 |
| | | | Phocid pinnipeds (earless/true seals) | – | 787–1,444 | 11,909–12,467 |
| 15-meter OSS monopile foundation installation* | 2 | 2 | LFC | < 33 | 3,084–5,873 | 11,516–11,877 |
| | | | MFC | – | – | 0–11,909 |
| | | | HFC | 361 | 2,723 | 11,483 |
| | | | Phocid pinnipeds (earless/true seals) | – | 33–1,214 | 11,549–12,303 |
| Temporary cofferdam installation and removal† | 1 | 56 | LFC | Not applicable (N/A) | 4,823 | 120,374 |
| | | | MFC | N/A | – | 68,537 |
| | | | HFC | N/A | 207 | 52,598 |
| | | | Phocid pinnipeds (earless/true seals) | N/A | 338 | 100,784 |
| HRG surveys†,‡ | 10,775 linear survey miles | 248 | LFC | N/A | 5 | 463 |
| | | | MFC | N/A | <3 | 463 |
| | | | HFC | N/A | 120 | 463 |
| | | | Phocid pinnipeds (earless/true seals) | N/A | <3 | 463 |

| Construction Activity | Number of Sites | Total Days | Species Group | Distance to Peak Injury Threshold (feet) | Distance to Cumulative Injury Threshold (feet)^ | Distance to Behavioral or Cumulative TTS Effect Threshold (feet) ^ |
|---|---|---|---|---|---|---|
| Construction vessel operation§ | N/A | 765 | LFC | N/A | 367 | 48,077 |
| | | | MFC | N/A | 115 | 44,236 |
| | | | HFC | N/A | 338 | 42,362 |
| | | | Phocid pinnipeds (earless/true seals) | N/A | 164 | 47,001 |
| UXO detonation¶,# | 13 | 13 | LFC | 466–2,776 | 883–14,009 | 8,629–44,291 |
| | | | MFC | 138–846 | 167–1,755 | 1,243–9,613 |
| | | | HFC | 3,025–17,615 | 5,512–22,835 | 19,783–51,181 |
| | | | Phocid pinnipeds (earless/true seals) | 518–3,091 | 236–6,004 | 3,707–25,656 |

^ Distances to thresholds for peak exposure, behavioral effects exposure, and UXO detonation are exposure ranges, which describe the area within which 95% of exposed animals would experience the effect from instantaneous exposure (R95%). Cumulative injury and TTS (i.e., temporary hearing impairment) threshold distances are exposure ranges (ER95%). Exposure ranges account for animal movement and are used to determine the number of animals likely to be exposed to cumulative exposure effects.

* Data from Kusel et al. (2023). Values shown are the range of effect threshold distances across all modeled species in each hearing group for summer installation of 12-m WTG monopiles and 15-m OSS monopiles. Installation scenario for 12-m monopiles is 10,740 strikes/pile at installation rate of three piles/day. Installation scenario for 15-m monopile is 11,563 strikes/pile at installation rate of up to two piles/day. All piles installed with a maximum 4,000-kJ hammer with an attenuation system achieving 10-dB sound source reduction.

† Data from LGL (2022) for a sheet pile cofferdam installed using a vibratory hammer. Distance to threshold estimated assuming the use of AZ-type sheet piles, with a maximum of 56 pile-driving days (for installation and removal). Threshold distances shown do not consider geographic confinement by surrounding shorelines of Narragansett Bay.

‡ HRG survey values are maximum threshold distances for each hearing group for the loudest type of equipment likely to be employed, as reported by LGL (2022).

§ Data from Denes et al. (2021). Analysis considered use of dynamic positioning thrusters by construction vessels. This analysis did not consider the timing, frequency, and duration of noise from background vessel traffic in and near the Lease Area. Noise levels produced by construction vessels are expected to be similar to these background sources.

¶ The range of values shown are the minimum and maximum threshold distances for detonation of UXOs ranging in size from 5 to 1,000 pounds at four modeled sites with 10 dB of sound attenuation (Hannay and Zykov 2022). The 1,000-pound UXO is the largest potential explosive device potentially occurring in the maximum work area.

# Peak and cumulative PTS threshold distances calculated by Hannay and Zykov (2022) for detonation of 5 to 1,000-pound UXOs with 10 dB of sound attenuation. NOAA uses the larger cumulative threshold distance to assess potential PTS (i.e., hearing injury) and TTS (i.e., temporary hearing impairment) exposure resulting from UXO detonation (Hannay and Zykov 2022). Hearing injury and temporary hearing impairment exposure could occur anywhere within zones of exposure ranging from 46,139 to 567,221 acres within and around the maximum work area for the RWF and RWEC. The size of a potential exposure area will vary within this range by hearing group and the type of exposure (i.e., PTS or TTS). The location of detonation impacts and actual likelihood of exposure would depend on where UXOs are encountered.

The PDE for the Proposed Action includes the installation of up to 100 12-meter and two 15-meter monopile foundations using an impact hammer. The installation scenario considered in the acoustic analysis assumes each WTG monopile installation would require up to 10,740 strikes from an impact hammer ranging in energy from 1,000 kJ to 4,000 kJ over 4 hours to achieve desired depth. Up to three WTG monopiles could be installed in 1 day. The 15-meter OSS monopiles would require up to 11,563 strikes from an impact hammer ranging in energy from 1,000 kJ to 4,000 kJ and up to two piles would be installed per day. After each pile is driven to depth, the construction vessel would attach appurtenant platforms and equipment and then reposition to the next foundation site. Additionally, detonation of UXOs within the work area may be required. The UXO exposure distance estimates (presented in Table 3.15-8) reflect the planned use of a noise attenuation system that would reduce the source noise level by an average of 10 dB per hammer strike, which has been demonstrated with currently available technologies under other circumstances (Bellman et al. 2020).

Monopile installation and UXO detonation are the most likely sources of permanent hearing injury and other temporary to short-term effects to marine mammals from Project-related underwater noise. UXO detonation may also result in non-auditory injury (i.e., lung and gastrointestinal tract compression injuries); these effects are dependent on water depth and animal mass (Hannay and Zykov 2022). The likelihood of injury from underwater noise also depends on proximity to the noise source, the intensity of the source, sensitivity to the sound source, and the duration of noise exposure. A summary of the distances required to attenuate impact pile-driving noise for WTG and OSS foundation installation and UXO detonation below exposure thresholds is provided in Table 3.15-8. As shown, the threshold distances for different types of effects varies between marine mammal species depending on hearing sensitivity. For example, a low-frequency cetacean would have to remain within 8,727 feet of a 12-meter monopile installation for 24 hours to experience permanent cumulative hearing injury, referred to as PTS. In contrast, the same animal could immediately experience PTS if it were within 14,009 feet from detonation of a 1,000-pound UXO. Mid-frequency cetaceans and phocid pinnipeds are less sensitive to the intense, low-frequency sounds produced by impact pile driving and would have to be much closer to the source to be injured. For example, phocid pinnipeds would need to remain within less than 1,444 feet of a 12-meter monopile installation for 24 hours to experience cumulative injury. Aversion responses (avoidance of sound levels or acoustic sources that are disturbing or injurious) by marine mammals have been documented, and available information suggests that mobile marine mammals are likely to leave areas where potentially harmful noise effects are occurring (Dunlop et al. 2017; Ellison et al. 2012; Southall et al. 2007). A detailed discussion of noise impacts on marine mammals is provided in Vineyard Wind final EIS Section 3.4.1.1.1 (BOEM 2021b).

Vibratory pile driving used during construction of the RWEC sea-to-shore transition would create an exposure area for underwater sound pressure levels in excess of the 120 dB re 1 µPa threshold (NMFS 2019) for behavioral harassment from continuous noise sources. Based on sound source modeling conducted to support the Revolution Wind incidental take petition (LGL 2022), vibratory pile-driving noise could theoretically extend outward from the cofferdam site up to 31,955 feet (6.05 miles). The surrounding shorelines of Narragansett Bay would restrict the maximum distance vibratory pile-driving noise could travel, limiting potential exposure to those marine mammal species that are likely to occur within this enclosed embayment. Vibratory pile-driving noise could occur for up to 8 hours per day over a maximum of 56 days: 28 days for installation and 28 days for removal.

HRG surveys would also generate impulsive noise but at a lower intensity than impact pile driving, limiting the duration of exposure. Additionally, as the equipment is mobile, the sound source and marine mammal receptors would be moving in relation to one another, further limiting the duration of exposure. Injury-level effects are therefore unlikely, but exposures exceeding behavioral thresholds could still occur. Revolution Wind estimates that up to 10,779 linear miles of preconstruction HRG surveys would occur over 248 days, averaging approximately 43.5 linear miles of exposure each day at a typical vessel speed of 4 knots (LGL 2022). As discussed under the No Action Alternative, BOEM (2021a) reviewed underwater noise levels produced by the available types of HRG survey equipment and NMFS (2021) concurred with BOEM's determination that the loudest available equipment types would be unlikely to injure or measurably affect the behavior of ESA-listed marine mammals. While individual marine mammals may be exposed to HRG survey noise sufficient to cause behavioral effects, those effects would be temporary in nature and unlikely to cause any perceptible longer-term consequences to individuals or populations.

As discussed above, the Revolution Wind–committed EPMs would effectively minimize injury risks to most marine mammals from instantaneous and cumulative noise exposure. Nighttime pile driving is proposed, but NMFS's ITA would require sufficient demonstration of the effectiveness of proposed monitoring and mitigation protocols in the form of a nighttime pile-driving plan prior to initiating any nighttime pile driving. Initial evaluation of monitoring equipment suggests that combined acoustic and visual monitoring methods can be effective for monitoring in the dark (ThayerMahan 2023). Proposed measures emphasize protection of the critically endangered NARW and concentrate construction within a timing window when this species is least likely to be present. This timing window is not protective for all species, and some impact areas for PTS, as well as behavioral effects, are large enough that the potential for individual exposure cannot be ruled out.

Kusel et al. (2023) modeled sound attenuation distance to hearing injury thresholds for construction-related impact pile driving and developed estimates of the number of marine mammals that could be exposed to potential adverse noise-related effects from the Proposed Action to support MMPA compliance. Hannay and Zykov (2022) similarly modeled the attenuation distance to marine mammal hearing and bodily injury thresholds for UXO detonation. Using habitat-based density modeling results reported by Roberts et al. (2016, 2017, 2018, 2021), LGL (2022) then calculated the take associated with these modeled exposure estimates incorporating other factors, such as proposed mitigation measures and marine mammal group sizes. The take results are summarized in Tables 3.15-9 and 3.15-10. LGL (2022) used a sophisticated exposure model to estimate the number of individuals by species that could be exposed to PTS (i.e., permanent hearing injury), TTS (i.e., a temporary and recoverable loss of hearing sensitivity), and other short-term physiological and behavioral effects from exposure to each source of construction noise (e.g., impact pile driving, vibratory pile driving, UXO detonation). The modeled exposure scenario for each species assumed an aggressive construction schedule of up to three WTG monopiles installed per day for 30 days (90 total) during the highest density month of species occurrence in the area and the remaining 10 WTG monopiles and two OSS monopiles installed during the month with the second-highest density. The exposure scenario for UXOs assumes that thirteen 1,000-pound devices would require detonation within the RWF and RWEC work areas and that the devices are distributed spatially such that the exposure areas would not overlap. Additionally, detonations would be limited to one per day, and the noise would be instantaneous, so there would be no temporal overlap in exposure. As stated, Revolution Wind has determined that all 16 UXOs identified within the RWEC corridor can be avoided; therefore, the values presented in Tables 3.15-9 and 3.15-10 are a useful upper bound for estimating the number of animals potentially exposed if additional devices are discovered. Modeling scenarios assume timing restrictions and the use of a noise attenuation system capable of achieving at least a 10-dB reduction in sound source level. Exposure may be further minimized by other established measures (e.g., pre-start clearance zone monitoring using protected species observers (PSOs) and passive acoustic monitoring (PAM), use of night vision equipment and infrared/thermal imaging technology at night, soft starts, and shutdown procedures). Recent work suggests that the use of infrared technology at night is as effective for detecting marine mammals as daylight visual monitoring (Guazzo et al. 2019; Verfuss et al. 2018). See Appendix F, Table F-1 for a complete list of EPMs.

**Table 3.15-9. Estimated Number of Marine Mammals Experiencing a Permanent Threshold Shift from Worst-Case Scenarios for Construction-Related Impact Pile Driving and Unexploded Ordinance Detonation Exposure**

| Functional Hearing Group | Species | Source: Impact Pile Driving Exposure† | Source: UXO Detonation Exposure‡ |
|---|---|---|---|
| LFC | Blue whale§ | – | – |
| | Fin whale§ | – | – |
| | Minke whale | – | – |
| | Sei whale§ | – | – |
| | Humpback whale | 8 | – |
| | NARW§ | – | – |
| MFC | Sperm whale§ | – | – |
| | Atlantic spotted dolphin | – | – |
| | Atlantic white sided dolphin | – | – |
| | Common bottlenose dolphin | – | – |
| | Common dolphin | – | – |
| | Risso’s dolphin | – | – |
| | Pilot whale* | – | – |
| HFC | Harbor porpoise | – | 49 |
| Phocid pinnipeds | Gray seal | – | 3 |
| | Harbor seal | – | 5 |

Source: LGL (2022).

Note: Estimated number of individuals is based on established injury thresholds. Cumulative exposure estimates for impact pile driving are based on exposure ranges that consider animal movement modeling for each species. UXO exposure estimates are based on acoustic ranges.

† Modeled exposure estimates based on a worst-case scenario impact hammer installation schedule of 100 12-meter WTGs and two 15-meter OSS monopiles, with up to three WTGs per day and up to two OSSs per day. Installation scenario assumes use of a noise attenuation system achieving 10-dB effectiveness and seasonal restrictions but does not consider other EPMs or mitigation measures.

‡ Model exposure estimates based on worst-case UXO scenario considering detonation of thirteen 1,000-pound (454-kg) explosives with 10 dB of noise attenuation at locations with non-overlapping spatial or temporal impacts. As described in the

text and based on information available as of February 2023 (Orsted 2023), this is likely an overestimate of impacts from UXO detonation.

[§] Listed under the ESA.

* Group includes both long-finned and short-finned pilot whales. Short-finned pilot whales are considered to be rare within the Lease Area because preferred habitat is not present.

**Table 3.15-10. Estimated Number of Marine Mammals Experiencing a Behavioral Effects from Construction-Related Activities**

| Functional Hearing Group | Species | Year 1 (construction) | Year 2 (construction) | Year 3 (O&M) | Year 4 (O&M) | Year 5 (O&M) | Current Stock Abundance | Number of Individuals Exposed as Percent of Stock Abundance |
|---|---|---|---|---|---|---|---|---|
| LFC | Blue whale[§] | 3 | 1 | 1 | 1 | 1 | 402 | 1.7% |
| | Fin whale[§] | 101 | 16 | 16 | 16 | 16 | 6,802 | 2.4% |
| | Humpback whale | 263 | 46 | 46 | 46 | 46 | 1,396 | 32.0% |
| | Minke whale | 363 | 10 | 10 | 10 | 10 | 21,968 | 1.8% |
| | North Atlantic right whale[§] | 50 | 3 | 3 | 3 | 3 | 338 | 18.3% |
| | Sei whale[*] | 21 | 2 | 2 | 2 | 2 | 6,292 | 0.5% |
| MFC | Atlantic spotted dolphin | 87 | 29 | 29 | 29 | 29 | 39,921 | 0.5% |
| | Atlantic white-sided dolphin | 312 | 28 | 28 | 28 | 28 | 93,233 | 0.5% |
| | Bottlenose dolphin | 375 | 65 | 65 | 65 | 65 | 62,851 | 1.0% |
| | Common dolphin | 10,521 | 1,821 | 1,821 | 1,821 | 1,821 | 172,974 | 10.3% |
| | Pilot whales* | 27 | 9 | 9 | 9 | 9 | 68,139 | 0.1% |
| | Risso’s dolphin | 43 | 6 | 6 | 6 | 6 | 35,215 | 0.2% |
| | Sperm whale[§] | 8 | 2 | 2 | 2 | 2 | 4,349 | 0.4% |
| HFC | Harbor porpoise | 1,283 | 33 | 33 | 33 | 33 | 95,543 | 1.5% |
| Phocid pinnipeds | Gray seal | 1,073 | 49 | 49 | 49 | 49 | 27,300 | 4.6% |
| | Harbor seal | 2,669 | 109 | 109 | 109 | 109 | 61,336 | 5.1% |

Source: Hayes et al. (2021, 2022); LGL (2022).

Note: Estimated number of individuals is based on established TTS and behavioral thresholds. TTS thresholds were used to determine exposure estimates to temporary hearing impairment from UXO detonation, while all other exposure estimates are based on the established behavioral thresholds for intermittent and continuous noise (refer to Table

3.15-5). Based on information available as of February 2023 (Orsted 2023), the effects associated with UXO detonation are likely overestimated here because the analysis assumes detonation of thirteen 1,000-pound (454-kg) explosives with 10 dB of noise attenuation at locations with non-overlapping impacts.

[§] Listed under the ESA.

* Group includes both long-finned and short-finned pilot whales. Short-finned pilot whales are considered to be rare within the Lease Area because s preferred habitat is not present.

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As shown in the above tables, LGL (2022) estimates that four species of marine mammals could experience PTS injury from exposure to underwater noise from impact pile-driving or UXO detonation noise under the Proposed Action. Specifically, up to eight humpback whales, 59 harbor porpoise, two gray seals, and four harbor seals could be exposed to PTS impacts from these activities. Multiple individuals from several species are likely to experience short-term TTS or behavioral effects from exposure to several different sources of Project-related noise, including HRG surveys and sea-to-shore transition construction, in addition to UXO detonation and impact pile driving. TTS and behavioral exposures can have an array of adverse effects on marine mammals, even in the absence of overt behavioral responses. For example, a reduction in effective "communication space" caused by auditory masking can make it more difficult to locate companions and maintain social organization (Cholewiak et al. 2018). This can increase physiological stress, leading to impaired immune function and other chronic health problems (Brakes and Dall 2016; Davis et al. 2017; Hatch et al. 2012). These kinds of effects are most associated with long-term changes in the ambient noise environment, specifically from chronic exposure to noise from increasing levels of marine vessel traffic. All construction-related noise sources would cease once construction is completed, and most animals suffering from TTS or stress from auditory masking and behavioral exposure would be expected to recover fully within hours to days. Therefore, for most marine mammal species, exposure to behavioral-level noise effects would constitute a **minor** impact. Certain species, notably NARW, may be more sensitive to behavioral exposure. NARWs employ a specialized feeding strategy that could be sensitive to behavioral disturbance (van der Hoop et al. 2019), and disturbance that results in missed feeding opportunities could have significant effects on fitness (Fortune et al. 2013). Short-term behavioral disturbance could therefore lead to greater than minor impacts on this species. However, the likelihood of this level of effect resulting from Project-related noise exposure and its significance at the individual or population level is currently unknown.

The exposure estimates reported in Tables 3.15-9 and 3.15-10 consider the application of seasonal restrictions and noise attenuation systems (also termed noise abatement systems) with 10-dB attenuation efficacy. Bellmann et al. (2020) found three noise abatement systems to have proven effectiveness and to be offshore suitable: 1) the near-to-pile noise abatement systems – noise mitigation screen; 2) the near-to-pile hydro sound damper; and 3) for a far-from-pile noise abatement system, the single and double big bubble curtain. With the near-to-pile noise abatement systems – noise mitigation screen or the single big bubble curtain, noise reductions of approximately 15 to 17 dB in depths of 82 to 131 feet (25 to 40 meters) could be achieved. The near-to-pile hydro sound damper system, independent of the water depth, demonstrated noise reductions of 10 dB with an optimum system design. The achieved broadband noise reduction with a single or double big bubble curtain was dependent on the technical-constructive system configuration. Based on Bellmann et al. (2020), the noise mitigation system performance of a 10-dB broadband attenuation assumed for the Project is considered achievable with currently available technologies for pile-driving activities. Additional EPMs and other minimization measures that may further limit exposure include establishment and monitoring of pre-start clearance zones using PSOs and PAM use of night vision equipment and infrared/thermal technology during nighttime pile driving, and soft-start and shutdown procedures. These measures would significantly reduce, but not completely avoid, marine mammal exposure to PTS and TTS or behavioral effects. Overall, underwater noise during construction activities would have a **minor** to **moderate** adverse effect on marine mammals, depending on the species.

LGL (2022) did not explicitly consider construction vessel noise in their exposure assessment. In general, vessel noise is unlikely to cause hearing injury in marine mammals because this would require prolonged exposure close to the source (i.e., remaining within 400 feet of a large vessel for 24 hours, per NOAA [2018]). This is an unlikely scenario. For example, an animal swimming at 2.5 miles per hour, the lower end of average swim speeds for the NARW (Baumgartner and Mate 2005), would travel 400 feet in less than 2 minutes. This animal would clear the zone of noise exposure (i.e., the area in which underwater noise may exceed the baseline) around a stationary construction vessel within approximately 4 hours. The potential for PTS is highly unlikely because it would require an animal remaining within 400 feet of a vessel for 24 hours; behavioral effects may occur but would be spatially and temporally limited. The likelihood and duration of exposure would be further reduced when construction vessels are moving. Animals and vessels moving in relation to each other are likely to reduce the duration of exposure to potential behavioral and auditory masking effects. However, certain marine mammals, notably dolphins, exhibit "bow-riding" behavior. Bow or wake riding provides an energetic advantage, allowing dolphins to travel at high speeds while using less energy (Würsig 2009) and becoming more energy efficient at speeds above 7 knots as compared to normal swimming at speeds below 4 knots (Williams et al. 1992). Individuals attracted to moving vessels would experience prolonged noise exposure, presumably above the behavioral effects threshold. However, a significant portion of construction vessel activity would occur at speeds at or below 4 knots (e.g., cable installation, HRG surveys, installation vessel travel between foundation sites).

As stated above, though it has not been definitively proven, logic and available data (e.g., Dunlop et al. 2017; Ellison et al. 2012; Southall et al. 2007) suggest that mobile marine mammals would avoid behavioral disturbances like those resulting from vessel noise, meaning that the duration of exposure to noise from slow-moving or closely clustered and stationary construction vessels would be limited. It is also important to recognize that a substantial portion of construction vessel activity would occur in areas with high existing levels of vessel traffic. As such, construction vessels would contribute to, but may not substantially alter, ambient noise conditions generated by existing large vessel traffic. While some individual marine mammals could experience short-term behavioral and auditory effects from vessel noise exposure, these effects would be short term in duration and unlikely to cause measurable effects at the broader stock or population-level. Therefore, construction vessel noise impacts on marine mammals would likely be **minor** adverse because of the intermittent nature of the impact and potential for avoidance behavior.

Impact pile-driving noise could indirectly affect marine mammals by killing, injuring or temporarily altering the distribution of fish and invertebrate prey (see Sections 3.6 and 3.13). These effects would be limited in extent, short term, and unlikely to measurably affect the amount of prey available to marine mammals across the OCS because 1) the area of effect is small relative to the available habitat; 2) the loss of individuals would likely be insignificant relative to natural mortality rates for planktonic eggs and larvae across the GAA, which can range from 1% to 10% per day or higher (White et al. 2014); and 3) construction timing along with EPMs intended to avoid noise impacts in areas with sensitive species. Therefore, the indirect effects of underwater noise on marine mammals through impacts to prey species would be short term and **negligible** adverse.

Pile driving also produces airborne noise. NMFS has established a behavioral sound pressure level threshold of 90 dB re 1 µPa for harbor seals and 100 dB re 1 µPa for other otariid and phocid pinniped exposure to airborne noise sources like pile driving (NOAA 2018). No equivalent airborne noise behavioral thresholds have been established for other marine mammal species. Harbor and gray seals are the only pinniped species group expected to occur in the RWF and RWEC vicinity. Based on the cylindrical spreading model described on the website Discovery of Sound in the Sea (University of Rhode Island 2021), behavioral effects could be experienced within approximately 500 and 10 feet from impact and vibratory pile-driving locations, respectively. However, because seals would experience behavioral harassment and injury-level exposures to underwater noise at greater distance, behavioral exposure to airborne noise is unlikely to occur as an independent effect. Moreover, marine mammal observers would monitor the affected area for seals and would halt construction if individuals are observed within these limits (refer to Appendix F, Table F-1), further minimizing the risk of seal exposure to airborne noise impacts (Baker et al. 2013; VHB 2023). On this basis, airborne noise effects on seals would be **negligible** adverse because of the established EPMs and likely avoidance response.

Helicopters and fixed-wing aircraft could also be used during Project construction. Aircraft operations could result in temporary behavioral responses, including short surface durations, abrupt dives, and percussive behaviors (i.e., breaching and tail slapping) (Patenaude et al. 2002), but BOEM does not expect that these exposures would result in biologically significant effects on marine mammals. On this basis, noise and disturbance effects on marine mammals from aircraft operations under the Proposed Action are expected to be **minor** adverse because of protective regulations and the temporary nature of the impact.

Overall, noise effects on marine mammals from proposed construction and installation activities are expected to range from **negligible** to **moderate** adverse, depending on the activity. Based on the likelihood of occurrence and extent of impacts, impact pile driving would produce underwater noise impacts with the greatest amount of exposure and the highest potential to cause injury-level effects on marine mammals.

<u>Presence of structures:</u> Effects on marine mammals from installation of WTG and OSS foundations would result from underwater noise impacts related to impact pile driving and noise disturbance from associated vessel activity. These impacts are described in the Noise IPF section. Indirect effects on marine mammals such as reduced availability of forage or prey could also result from impacts on invertebrate and finfish prey species (see Sections 3.6.2.2.1 and 3.13.2.2.1, respectively). While indirect effects to fish and invertebrate prey resources would occur, these impacts are not likely to significantly affect the availability of prey and forage resources for marine mammals because of their broad resource base and the minimal anticipated adverse effect to fish and invertebrates during the construction phase. Therefore, construction and installation of offshore structures would have temporary, **negligible** to **minor** adverse effects on marine mammals. Effects to each marine mammal species would depend on the magnitude and extent of effects on forage and prey availability, the significance of those effects on individual survival and reproductive fitness, and the status and sensitivity of the affected population to those impacts.

<u>Vessel traffic:</u> Construction and monitoring vessels pose a potential collision risk to marine mammals, and the noise and disturbance generated by vessel presence could temporarily displace individual marine mammals from preferred habitats. Based on information provided by Revolution Wind (Tech Environmental 2023), BOEM estimates that Project construction would require up to 1,407 one-way trips by various classes of vessels between the RWF and regional ports in Rhode Island, Massachusetts, Connecticut, New Jersey, Virginia, and Maryland, as well as ports in Europe over the 2-year construction period. This equates to approximately 59 trips per month or 704 trips per year. In addition, approximately

10,755 linear miles of preconstruction HRG surveys are anticipated to support micrositing of the WTG foundations and cable routes. HRG surveys could occur during any month of the year and would require a maximum of 248 total vessel days. The construction vessels used for Project construction are described in Table 3.3.10-3 in the COP and in Section 3.16. Typical large construction vessels used in this type of project range from 325 to 350 feet in length, from 60 to 100 feet in beam, and draft from 16 to 20 feet (Denes et al. 2021).

Large construction vessels and barges would account for an estimated 23% of these one-way trips, with the remainder comprising CTVs and other small support vessels. BOEM developed a representative analysis of construction vessel effects on regional traffic volume by evaluating the potential increase in transits across a set of analysis cross sections relative to baseline levels of vessel traffic. These cross sections were developed by DNV GL Energy USA, Inc. (2020) to support the COP and are shown in Figures 3.15-2 and 3.15-3.

Using the port of origin information provided by Revolution Wind (Tech Environmental 2023), the estimated 704 construction vessel trips per year would cross transects 13-17 when leaving the RWF and could cross several different transects depending on the destination port. This would equate to a 30% increase in vessel transits across these transects. However, the Automatic Identification System (AIS) data used in transect analysis do not include many recreational vessels that lack AIS transponders and commercial fishing vessels that deactivate their transponders when actively fishing. These two vessel classes account for the vast majority of vessel activity. For example, DNV GL Energy USA, Inc. (2020) estimated over 19,000 one-way trips per year by commercial fishing vessels between the RWF and area ports. When these vessel trips are included, Project construction would result in a 3.1% increase in vessel transits per year across transects 13–17. In summary, this assessment indicates that construction vessels would likely increase vessel traffic to some degree, and large vessel traffic would measurably increase during the 2-year construction period. This indicates the potential for increased risk of marine mammal collisions.

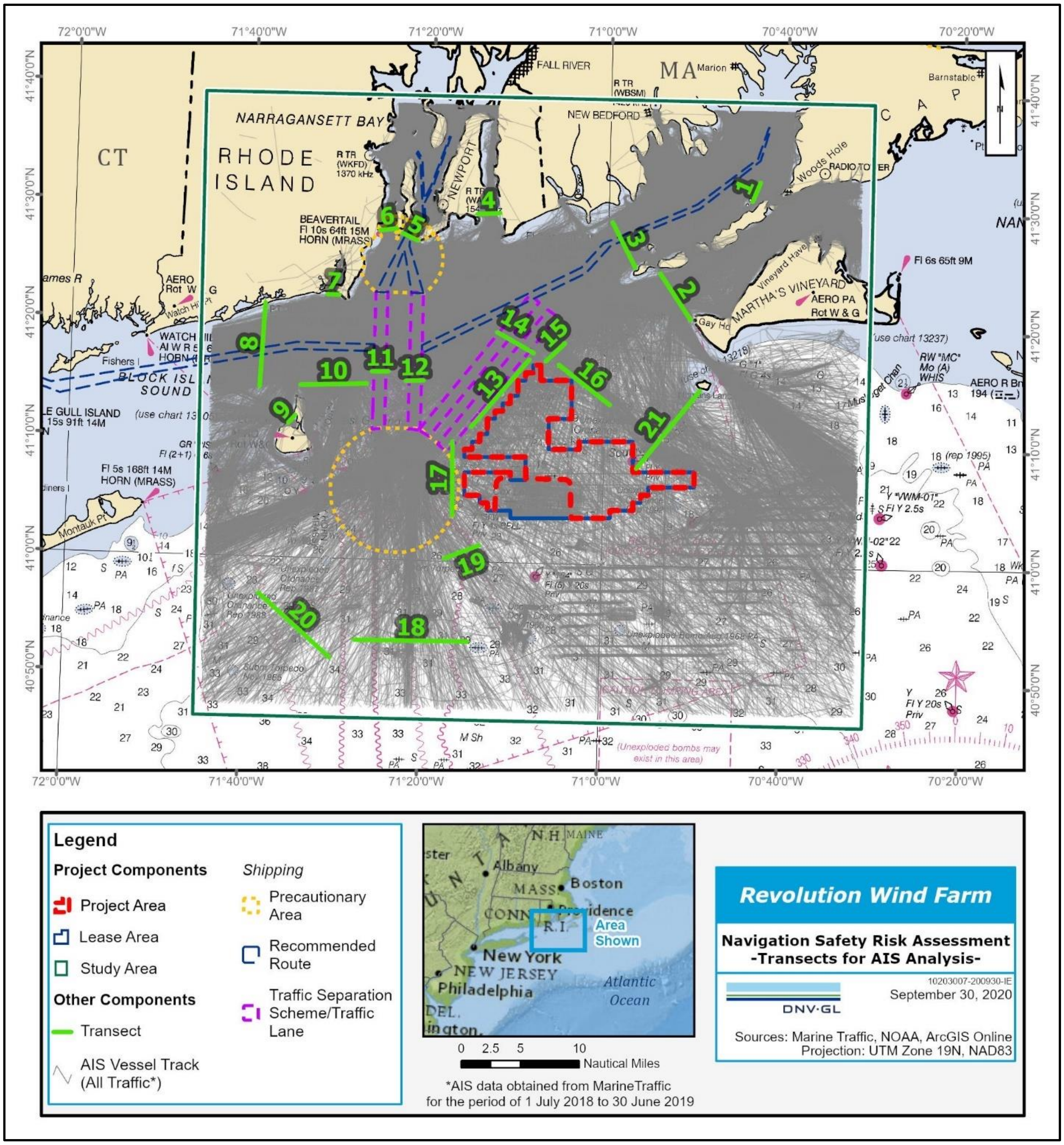


**Figure 3.15-2. Automatic Identification System Vessel Traffic Tracks for July 2018 to June 2019 and Analysis Transects Used for Traffic Pattern Analysis (DNV GL Energy USA, Inc. 2020).**

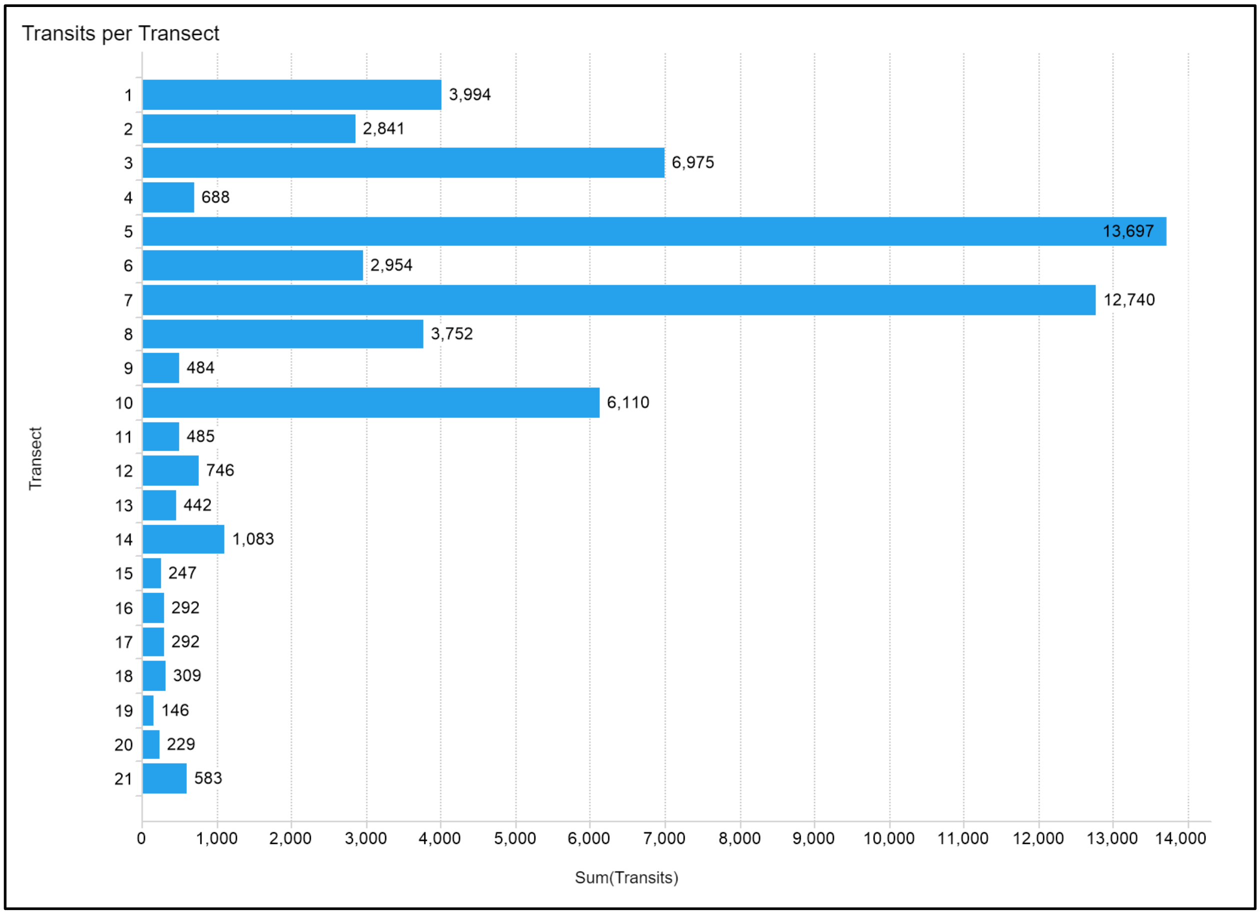


**Figure 3.15-3. Vessel Transits of DNV GL Energy USA, Inc. (2020) Analysis Transects Used for Traffic Pattern Analysis from 2018 to June 2019.**

Vessel collisions are a key source of mortality and serious injury for many marine mammal species (Hayes et al. 2021, 2022; Laist et al. 2001; Rockwood et al. 2017; Schoeman et al. 2020), indicating the importance of protective measures to minimize risks to vulnerable species. If a vessel strike does occur, the impact on marine mammals would range from **minor** to **moderate** adverse for cetaceans and marine mammals other than NARW, with the impact dependent on the number of individuals exposed and population status. Given the imperiled status of NARW, a vessel collision that results in injury or mortality of even a single individual could constitute a **major** impact. However, the applicant has committed to a range of EPMs to avoid vessel collisions with marine mammals (see Appendix F, Table F-1), and these EPMs, plus additional mitigation measures, are expected to result in a discountable risk of vessel strike. These measures include adherence to NOAA guidance for collision avoidance and a combination of others, including approved speed restrictions for all vessels within marine mammal seasonal management areas (SMAs) and dynamic management areas (DMAs). The proposed EPMs have proven effective at avoiding and minimizing collision risk.

BOEM would ensure that all collision avoidance EPMs will be fully implemented. On this basis, BOEM concludes that vessel strikes are unlikely to occur and therefore there is no anticipated effect on marine mammals. In the event of an unanticipated vessel strike of a marine mammal, Project vessels must immediately cease activities until BOEM is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with all applicable laws (e.g., ESA, MMPA) and COP approval conditions.

All vessel crews would receive training to ensure that these EPMs are fully implemented for vessels in transit. Once on station, the construction vessels either remain stationary when installing the monopiles and WTG/OSS equipment or move slowly when traveling between foundation locations. Cable laying and HRG survey vessels also move slowly, with typical operational speeds of less than 3 knots and approximately 4 knots, respectively, and present minimal risk of collision-related injury.

The densities of most common species of marine mammals likely to occur in the RWF Lease Area and RWEC route are low based on monthly mean density estimates developed by Roberts et al. (2016, 2017, 2018, 2020, 2021, 2022). Project construction of the maximum-case scenario under the Proposed Action would require an estimated maximum of 1,335 one-way trips for all vessel classes combined over the 2-year construction and installation period. Although this would likely be an increase in vessel traffic in and around the maximum work area of approximately 2% a year, the operational conditions combined with planned EPMs would minimize collision risk during construction and installation. Additional mitigation measures agreed upon through agency consultation would further reduce this risk (see Appendix F for all vessel strike avoidance measures). During periods of low visibility, trained crew would use increased vigilance to avoid marine mammals.

Because vessel strikes are not an anticipated outcome given the relatively low number of vessel trips and EPMs to avoid encountering marine mammals, BOEM concludes vessel strikes are unlikely to occur. Therefore, there is no anticipated effect on marine mammals and collision effects would be **negligible** adverse during Project construction.

The presence of construction vessels and associated noise and disturbance could cause short-term displacement of marine mammals from preferred habitats. Temporary marine mammal displacement from offshore wind energy construction sites have been observed, apparently due to vessel-related disturbance, Long (2017). Habitat use within the affected areas returned to normal after construction was completed, indicating that construction-related displacement effects would be short term in duration. On this basis, vessel displacement effects on marine mammals could range in significance from **minor** to **moderate** adverse depending on the species affected and the biological significance of displacement, recognizing that some portion of these effects is also likely the result of construction noise, as described above.

#### 3.15.2.3.2 Operations and Maintenance and Decommissioning

##### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Potential anchoring impacts would be similar to the construction phase, but considerably reduced due to fewer anchored vessels. As stated in Section 3.5.2 of the COP, the Project does not anticipate that the IACs, OSS-link cable, and RWEC would require significant maintenance. The cables themselves are unlikely to require repair, but up to 10% of cable protection may need to be replaced over the life of the Project. The IACs, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable would disturb the seafloor. Vessel anchoring could also be required for specific O&M activities and during Project decommissioning. Effects to marine mammals from cable protection maintenance and vessel anchoring would result primarily from seafloor disturbance, with additional potential effects from underwater noise exposure and collision risk associated with O&M vessel activity. The latter are addressed under their respective IPFs in the following sections. Entanglement risks to marine mammals from vessel anchoring and cable maintenance and decommissioning are not anticipated. Only larger construction and O&M vessels would anchor to the seafloor, no divers would be used, and no lines or rigging are anticipated for cable maintenance. The methods used to remove transmission cables at the end of project life would be specified in the decommissioning plan. Therefore, the likelihood of marine mammal entanglement from this IPF is discountable.

The resulting effects to marine mammals from cable O&M and decommissioning and O&M vessel anchoring would be similar in nature but lesser in scale and magnitude than those resulting from Project construction. As discussed in Section 3.15.2.1, seafloor disturbance effects on marine mammals during Project construction are anticipated to be **negligible** adverse. As such, seafloor disturbance impacts of similar nature but reduced in scale and magnitude from Project O&M and decommissioning would have **negligible** adverse effects on marine mammals.

Noise: Offshore WTGs produce continuous non-impulsive underwater noise during operations, mostly in lower frequency bands below 8 kHz. The low-frequency sounds produced by WTGs are within the range of hearing sensitivity and audible communication frequencies used by many species of marine mammals (NOAA 2018), indicating that this impact mechanism could be a potential source of behavioral and auditory masking effects on marine mammal species.

As discussed under the No Action Alternative, Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise and determined that operating turbines produce underwater sound pressure levels of approximately 110 to 118 dB re 1 µPa at a reference distance of 50 meters, in the 10-Hz to 8-kHz range. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from 10-MW current generation direct-drive WTGs (i.e., turbines larger than most previously monitored) and concluded that these designs could generate higher operational noise levels than those reported in earlier research.

The potential for behavioral effects on marine mammals can be evaluated by estimating the area exposed to WTG $L_{\mathrm{rms}}$ operational noise above the 120 dB re 1 µPa behavioral harassment threshold for continuous noise sources (NMFS 2019). Applying the practical spreading loss model (spreading coefficient of 15 dB/decade of range) and the general rule of thumb for estimating $L_{\mathrm{rms}}$ from zero-to-peak sound pressure level ($L_{pk}$) (University of Rhode Island 2021),[43] operational ranges of 110 to 118 dB re 1µPa at a reference distance of 164 feet would attenuate below 120 dB re 1 µPa within approximately 35 to 165 feet of each turbine foundation. However, as stated, larger turbines could produce higher operational noise levels that could exceed this threshold at a greater distance.

In addition, it is probable that operational noise would change the ambient sound environment within the Lease Area in ways that could affect habitat suitability. This impact can be evaluated by estimating the area exposed to operational noise above the existing environmental baseline. As discussed under the No Action Alternative, Kraus et al. (2016) measured ambient noise conditions at three locations within and adjacent to the proposed RWF over a 3-year period and identified baseline levels of 102 to 110 dB re 1

[43] An estimate was calculated using the cylindrical spreading loss model (University of Rhode Island 2021).

µPa.[44] Maximum operational noise levels typically occur at higher wind speeds when baseline noise levels are higher due to wave action. Applying the same approach described above, the operational range $L_{rms}$ of 110 and 118 dB re 1 µPa at a reference distance of 50 m would attenuate to the 102 to 110 re 1 µPa baseline within approximately 1,200 feet of each turbine.

Operational noise could interfere with communication and echolocation, reducing feeding efficiency in the areas within a few hundred feet of the monopiles under some conditions. Any such effects would likely be dependent on hearing sensitivity and the ability to adapt to low-intensity changes in the noise environment. Low-frequency cetaceans are more likely to be affected by operational noise as the frequencies generated largely fall within the range of peak hearing sensitivity for these species. These negative impacts could include a variety of long-term physiological and behavioral effects. For example, a reduction in effective “communication space” caused by auditory masking can make it more difficult to find food, locate companions, and maintain social organization (Cholewiak et al. 2018). This can increase physiological stress, leading to impaired immune function and other chronic health problems (Brakes and Dall 2016; Davis et al. 2017; Fortune et al. 2013; Hatch et al. 2012). These kinds of effects are most associated with long-term changes in the ambient noise environment, specifically from chronic exposure to noise from increasing levels of marine vessel traffic. In contrast, mid-frequency cetaceans such as dolphins and sperm whale and high-frequency cetaceans such as harbor porpoise are likely to be less sensitive to the low-frequency sounds generated by operational WTGs because these species are most sensitive to sound at higher frequencies (Johnson 1967; NOAA 2018). Although there can be associated physiological strains, certain species may also be able to acclimatize and adapt to operational noise. For example, while dolphins vocalize in low to middle frequencies, certain species are known to shift vocalization into higher frequency ranges to communicate more effectively in shallow water and adapt to the presence of anthropogenic noise sources (David 2006; Quintana-Rizzo et al. 2006). Therefore, mid-frequency cetaceans are more likely than low-frequency cetaceans to be able to adapt to operational noise effects through responses like shifting their communication frequency range, whereas low-frequency cetaceans may experience interference with communication and echolocation.

On balance, operational noise effects from the RWF are likely to be of low intensity and localized to around each foundation. Jansen and de Jong (2016) and Tougaard et al. (2009) concluded that marine mammals would be able to detect operational noise within a few thousand feet of WTGs, but the effects would have no significant impacts on individual survival, population viability, distribution, or behavior. The findings provided above indicate that operational noise effects would attenuate to ambient levels within a few hundred to a few thousand feet of each foundation, but operational noise would be at levels that could cause behavioral reactions in marine mammals within 120 feet of each turbine. There is the potential for a reduction in effective communication space within the wind farm environment for marine mammals that communicate primarily in frequency bands below 8 kHz (i.e., low-frequency cetaceans). This localized, long-term impact would constitute a **moderate** adverse effect on marine mammals belonging to the low-frequency cetacean hearing group. Operational noise effects on marine mammals in other hearing groups would be **negligible** to **minor** adverse because operational noise overlaps the sound frequencies used for hearing and communication by these species to a lesser degree. It is unknown if operational noise would contribute to displacement effects to marine mammals.

[44] These are 50th and 90th percentile values for monitoring locations RI-1, RI-2, and RI-3, as reported by Kraus et al. (2016).

O&M HRG surveys would also generate impulsive and non-impulsive noise during Project operations. Up to 1,062 linear miles of O&M HRG surveys may be conducted in the RWF and RWEC corridor every year for up to 4 years following Project construction (LGL 2022). As noted above in Section 3.15.2.2.1, BOEM (2021a) determined, and NMFS concurred (NMFS 2021), that HRG survey activities would be unlikely to injure or measurably affect the behavior of ESA-listed marine mammals. This finding can also be applied to non-listed marine mammal species. LGL (2022) estimated the exposure of marine mammal species to 4 years of postconstruction HRG surveys (Table 3.15-11). Overall, noise generated by O&M HRG surveys would likely have a **minor** adverse effect on marine mammals because of the limited exposure and likelihood of full recovery within hours to days.

O&M vessels would also generate periodic, short-term underwater noise impacts with the potential to affect marine mammals. Revolution Wind (Tech Environmental 2023) has estimated that Project O&M would involve up to four CTV and two SOV trips per month for wind farm O&M, or 2,280 vessel trips over the life of the Project. These trips would originate either from an O&M facility located either in Montauk, New York, or Davisville, Rhode Island. One or more CTVs ranging from 62 to 95 feet in length would be purpose built to service the RWF over the life of the Project. SOVs are larger mobile work platforms, on the order of 215 to 305 feet long and 60 feet in beam, equipped with dynamic positioning systems used for more extensive, multi-day maintenance activities (Ulstein 2021). Larger vessels similar to those used for construction could be required for unplanned maintenance, such as repairing scour protection or damaged WTGs. Those activities would occur on an as-needed basis. Additional vessel trips would be required over the life of the Project for seafloor surveys and subsurface inspections. A minimum of three postconstruction seafloor bathymetry surveys would be conducted to assess foundation scour and correct if needed. Project fishery monitoring and benthic habitat monitoring surveys would also be conducted seasonally. Vessels used would be similar to those used for preconstruction HRG surveys.

**Table 3.15-11. Estimated Number of Marine Mammals Experiencing Behavioral Effects from Postconstruction High-Resolution Geophysical Survey Activities**

| Functional Hearing Group | Species | Estimated Number of Individuals Exposed to Behavioral Level Noise Effects Postconstruction HRG Surveys (4 years total) | NMFS Stock Abundance | Number of Individuals Exposed as Percent of Stock Abundance |
|---|---|---|---|---|
| LFC | Blue whale* | 4 | 402 | 1.0% |
| | Fin whale* | 64 | 6,802 | 0.9% |
| | Humpback whale | 184 | 1,396 | 13.2% |
| | Minke whale | 40 | 21,968 | 0.2% |
| | North Atlantic right whale* | 12 | 338 | 3.6% |
| | Sei whale* | 8 | 6,292 | 0.1% |
| MFC | Atlantic spotted dolphin | 116 | 39,921 | 0.3% |
| | Atlantic white-sided dolphin | 112 | 93,233 | 0.1% |
| | Bottlenose dolphin | 260 | 62,851 | 0.4% |

| Functional Hearing Group | Species | Estimated Number of Individuals Exposed to Behavioral Level Noise Effects Postconstruction HRG Surveys (4 years total) | NMFS Stock Abundance | Number of Individuals Exposed as Percent of Stock Abundance |
|---|---|---|---|---|
| | Common dolphin | 7,284 | 172,974 | 4.2% |
| | Pilot whales† | 36 | 68,139 | 0.1% |
| | Risso's dolphin | 24 | 35,215 | 0.1% |
| | Sperm whale* | 8 | 4,349 | 0.1% |
| HFC | Harbor porpoise | 132 | 95,543 | 0.2% |
| Phocid pinnipeds | Gray seal | 196 | 27,300 | 0.7% |
| | Harbor seal | 436 | 61,336 | 0.7% |

Source: Hayes et al. (2021, 2022); LGL (2022).

* ESA-listed species.

† Group includes both long-finned and short-finned pilot whales. Short-finned pilot whales are considered to be rare within the Lease Area because preferred habitat is not present.

Noise levels generated by the CTVs are expected to have source levels of approximately 160 dB re 1 µPa-m, based on observed noise levels generated by working commercial vessels of similar size and class to the CTVs (Kipple and Gabriele 2003; Takahashi et al. 2019). The SOV would produce similar noise levels to those described for construction vessels by Denes et al. (2021), with an approximate $L_{rms}$ source level of 170 dB re 1 µPa-m. BOEM anticipates that underwater noise generated by CTVs and monitoring vessels would overlap the hearing range and would be audible to most marine mammal species potentially present near the Lease Area. However, the noise levels generated by these smaller Project vessels are below the hearing injury threshold of marine mammals and animals are expected to only have short, transient exposures; therefore, vessel noise from Project monitoring activities is not expected to result in injury-level effects. Noise levels generated by the larger SOVs would be similar to those described in Section 3.15.2.2.1 for Project construction vessels and would result in short-term **minor** adverse noise effects that would occur periodically throughout the life of the Project.

Vessel traffic associated with EPM monitoring could result in brief behavioral responses that would be expected to dissipate once the vessel or the individual has left the area. BOEM expects that these brief responses of individuals to passing vessels would be infrequent. Therefore, noise effects from vessels associated with monitoring efforts would result in **negligible** adverse impacts to marine mammals.

The associated disturbance from decommissioning would be similar to that described above for construction (see Section 3.15.2.2.1), with the exception that pile driving would not be required. While specific decommissioning equipment and methods have not yet been proposed, it is reasonable to assume that the associated impacts would be comparable in magnitude to those resulting from Project construction. One important exception is that impact pile driving would not be required; therefore, underwater noise impacts from decommissioning would be less intense and extensive than those from construction. The monopiles would be cut below the bed surface for removal using a cable saw or abrasive waterjet. Noise levels produced by this type of cutting equipment are generally indistinguishable from engine noise generated by the associated construction vessel (Pangerc et al. 2016). On this basis, short-term effects on marine mammals from decommissioning would be **negligible** adverse because of the limited exposure to noise during decommissioning activities.

Presence of structures: The presence of RWF monopile foundations over the life of the Project would change the offshore environment, and their presence could affect marine mammal behavior; however, the likelihood and significance of these effects are difficult to determine. As discussed in the No Action Alternative, Long (2017) compiled a statistical study of seal and cetacean (including porpoises and baleen whales) behavior in and around Scottish wave energy converter facilities. The study found evidence of displacement during construction, but habitat use appeared to return to previous levels once construction was complete. No observable long-term displacement effects on seals, porpoises, dolphins, or large whales from wave energy converter operations were observed, but these findings may not be applicable to offshore wind structures. Long (2017) also cautioned that observational evidence was limited for certain species and further research would be required to draw a definitive conclusion about operational effects. Delefosse et al. (2017) reviewed marine mammal sighting data around oil and gas structures in the North Sea and found no clear evidence of species attraction or displacement. Other studies have documented apparent changes in marine mammal behavior around wind energy facilities. Some research has suggested that wind farm operations may lead to long-term displacement of species such as harbor porpoise, but the evidence is mixed, and observed changes in abundance could be more indicative of general population trends than an actual wind farm effect (Nabe-Nielsen et al. 2011; Tielmann and Carstensen 2012; Vallejo et al. 2017).

Offshore wind structures are unlikely to interfere with marine mammal movement. The up to 102 RWF monopile foundations proposed under Alternative B would be placed in a grid-like pattern with spacing of approximately 1.0 (0.9 to 1.1) nm between turbines. Based on documented adult lengths (Wynne and Schwartz 1999), the largest NARW (59 feet), fin whale (79 feet), sei whale (59 feet), and sperm whale (59 feet) would fit end-to-end between two foundations spaced at 1 nm 100 times over. This simple assessment of spacing relative to animal size indicates that the physical presence of the monopile foundations is unlikely to pose a barrier to the movement of large marine mammals, and even less likely to impede the movement of smaller marine mammals.

Hydrodynamic and reef effects could theoretically cause indirect effects on marine mammals by changing the distribution and abundance of preferred prey and forage species. Monopile foundations and scour protection would generate an artificial reef effect as surfaces are colonized by habitat-forming organisms (Degraer et al. 2020), likely leading to enhanced biological productivity and increased abundance and concentration of fish and invertebrate resources within and around the Lease Area (Hutchison et al. 2020). This could alter predator-prey interactions with uncertain and potentially beneficial or adverse effects on marine mammals. For example, fish predators like seals and porpoises could benefit from increased biological productivity and abundant concentrations of prey generated by the reef effect (e.g., Russel et al. 2014). Conversely, increased fish biomass around the structures could attract commercial and recreational fishing activity, creating an elevated risk of injury or death from gear entanglement (Moore and van der Hoop 2012). Fisheries interactions are a known source of negative impacts on marine mammals, with estimated global mortality across species exceeding hundreds of thousands of individuals each year (Read et al. 2006; Reeves et al. 2013; Thomas et al. 2016). Entanglement in fishing gear has been identified as one of the leading causes of mortality in NARW and could be a limiting factor in the species' recovery (Knowlton et al. 2012). Project EPMs include inspection and removal of marine debris from foundations (see Table F-1 in Appendix F). This would help to reduce the minimal risk of entanglement in debris caught on structures and provide a mechanism for removing potentially harmful derelict gear from the marine environment.

The RWF would also cause hydrodynamic effects that could influence the distribution and abundance of fish and planktonic prey resources (van Berkel et al. 2020). Offshore wind farms can influence hydrodynamic conditions through two mechanisms: turbulent effects on mixing and stratification patterns caused by current flow around structures in the water column, and changes in surface wave and current patterns caused by wind field effects (i.e., the extraction of wind energy from the atmosphere) (Johnson et al. 2021; van Berkel et al. 2020). Turbulence in the water column created by structure wakes could lead to localized changes in circulation and stratification patterns, with potential implications for primary and secondary productivity and fish distribution. These localized effects would likely be limited to a few hundred to a few thousand feet downcurrent of each foundation.

In contrast, the combined effects of a WTG array on the wind field and surface waves are typically more extensive (Johnson et al. 2021; van Berkel et al. 2020). A growing body of research has demonstrated that offshore wind farms could have observable effects on oceanographic conditions up to tens of miles downfield from wind farm sites (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorell et al. 2022; Floeter et al. 2022; Raghukumar et al. 2022), although the extent of these effects and the resulting significance on biological processes are likely to vary considerably between different oceanographic environments (van Berkel et al. 2020). Van Berkel et al. (2020) and Schultze et al. (2020) note that environments characterized by strong seasonal stratification, such as the Mid-Atlantic Bight, are likely to be less sensitive to changes and disruptions to oceanographic processes from wind farm effects. In addition, atmospheric effects are influenced by WTG design. Golbazi et al. (2022) demonstrated that the surface effects of wind wakes from 10 to 15 MW WTGs, the size range being considered for development in the region, were appreciably less extensive than those produced by the smaller turbine designs currently employed in Europe (Akhtar et al. 2022; Christiansen et al. 2022; Daewel et al. 2022). Broadly speaking, the atmospheric effects of wind farms appear to decrease as WTG hub height above the sea surface increases. Collectively, these findings indicate that planned future wind farm development on the Mid-Atlantic OCS are unlikely to produce hydrodynamic effects on the order of those associated with European wind farm development in the southern North Sea (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorell et al. 2022).

As discussed in Section 3.6.2.5.2, hydrodynamic effects from RWF development could lead to changes in the dispersal of planktonic eggs and larvae. This suggests that marine mammal species that rely on planktonic prey resources, like NARW, may experience shifts in the availability of preferred resources due to hydrodynamic effects. NARW typically depends on the formation of compressed concentrations of their preferred copepod prey organisms for energy efficient feeding (Baumgartner and Mate 2003; Baumgartner et al. 2017). These compressed concentrations most commonly form during periods of strong stratification and low mixing. Turbulent mixing around wind farm wakes could theoretically scatter these tight copepod concentrations. However, NARWs are most commonly present in southern New England waters during winter months when the water column is well mixed and planktonic organisms are more widely dispersed. NARW may tolerate inefficient feeding during winter to maintain nutritional intake. For example, White and Veit (2020) recently described an association between sea duck distribution and abundant patches of Gammarid amphipods on the western edge of Nantucket Shoals, where NARWs are also found, suggesting that NARW may prey on these amphipods as well in this area. Turbulent mixing effects are likely to be less evident during the well-mixed conditions that predominate during winter.

BOEM conducted a hydrodynamic modeling study to evaluate how wind farm presence could affect the seasonal stratification patterns that contribute to the formation and persistence of the Mid-Atlantic cold pool (Johnson et al. 2021). The findings of this hydrodynamic study and their implications for invertebrates, finfish, and primary and secondary productivity are discussed in detail in Sections 3.6.2.3.2 and 3.13.2.2.2. In summary, the RWF and surroundings are characterized by strong seasonal stratification occurring in summer and early fall, which is expected to limit measurable hydrodynamic effects within the wind farm to within 600 to 1,300 feet downcurrent of each monopile (van Berkel et al. 2020). During winter months, the water column is well mixed, and turbulent mixing effects are likely to be less evident. Localized turbulence and upwelling effects around the monopiles are likely to transport nutrients into the surface layer, potentially increasing primary and secondary productivity. That increased productivity could be partially offset by the formation of abundant colonies of filter feeders on the monopile foundations. As discussed in the No Action Alternative, hydrodynamic effects on wind field and wave energy could influence surface currents at scales on the order of miles to tens of miles, potentially altering the distribution of planktonic organisms (Johnson et al. 2021).

These findings suggest that hydrodynamic effects are unlikely to affect the abundance and availability of zooplankton prey sufficiently to have a measurable effect at the population level, but could alter the distribution of prey at scales ranging from miles to tens of miles. In the absence of other factors, localized impacts on zooplankton and fish abundance and distribution on the scale described are not likely to be biologically significant for marine mammals when considered relative to the broader oceanographic factors that determine primary and secondary productivity in the region and seasonal and interannual variability. However, those changes could become significant if they lead to increased interaction with fisheries or vessel traffic. The likelihood of this type of effect, and the resulting effects to marine mammals, are difficult to predict and therefore unknown.

In summary, long-term reef and hydrodynamic effects resulting from the Proposed Action could result in **minor** beneficial effects on fish-eating marine mammals such as dolphins and seals that benefit from increased prey abundance around the structures. These effects could cause localized changes to prey distribution but do not suggest a notable change in prey availability. It is unclear if these have a significant impact to the ability for marine mammals to feed. Long-term reef and hydrodynamic effects could result in negligible adverse effects on marine mammals that forage on plankton and forage fish. Habitat conditions would be expected to revert back to pre-Project conditions when the Project is decommissioned, or similar conditions within the limits determined by climate change and other ongoing environmental trends. BOEM concludes that the physical presence of RWF monopile foundations would pose a negligible adverse risk of displacement effects on marine mammals by posing a barrier to movement. However, this determination does not consider the potential effects of operational noise, which are localized, long-term impacts and would constitute a **minor** to **moderate** adverse effect on marine mammals belonging to the low-frequency cetacean hearing group. Operational noise effects on marine mammals in other hearing groups would be negligible to minor adverse because the degree to which operational noise overlaps the range of frequencies used for hearing and communication is more limited.

Reef and hydrodynamic effects from the presence of structures would cease when the Project is decommissioned and structures are removed from the environment. Marine mammal prey and forage organisms would redistribute in response to the new baseline ecological and oceanographic conditions. Therefore, the effects of the presence of structures on marine mammals following decommissioning would be **negligible** adverse.

Vessel traffic: Revolution Wind (Tech Environmental 2023) has estimated that Project O&M would involve up to one CTV trip each week and one SOV trip every other week to the RWF over the life of the Project. CTV trips shared between RWF and other offshore energy projects and daughter craft activity could account for an additional 23 vessel trips per year. In total, Project O&M would require an estimated 3,030 vessel trips over the life of the Project. These trips would originate from an O&M facility located either in Montauk, New York, or Davisville, Rhode Island. One or more CTVs ranging from 62 to 95 feet in length would be purpose built to service the RWF over the life of the Project. SOVs are larger mobile work platforms, on the order of 215 to 305 feet long and 60 feet in beam, equipped with dynamic positioning systems used for more extensive, multi-day maintenance activities (Ulstein 2021). Larger vessels similar to those used for construction could be required for unplanned maintenance, such as repairing scour protection or replacing damaged WTGs. Those activities would occur on an as-needed basis. Additional vessel trips would be required over the life of the Project for seafloor surveys and subsurface inspections. A minimum of three postconstruction seafloor bathymetry surveys would be conducted to assess foundation scour and correct if needed. Project fishery monitoring and benthic habitat monitoring surveys would also be conducted annually. Vessels used would be similar to those used for the HRG surveys conducted prior to and during Project construction.

In general, O&M-related vessel activities would represent a small increase in regional vessel traffic compared to existing conditions. Project O&M could involve up to 10 one-way vessel trips between the RWF and O&M facility or other area ports each month. By comparison, hundreds of large vessels and thousands of smaller vessels, many of the latter comparable in size to the CTV, travel through the areas between the wind farm and proposed O&M facility locations on a monthly basis (Section 3.15.2.2.1). O&M vessel use would therefore represent a minimal increase in regional vessel traffic over the life of the facility.

As detailed in Appendix F, all survey vessels would comply with speed restrictions and other minimization measures to minimize risk of collision with marine mammals, making the risk of vessel strikes from survey vessels unlikely. This conclusion is informed by estimated marine mammal densities within the Lease Area and RWEC corridor (Roberts et al. 2016, 2017, 2018, 2020, 2021, 2022), which are generally low in comparison to those in core habitats used by each species. Although species-specific density estimates vary by season, indicating that collision risk would also vary, the vessel strike avoidance measures are designed adaptively to respond to changing conditions as needed to minimize collision risk. Operational conditions combined with planned EPMs (see Appendix F for all vessel strike avoidance measures) would minimize collision risk during construction and installation, O&M, and decommissioning. During periods of low visibility, trained crew would use increased vigilance to avoid marine mammals, including night vision devices and infrared imaging (LGL 2022). BOEM concludes vessel strikes are unlikely to occur and therefore there is no anticipated effect on marine mammals. In the event of an unanticipated vessel strike of a marine mammal, project vessels must immediately cease activities until BOEM is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with all applicable laws (e.g., ESA, MMPA) and COP approval conditions. Overall, effects of vessel traffic on marine mammals from Project O&M and decommissioning would be **negligible** to **minor** adverse because of limited risk exposure and anticipated EPM effectiveness.

#### 3.15.2.3.3 Cumulative Impacts

This section discloses potential impacts to marine mammals associated with future offshore wind development, including the Proposed Action. The cumulative impact analysis for the Proposed Action includes Alternative B, other planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects. Cumulative impacts to marine mammals under the Proposed Action presented herein would be incremental to and would compound the impacts of baseline conditions on each marine mammal population considered in this EIS (see Table 3.15-2).

##### Offshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> The Proposed Action would result in localized, temporary, **negligible** adverse impacts to marine mammals through an estimated 7,213 acres of anchoring and cabling-related seafloor disturbance and associated increased suspended sedimentation within the GAA. BOEM estimates a cumulative total of 105,390 acres of cabling seafloor disturbance and 11,631 acres of anchoring disturbance for the Proposed Action plus all other future offshore wind projects in the GAA. No population-level effects on marine mammals are expected from reduced water quality. However, there could be temporary displacement of marine mammals from preferred habitats, especially during construction activities, due to increased vessel activity. Vessel anchoring and cable emplacement during construction and installation, O&M, and decommissioning are not anticipated to involve equipment, lines, or rigging that could pose a potential entanglement risk to marine mammals. Therefore, the Proposed Action combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative effects on marine mammals.

<u>Climate change:</u> Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. Several marine species, including fish, invertebrates, and zooplankton—prey resources for marine mammals—have shifted northward in distribution over the past several decades (NOAA 2021b). Ocean acidification, also a function of climate change, has negatively affected some zooplankton species (PMEL 2020). Marine mammals are modifying their behavior and distribution in response to these broader observed changes (Davis et al. 2017, 2020; Hayes et al. 2020, 2021, 2022). These trends are expected to continue, with complex and potentially adverse consequences for many marine mammal species. The Proposed Action in combination with existing and planned future actions would result in the development of a network of artificial reefs distributed across the GAA. The biological hotspots created by these artificial reefs are expected to influence fish and invertebrate community structure at local scales and could also influence the ability of certain fish and invertebrate species to shift and expand their ranges in response to climate change. This could in turn result in cumulative effects on marine mammals that could be beneficial or adverse depending on a number of complex factors. The nature and potential significance of these effects to marine mammals are unknown but are likely to range from **minor** to **moderate** adverse. Effects to specific marine mammal species, such as NARW, would depend on how climate change affects habitat suitability and forage availability, the status and resilience of affected populations, and the ability to adapt to these impacts.

Noise: BOEM estimates that a cumulative total of 3,190 offshore WTGs and OSS foundations would be developed in the GAA for marine mammals between 2022 and 2030.While the number and distribution of potential UXO encounters is not currently known, it is likely that a least some UXO detonations would be required. Device size is also not currently known but would likely fall within a similar range of impacts to those described for construction of the Proposed Action.

Section 3.15.1.1 provides an overview of potential concurrent construction activities in the GAA. Each action would generate underwater noise of similar type and intensity as the Proposed Action, scaled in extent to the size of each facility. Each future project would be anticipated to result in adverse effects on individual marine mammals, up to and including PTS, and TTS, auditory masking and behavioral impacts. Construction noise would also contribute to short-term displacement effects, as described above.

All future actions would be subject to the same independent NEPA analysis and regulatory approvals as the Proposed Action. BOEM would require all projects to incorporate the same types of EPMs included in the Proposed Action to avoid and minimize harmful noise effects. While these measures would avoid and minimize impacts to marine mammals to the greatest extent practicable, some unavoidable impacts on individuals are likely to occur. The impacts of each project would result in **minor** to **moderate** adverse effects on marine mammals. Cumulative noise effects on marine mammal species would depend on the number of individual animals exposed to injury and behavioral level noise effects, the significance of those effects to survival and reproductive success, and the status of the affected population. BOEM anticipates that future MMPA approvals would consider the known status of individual marine mammal stocks and populations, indirectly incorporating the potential combined effects of future projects. Therefore, BOEM concludes that the cumulative effects of construction noise on marine mammals would be **moderate** adverse because of the potential for PTS, TTS, and behavioral impacts during construction activities. NARW could be an exception to this determination because of its perilous population status. Hearing-related injury to even one individual that results in reduced reproductive fitness could contribute to ongoing downward trends in population viability. Should such impacts occur, they could constitute a greater than moderate adverse impact on this species. However, the EPMs proposed for this project should effectively avoid this level of impact.

As discussed in Sections 3.15.1.1 and 3.15.2.2, operational noise from offshore wind turbines is expected to be limited in intensity and extent. Operational noise exceeding the 120 dB re 1 µPa behavioral harassment threshold would be limited to within approximately 35 to 165 feet of each turbine (per NOAA 2018), although detectable noise above ambient levels could extend up to approximately 1,200 feet. The Proposed Action combined with all existing and planned future actions would place over 3,000 noise-generating WTG foundations in the RI/MA and MA WEAs. These structures would contribute to and potentially increase ambient noise within each WEA, albeit at levels generally not associated with adverse effects on marine mammals. However, the 120 dB re 1 µPa threshold may not adequately represent the potential for adverse effects of chronic noise exposure (e.g., Cholewiak et al. 2018; Hatch et al. 2012; Jensen et al. 2009; Putland et al. 2017). While the potential for broader effects is unclear, BOEM concludes that the cumulative effects of low-level operational noise could raise to the level of **minor** adverse for certain marine mammal species.

Presence of structures: BOEM estimates a cumulative total of up to 3,190 offshore WTGs and OSS foundations in the GAA for marine mammals between 2022 and 2030. This total comprises foundations from the Proposed Action and up to 3,088 foundations associated with existing (BIWF) and planned state and federal offshore wind energy projects on the OCS between North Carolina and Maine (see Appendix E3, Table E3-1).

Project construction is likely to result in short-term displacement effects on marine mammals from the areas affected by disturbance from vessel activity, foundation installation, HRG surveys, and related activities. Several projects are expected to be constructed concurrently, potentially resulting in individual marine mammals being exposed to multiple episodes of habitat displacement. BOEM anticipates that the construction schedules for future wind projects would employ the same types of timing restrictions to protect NARW as those included in the Proposed Action, with modifications as needed to adapt to ongoing shifts in the seasonal distribution of this species (e.g., Davis et al. 2017, 2020). However, timing restrictions for NARW would not be protective for all marine mammal species. It is anticipated that future wind projects would also employ a similar range of EPMs to avoid and minimize impacts to marine mammals, but some level of short-term displacement is likely to occur, and some individual animals are likely to be exposed to multiple episodes of displacement. The significance of these potential impacts is unclear, but when all protective measures are considered, cumulative effects are likely to range from **negligible** to **moderate** adverse. Impacts to each marine mammal species, such as NARW, are uncertain and would depend on several factors, including species-specific displacement effects, the nature and extent of effects to forage resources, and, the status and sensitivity of the affected population to effects to individuals.

BOEM anticipates that future wind projects within the RI/MA WEA would be constructed using 1 × 1–nm grid spacing, as does the Proposed Action. Foundations spaced at 1 × 1 nm are unlikely to pose a barrier to movement for even the largest marine mammal species. However, the broadscale development of offshore energy structures would introduce an extended network of biologically productive artificial reefs, most generating low levels of non-impulsive sound that are detectable to marine mammals within a few hundred feet. While the individual effects of each turbine would be **minor** adverse, the broader implications of these habitat changes for marine mammals are unclear. Displacement effects that result in increased interactions between vulnerable populations of marine mammals and commercial shipping and/or fishing activity could have significant long-term cumulative effects. Given these uncertainties, the potential for displacement and level of effects is unknown, but there is currently no basis to conclude that these impacts would result in greater than minor adverse long-term effects on any species.

The abundance of fish and invertebrate prey resources created by the artificial reef effect are likely to attract predatory marine mammals, particularly seals (e.g., Russel et al. 2014) and potentially dolphins and porpoises. Increased fish biomass around the structures could attract commercial and recreational fishing activity, leading to increased interactions between humans and marine mammals. BOEM anticipates that future projects would perform regular inspections to identify and remove derelict fishing gear and other marine debris from offshore structures, reducing associated risks to marine mammals.

The new wind energy structures would also cause hydrodynamic effects. Marine mammal species that rely on planktonic prey resources, like NARW, may experience shifts in the availability of preferred resources due to these hydrodynamic effects. NARW typically depends on the formation of thin vertically compressed layers of copepods to efficiently feed (Baumgartner and Mate 2003; Baumgartner et al. 2017). However, during the winter months, when they are primarily present in southern New England waters and the water column is well mixed, they may tolerate inefficient feeding simply to gain some nutrition. For example, White and Veit (2020) recently described an association between sea duck distribution and abundant patches of Gammarid amphipods on the western edge of Nantucket Shoals, suggesting that right whales also present there may prey on these amphipods as well. Thus, the potential hydrodynamic effects discussed in the subsequent paragraphs may influence the availability of already limited prey resources for NARW.

A growing body of research has demonstrated that offshore wind farms could have observable effects on oceanographic conditions up to tens of miles downfield from wind farm sites (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorell et al. 2022; Floeter et al. 2022; Raghukumar et al. 2022), although the extent of these effects and resulting significance on biological processes are likely to vary considerably between different oceanographic environments (van Berkel et al. 2020). In addition, atmospheric effects are influenced by WTG design. Golbazi et al. (2022) demonstrated that the surface effects of wind wakes from 10 to 15 MW WTGs, the size range being considered for development in the region, were appreciably less extensive than those produced by the smaller turbine designs currently employed in Europe (Akhtar et al. 2022; Christiansen et al. 2022; Daewel et al. 2022). Broadly speaking, the atmospheric effects of wind farms appear to decrease as WTG hub height above the sea surface increases. Collectively, these findings indicate that planned future wind farm development on the Mid-Atlantic OCS are unlikely to produce hydrodynamic effects on the order of those associated with European wind farm development in the southern North Sea (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorell et al. 2022).

As discussed in the previous section, the Proposed Action is not anticipated to result in additive hydrodynamic effects. However, broader scale development of contiguous projects could have more extensive effects. For example, Afsharian et al. (2020) modeled the potential effects from installation of over 400 offshore wind turbines in Lake Erie and determined that their cumulative effect on wind energy could disrupt circulation patterns and affect seasonal stratification and water temperatures over broad scales. However, these findings may not be applicable to the open ocean where circulation patterns are strongly influenced by tides and ocean currents.

At present, currently available information suggests that hydrodynamic effects of foundation structures are likely to be localized and not additive when spaced at 1 × 1 nm in environments with strong seasonal stratification (van Berkel et al. 2020). Recent modeling of hydrodynamic effects suggests that surface currents could be affected by the presence of multiple wind farms potentially impacting the distribution of larvae (Johnson et al. 2021). There is insufficient information to determine if this conclusion is valid for broader scale development at the levels planned within the GAA. Therefore, at this time, there is no basis to conclude that the cumulative hydrodynamic impacts of Proposed Action in combination with planned future actions would have a measurable effect on marine mammals and their prey and forage species.

In summary, the cumulative effects of long-term habitat alteration and hydrodynamic impacts on marine mammals are unclear, could be beneficial or adverse, and could range from **negligible** to **moderate** adverse. Effects to specific species, such as NARW, would depend on several factors including the nature and distribution of changes in forage availability, resulting effects on individual survival and reproductive fitness, and the status and sensitivity of the affected population to these impacts. Although the type and magnitude of effect from displacement and shifts in prey resources due to the presence of structures are largely unknown, the possibility of changes in distribution relative to commercial fishing activity and increased interaction with fishing gear poses the potential for increased risk of entanglement. Should such changes occur, increased risk of entanglement would constitute a **minor** to **moderate** adverse effect on marine mammals, because this stressor is a documented source of injury and mortality. Effects to each marine mammal species would depend on the number of individual animals exposed to entanglement effects, the nature of the impact (i.e., injury or mortality), and the status and sensitivity of the affected population to these impacts. In the case of NARW, the potential for increased exposure to entanglement could pose a significant risk as injury or mortality that removes even one juvenile or reproductive age individual from the population would constitute a greater than moderate effect. It is important to stress that the likelihood of this level of effect is unclear because it is not known if the presence of structures would displace NARW and whether displacement would lead to increased fishing gear exposure. These potential long-term impacts would persist until decommissioning is complete and structures are removed. EPMs would help to offset the potential impact of entanglement within derelict fishing gear or marine debris.

Vessel traffic: BOEM estimates that, cumulatively, up to 262 construction vessels could be active within the GAA between 2022 and 2030. As discussed above for Project construction, the majority of vessel operations would be expected to occur at speeds of less than 10 knots. In addition, BOEM anticipates that future projects would adhere to mandatory and voluntary vessel speed restrictions in posted DMAs and SMAs and would implement EPMs similar to those described for the Proposed Action (see Appendix F, Table F-1) to avoid marine mammal collisions. BOEM has concluded that these measures would effectively avoid all but minor adverse impacts on sensitive species such as NARW and minimize risk of vessel collisions to other marine mammal species. Therefore, the cumulative effects of increased vessel traffic on marine mammals would range from **negligible** to **moderate** adverse.

#### 3.15.2.3.4 Conclusions

Impacts of Alternative B, the Proposed Action. Project construction would primarily result in noise that would disturb marine mammals and potentially result in permanent impacts (i.e., PTS). EPMs would minimize noise exposure such that any PTS of NARWs would be avoided and, for all marine mammals, the severity of any behavioral responses would be minimized. Therefore, the incremental impact of the Proposed Action when compared to the No Action Alternative would be minor for NARWs from construction given the likely outcome of noise exposure would be a deflection, but not abandonment, of their migratory path. More severe impacts on marine mammals, such as mortality or serious injury from vessel strikes, UXO detonation, and entanglement, are not anticipated due to the EPMs and additional measures that would be required as part of the environmental permitting processes. The incremental impact of the Proposed Action when compared to the No Action Alternative would be **minor** to **moderate** adverse for mysticetes, with moderate adverse impacts for humpback whale due to permanent hearing injury to individuals and for NARW due to potential exposure of several individuals to temporary behavioral disturbance in potentially important seasonal foraging habitats. Impacts to odontocetes would range from **minor** to **moderate**, with moderate impacts to harbor porpoise from permanent hearing injury to individuals. Pinnipeds would experience **minor** to **moderate** impacts to individuals from behavioral exposure and hearing injury to individuals. Mortality and non-auditory injury would not occur as a result of UXO detonation, only a few marine mammals of select species are anticipated to incur PTS incidental to pile driving and UXO detonation, vessel strike risk is very low and not anticipated, and accidental spills are also not anticipated. Because of the population status of NARW, the Project includes EPMs specifically designed to avoid and minimize adverse effects on this species. Implementation of these EMPs would effectively avoid greater than moderate effects on this species. Given this, the overall impact of the Proposed Action alone on marine mammals would be **moderate** adverse.

When including the baseline status of marine mammals into the impact findings and considering all phases of the Project, the impacts of the Proposed Action on NARW would be long term and **major** (primarily due to ongoing vessel strike and entanglement), and long term and **moderate** for other mysticetes. Impacts of the Proposed Action on odontocetes and pinnipeds would be long term and **minor** to **moderate**. Some **minor beneficial** impacts to certain odontocetes and pinnipeds could be realized through artificial reef effects. Beneficial effects, however, may be offset given the increased risk of entanglement due to derelict fishing gear and marine debris captured by offshore wind structures.

Cumulative Impacts of Alternative B, the Proposed Action. Existing environmental trends and ongoing activities would continue, and mysticetes, odontocetes, and pinnipeds would continue to be affected by natural and human-caused IPFs. Planned activities would contribute to impacts on marine mammals. Although injury or mortality of individuals may occur, long-term population-level effects are not anticipated for marine mammals (with the exception of NARW). Underwater noise impacts, vessel activity (vessel collisions), entanglement, and seabed disturbance, primarily from non–offshore wind activities, would result in **moderate** impacts. Accidental releases and discharges, EMF, the presence of structures, cable emplacement and maintenance, port utilization, and lighting associated with offshore wind activities would be implemented with measures to minimize impacts on marine mammals. Incremental impacts contributed by the Proposed Action to the cumulative impact on marine mammals would range from undetectable to noticeable. BOEM anticipates that the cumulative impacts for mysticetes, odontocetes, and pinnipeds in the GAA from the Proposed Action would be **moderate** to **major.** Long-term impacts to NARW would be **major** (due principally to baseline conditions), **moderate** for other mysticetes, and **minor** to **moderate** for odontocetes and pinnipeds. Impacts from the Proposed Action are not anticipated to substantially contribute to **major** long-term cumulative impacts for NARW. Some **minor beneficial** impacts to certain odontocetes and pinnipeds could be realized through artificial reef effects.

### 3.15.2.4 Alternatives C, D, E, and F

Under Alternatives C, D, E, and F, baseline conditions for marine mammals (see Section 3.15.1) would continue to follow current regional trends within the GAA. The impacts of existing conditions on marine mammals are described and analyzed in Appendix E1. The impacts of each IPF from the construction and installation, O&M, and conceptual decommissioning of Alternatives C, D, E, and F would be incremental to and would compound the impacts of baseline conditions on each marine mammal population considered in this EIS (see Table 3.15-2). These effects are described below.

#### 3.15.2.4.1 Construction and Installation

#### Offshore Activities and Facilities

Noise: Construction of Alternatives C through F would result in similar underwater noise impacts on marine mammals to those described for the Proposed Action in Section 3.15.2.2.1, but those impacts would be reduced in extent and duration because fewer structures would be installed. Reducing the number of structures is also expected to reduce the required extent of HRG surveys relative to the Proposed Action. It is assumed that 3,547 linear miles and 82 days of HRG survey effort would be required for the RWEC and OSS-link, plus 50 survey miles per linear mile of IAC cable at 43 miles of survey effort per day. The alternatives therefore range from 7,386 to 7,616 survey miles over 170–175 days for Alternative C, 7,951 to 8,846 survey miles over 183–204 days for Alternative E, and 9,279 to

10,142 survey miles over 213–233 days for Alternative E. Thus, the extent of HRG surveys is reduced proportional to the total number of structures proposed for each configuration. As of February 2023, 16 UXOs have been identified in the RWEC corridor (see Figure 2.1-10). Revolution Wind has determined that all 16 devices can be safely avoided by shifting the cable route within the approved installation corridor without the need for detonation (Orsted 2023). However, it is possible that additional devices of unknown size and location could be discovered during preconstruction surveys or construction that cannot be avoided or safely relocated. Impacts to marine mammals from HRG surveys and UXO detonation are considered to be similar in magnitude and general scale across all alternatives.

Differences in extent and duration of potential noise exposure from impact pile driving activities between the Proposed Action and the different configurations proposed for Alternatives C through E are summarized in Tables 3.15-12 through 3.15-14. These tables display the number of structures installed and estimated days of pile-driving activity required to construct each alternative. Extent and duration of potential noise exposure are proportional to the number of WTGs proposed; fewer WTGs would result in a smaller extent and shorter duration of impacts. For example, the two configurations of Alternative C and Alternative E1 would involve noticeably fewer days of pile driving than the Proposed Action and most configurations of Alternative D. While fewer individual marine mammals could be exposed to underwater noise impacts under these alternatives, the likelihood of at least some individuals being exposed to permanent injury remains. Accordingly, the impacts of this IPF would be noticeably reduced under these alternatives, the overall impacts would be similar in magnitude and general scale to those resulting from the Proposed Action. Adverse noise effects on marine mammals from each alternative for the duration of construction activities would likewise vary between species ranging from **minor** to **moderate** adverse. The potential use of larger capacity WTGs under Alternative F could result in more extensive operational noise impacts than the Proposed Action, but insufficient information is available to characterize differences in effect.

**Table 3.15-12. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) by Marine Mammal Hearing Group from Revolution Wind Farm WTG and OSS Foundation Installation, Proposed Action, and Proposed Configurations for Alternative C***

| Noise Exposure Type | Hearing Group | Threshold Distance for WTGs (feet)† | Threshold Distance for OSSs (feet)[†,§] | Proposed Action | Alternative C1 | Alternative C2 |
|---|---|---|---|---|---|---|
| Peak injury | LFC | < 33 | < 33 | 102 sites/ 35 days | 66 sites/ 23 days | 67 sites/ 23 days |
| | MFC | – | – | | | |
| | HFC | 525 | 361 | | | |
| | Phocids | – | | | | |
| Cumulative injury | LFC | 4,954–8,727 | 3,084–5,873 | | | |
| | MFC | 0–66 | – | | | |
| | HFC | 4,396 | 2,723 | | | |
| | Phocids | 787–1,444 | 33–1,214 | | | |
| Behavioral effects | LFC | 11,909–12,336 | 11,516–11,877 | | | |
| | MFC | 0–12,041 | 0–11,909 | | | |
| | HFC | 11,877 | 11,483 | | | |
| | Phocids | 11,909–12,467 | 11,549–12,303 | | | |

* Installation scenario for a 12-m monopile is 10,740 strikes/pile at an installation rate of three piles/day. Installation scenario for 15-m monopile is 11,563 strikes/pile at an installation rate of up to two piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. Values are the range of threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites during summer conditions.

§ Threshold distances for OSSs apply to two of the structures identified for each of the alternatives presented.

**Table 3.15-13. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) by Marine Mammal Hearing Group from Revolution Wind Farm WTG and OSS Foundation Installation, Proposed Action, and Proposed Configurations for Alternative D***

| Exposure Type | Hearing Group | Threshold Distance for WTGs (feet)† | Threshold Distance for OSSs (feet)†,§ | Proposed Action | Alternative D1 | Alternative D2 | Alternative D3 | Alternative D1+D2 | Alternative D1+D3 | Alternative D2+D3 | Alternative D1+D2+D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Peak injury | LFC | < 33 | < 33 | 102 sites/ 35 days | 95 sites/ 33 days | 94 sites/ 33 days | 95 sites/ 33 days | 87 sites/ 30 days | 88 sites/ 31 days | 87 sites/ 30 days | 80 sites/ 28 days |
| | MFC | – | – | | | | | | | | |
| | HFC | 525 | 361 | | | | | | | | |
| | Phocids | – | | | | | | | | | |
| Cumulative injury | LFC | 4,954–8,727 | 3,084–5,873 | | | | | | | | |
| | MFC | 0–66 | – | | | | | | | | |
| | HFC | 4,396 | 2,723 | | | | | | | | |
| | Phocids | 787–1,444 | 33–1,214 | | | | | | | | |
| Behavioral effects | LFC | 11,909–12,336 | 11,516–11,877 | | | | | | | | |
| | MFC | 0–12,041 | 0–11,909 | | | | | | | | |
| | HFC | 11,877 | 11,483 | | | | | | | | |
| | Phocids | 11,909–12,467 | 11,549–12,303 | | | | | | | | |

* Installation scenario for a 12-m monopile is 10,740 strikes/pile at an installation rate of three piles/day. Installation scenario for 15-m monopile is 11,563 strikes/pile at an installation rate of up to two piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. Values are the range threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites and seasonal conditions.

§ Threshold distances for OSSs apply to two of the structures identified for each alternative presented.

**Table 3.15-14. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) by Marine Mammal Hearing Group from Revolution Wind Farm WTG and OSS Foundation Installation, Proposed Action, and Proposed Configurations for Alternative E***

| Noise Exposure Type | Hearing Group | Threshold Distance for WTGs (feet)† | Threshold Distance for OSSs (feet)†,§ | Proposed Action | Alternative E1 | Alternative E2 |
|---|---|---|---|---|---|---|
| Peak injury | LFC | < 33 | < 33 | 102 sites/ 35 days | 66 sites/ 23 days | 83 sites/ 29 days |
| | MFC | – | – | | | |
| | HFC | 525 | 361 | | | |
| | Phocids | – | | | | |
| Cumulative injury | LFC | 4,954–8,727 | 3,084–5,873 | | | |
| | MFC | 0–66 | – | | | |
| | HFC | 4,396 | 2,723 | | | |
| | Phocids | 787–1,444 | 33–1,214 | | | |
| Behavioral effects | LFC | 11,909–12,336 | 11,516–11,877 | | | |
| | MFC | 0–12,041 | 0–11,909 | | | |
| | HFC | 11,877 | 11,483 | | | |
| | Phocids | 11,909–12,467 | 11,549–12,303 | | | |

* Installation scenario for a 12-m monopile is 10,740 strikes/pile at an installation rate of three piles/day. Installation scenario for 15-m monopile is 11,563 strikes/pile at an installation rate of up to two piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. Values are the range threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites and seasonal conditions.

§ Threshold distances for OSSs apply to two of the structures identified for each of the alternatives presented.

### 3.15.2.4.2 Operations and Maintenance and Decommissioning

#### Offshore Activities and Facilities

Presence of structures: The presence of WTG and OSS monopile foundations associated with Alternatives C through F would result in similar impacts to marine mammals as those described for the Proposed Action in Section 3.15.2.2.2, but those impacts would be reduced in extent and would vary depending on the alternative selected. Refer to Tables 3.6-17 through 3.6-19 in Section 3.6.2.4.2 for a summary of the number of structures under each proposed configuration of Alternatives C through F. As stated, Alternative F would employ one of the proposed configurations of Alternatives C through E using higher capacity WTGs. Aside from increased WTG capacity, all other features and impacts of Alternative F would be the same as those described for the selected configuration.

Over the life of the Project, the WTG and OSS foundations and associated scour protection would alter the offshore environment inhabited by marine mammals. Their presence could affect marine mammal behavior and indirectly affect the distribution and abundance of prey and forage species; however, the significance of these effects to a specific marine mammal species, such as NARW, is uncertain and would depend on the nature, extent, and significance of effects to forage species. For example, hydrodynamic effects from the presence of structures could alter the distribution of zooplankton and forage fish resources for baleen whales, leading those species to alter foraging patterns in response. These effects would likely influence the distribution of marine mammal forage species at a broad scale, but as discussed in Section 3.15.2.2.2, shifts in forage abundance and distribution would be expressed at smaller scales within this broader range. There is no basis to conclude that hydrodynamic effects would negatively affect the abundance and availability of prey species for marine mammals. The presence of structures and localized changes in forage species distribution could theoretically lead to displacement some marine mammal species and the potential for increased interaction with fisheries. Should such effects occur, they could lead to greater than negligible impacts on certain marine mammal species. However, insufficient information is available to determine if displacement effects are likely to occur and whether those effects would be biologically significant.

Impacts from the presence of structures are expected to vary in relation to the total number of foundations proposed (i.e., fewer structures would result in less extensive impacts). For example, both configurations of Alternative C and Alternative E1 propose noticeably fewer WTG and OSS foundations compared to the Proposed Action and most configurations of Alternative D. Therefore, these alternatives would be expected to produce noticeably reduced impacts from this IPF by comparison. In general, presence of structures effects on marine mammals under Alternatives C through F would likely be less extensive compared to those resulting from the Proposed Action. Reef effects would be reduced commensurate with the number of foundations constructed under each alternative configuration. At present, insufficient information is available to determine if differences in Project configuration between alternatives, specifically where foundations are located relative to sensitive benthic habitats, would contribute to a measurable difference in reef effects on marine mammals beyond those resulting from a simple reduction in the number of structures. As stated in Section 3.15.2.2.3, hydrodynamic effects are likely to lead to localized changes in the distribution of phytoplankton and forage fish prey for some marine mammal species, but these changes are unlikely to be biologically significant. Therefore, while Alternatives C through F would likely alter and reduce the extent of measurable hydrodynamic effects, those effects are likely to remain biologically insignificant. Following decommissioning and removal of the structures from the water column, the habitat would be expected to recover to conditions comparable to the environmental baseline for the surrounding habitats.

While certain alternative configurations would result in a noticeable reduction in the number of structures in the marine environment, it is not clear that this would result in a biologically significant difference in the effects of this IPF relative to the Proposed Action. It is not currently known if the presence of structures would result in displacement effects; therefore, it is not possible to determine if reducing the number of structures and altering their configuration would reduce displacement effects. Therefore, while Alternatives C through F would reduce the extent of reef and hydrodynamic effects, the overall impacts to marine mammals would be similar in magnitude and general scale to those resulting from the Proposed Action. On this basis, impacts from the presence of structures on marine mammals for Alternatives C through F are expected to range from **negligible** adverse to **minor** beneficial for the life of the Project. Impacts to specific species, such as NARW, are uncertain and would depend on several factors, including species-specific displacement effects, the nature and extent of effects to forage resources, and the status and sensitivity of the affected population to effects to individuals.

#### 3.15.2.4.3 Cumulative Impacts

##### Offshore Activities and Facilities

The cumulative impacts analysis for Alternatives C, D, E, and F is provided in Table 3.15-4.

#### 3.15.2.4.4 Conclusions

<u>Impacts of Alternatives C, D, E, and F.</u> As discussed in above sections, the anticipated impacts from these alternatives would reduce the number of WTGs and their associated IACs by approximately 10% to 43%, which would in turn result in an incremental reduction in effects on marine mammals from certain construction and installation, O&M, and conceptual decommissioning impacts. However, BOEM anticipates that any incremental reduction in impacts would not change the resulting effects on marine mammals to the extent necessary to alter the impact-level conclusions for any impact mechanism. The incremental impacts of Alternatives C, D, E, and F, when each is compared to the No Action Alternative, would be similar as the Proposed Action (i.e., **moderate** for NARWs, **minor** to **moderate** for other mysticetes, **minor** to **moderate** for odontocetes, and **minor** to **moderate** for pinnipeds) because, with the implementation of EPMs, mortality and non-auditory injury would not occur as a result of UXO detonation, only a few marine mammals of select species are anticipated to incur PTS incidental to pile driving and UXO detonation, vessel strike risk is very low and not anticipated, and accidental spills are also not anticipated.

The impacts resulting from Alternatives C, D, E, and F individually, when including the baseline status of marine mammals into the impact findings and considering all phases of the Project, would be similar to those of the Proposed Action and would be **minor** to **moderate** for mysticetes except for the NARW, which would be **major**. BOEM anticipates that the impacts resulting from the Proposed Action would be **minor to moderate** for odontocetes and pinnipeds and could include **minor beneficial** impacts. Adverse impacts are expected to result mainly from underwater noise (e.g., UXO detonations and impact pile driving) and increased vessel traffic potentially leading to vessel strikes. Beneficial impacts for odontocetes and pinnipeds are expected to result from the presence of structures.

Cumulative Impacts of Alternatives C, D, E, and F. The incremental impacts contributed by Alternatives C, D, E, and F to the cumulative impacts on marine mammals would be similar to those of the Proposed Action and would range from undetectable to noticeable. BOEM anticipates that the cumulative impacts of Alternatives C, D, E, and F when each is combined with ongoing and planned activities, including offshore wind, would be the same level as under the Proposed Action: **major** for NARW and **minor** to **moderate** for all other marine mammals. Some **minor beneficial** impacts to certain odontocetes and pinnipeds could be realized through artificial reef effects.

### 3.15.2.5 Alternative G: Impacts of the Preferred Alternative on Marine Mammals

Under Alternative G, baseline conditions for marine mammals (see Section 3.15.1) would continue to follow current regional trends within the GAA. The impacts of existing conditions on marine mammals are described and analyzed in Appendix E1. The impacts of each IPF from the construction and installation, O&M, and conceptual decommissioning of Alternative G would be incremental to and would compound the impacts of baseline conditions on each marine mammal population considered in this EIS (see Table 3.15-2). These effects are described below.

#### 3.15.2.5.1 Construction and Installation

#### Offshore Activities and Facilities

Noise: Construction of Alternative G would result in similar underwater noise impacts on marine mammals to those described for the Proposed Action in Section 3.15.2.3.1, but those impacts would be reduced in extent and duration because fewer structures would be installed. Reducing the number of structures could also reduce the required extent of HRG surveys relative to the Proposed Action, but BOEM has insufficient information to determine if this is the case. As of February 2023, 16 UXOs have been identified in the RWEC corridor. Revolution Wind has determined that all 16 devices can be safely avoided by shifting the cable route within the approved installation corridor without the need for detonation (Orsted 2023). However, it is possible that additional devices of unknown size and location could be discovered during preconstruction surveys or construction that cannot be avoided or safely relocated. Therefore, impacts to marine mammals from HRG surveys and UXO detonation are considered to be the same as for the Proposed Action.

Differences in the extent and duration of potential noise exposure from impact pile-driving activities between the Proposed Action and Alternative G are summarized in Table 3.15-15. This table displays the number of structures installed and estimated days of pile-driving activity required to construct the alternative. Extent and duration of potential noise exposure are proportional to the number of WTGs proposed; fewer WTGs would result in a smaller extent and shorter duration of impacts. While fewer individual marine mammals could be exposed to underwater noise impacts under these alternatives, the likelihood of at least some individuals being exposed to permanent injury remains. Accordingly, the impacts of this IPF would be noticeably reduced under this alternative, but the overall impacts would be similar in magnitude and general scale to those resulting from the Proposed Action. Adverse noise effects on marine mammals from Alternative G for the duration of construction activities would likewise vary between species, ranging from **minor** to **moderate** adverse.

**Table 3.15-15. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) by Marine Mammal Hearing Group from Revolution Wind Farm WTG and OSS Foundation Installation, Proposed Action, and Proposed Configuration for Alternative G***

| Noise Exposure Type | Hearing Group | Threshold Distance for WTGs (feet)† | Threshold Distance for OSSs (feet)[†,§] | Proposed Action | Alternative G | Alternatives G1–G3 |
|---|---|---|---|---|---|---|
| Peak injury | LFC | < 33 | < 33 | 102 sites/ 35 days | 81 sites/ 28 days | 67 sites/ 24 days |
| | MFC | – | – | | | |
| | HFC | 525 | 361 | | | |
| | Phocids | – | | | | |
| Cumulative injury | LFC | 4,954–8,727 | 3,084–5,873 | | | |
| | MFC | 0–66 | – | | | |
| | HFC | 4,396 | 2,723 | | | |
| | Phocids | 787–1,444 | 33–1,214 | | | |
| TTS and behavioral effects | LFC | 11,909–12,336 | 11,516–11,877 | | | |
| | MFC | 0–12,041 | 0–11,909 | | | |
| | HFC | 11,877 | 11,483 | | | |
| | Phocids | 11,909–12,467 | 11,549–12,303 | | | |

* Installation scenario for a 12-m monopile is 10,740 strikes/pile at an installation rate of three piles/day. Installation scenario for 15-m monopile is 11,563 strikes/pile at an installation rate of up to two piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. Values are the range threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites during summer conditions.

§ Threshold distances for OSSs apply to two of the structures identified for each of the alternatives presented.

<u>Vessel traffic:</u> Alternative G would result in similar vessel traffic impacts on marine mammals to those described in Section 3.15.2.3.1. An estimate of vessel trips associated with Alternative G construction is not available; however, it is expected to be slightly less than the Proposed Action with effects commensurate with the reduction in vessel activities associated with 21 or 35 (depending on the configuration) fewer foundations.

Vessel collisions are a key source of mortality and serious injury for many marine mammal species (Hayes et al. 2021, 2022; Laist et al. 2001; Rockwood et al. 2017; Schoeman et al. 2020), indicating the importance of protective measures to minimize risks to vulnerable species. If a vessel strike does occur, the impact on marine mammals would range from **negligible** to **moderate** adverse, considering the application of project-specific EPMs. The applicant has committed to a range of EPMs to avoid vessel collisions with marine mammals (see Appendix F, Table F-1). These include adherence to NOAA guidance for collision avoidance and a combination of additional measures, including approved speed restrictions for all vessels within marine mammal SMAs and DMAs, and adherence to additional mitigation measures, as identified in Appendix F, Table F-1. All vessel crews would receive training to ensure that these EPMs are fully implemented for vessels in transit. Once on station, the construction vessels either remain stationary when installing the monopiles and WTG/OSS equipment or move slowly when traveling between foundation locations. Cable laying and HRG survey vessels also move slowly, with typical operational speeds of less than 1 knot and approximately 4 knots, respectively, and present minimal risk of collision-related injury.

The densities of the most common species of marine mammals likely to occur in the RWF Lease Area and RWEC route are generally low based on monthly mean density estimates developed by Roberts et al. (2016, 2017, 2018, 2020, 2021). Density and occurrence in and near the Lease Area vary by season and species; however, vessel strike avoidance measures would be implemented to minimize risk across the range of seasonal densities. Operational conditions combined with planned EPMs would minimize collision risk during construction and installation. Additional mitigation measures agreed upon through agency consultation would further reduce this risk (see Appendix F for all vessel strike avoidance measures). During periods of low visibility, trained crew would use increased vigilance to avoid marine mammals. Because vessel strikes are not an anticipated outcome given the relatively low number of vessel trips and EPMs to avoid encountering marine mammals, BOEM concludes vessel strikes are unlikely to occur. Therefore, there is no anticipated effect on marine mammals, and collision effects would be **negligible** adverse during Project construction.

The presence of construction vessels and associated noise and disturbance could cause short-term displacement of marine mammals from preferred habitats similar to the Proposed Action. Temporary marine mammal displacement from offshore wind energy construction sites have been observed, apparently due to vessel-related disturbance (Long 2017). Habitat use within the affected areas returned to normal after construction was completed, indicating that construction-related displacement effects would be short term in duration. On this basis, vessel displacement effects on marine mammals could range in significance from **minor** to **moderate** adverse depending on the species affected and the biological significance of displacement, recognizing that some portion of these effects is also likely the result of construction noise, as described above.

#### 3.15.2.5.2 Operations and Maintenance and Decommissioning

##### Offshore Activities and Facilities

Presence of structures: The presence of WTG and OSS monopile foundations associated with Alternative G would result in similar impacts to marine mammals as those described for the Proposed Action in Section 3.15.2.2.2, but those impacts would be reduced in extent due to the reduced number of structures.

Impacts from the presence of structures are expected to vary in relation to the total number of foundations proposed (i.e., fewer structures would result in less extensive impacts). Therefore, Alternative G would be expected to produce noticeably reduced impacts from this IPF by comparison. In general, presence of structures effects on marine mammals under this alternative is likely be less extensive compared to those resulting from the Proposed Action. Reef effects would be reduced commensurate with the number of foundations constructed. As stated in Section 3.15.2.3.2, hydrodynamic effects are likely to lead to localized changes in the distribution of phytoplankton and forage fish prey for some marine mammal species, but these changes are unlikely to be biologically significant. Therefore, while Alternative G would likely alter and reduce the extent of measurable hydrodynamic effects, those effects are likely to remain biologically insignificant. Following decommissioning and removal of the structures from the water column, the habitat would be expected to recover to conditions comparable to the environmental baseline for the surrounding habitats.

It is not currently known if the presence of structures would result in displacement effects; therefore, it is not possible to determine if reducing the number of structures and altering their configuration would reduce displacement effects. Therefore, while Alternative G would reduce the extent of reef and hydrodynamic effects, the overall impacts to marine mammals would be similar in magnitude and general scale to those resulting from the Proposed Action. On this basis, impacts from the presence of structures on marine mammals for Alternative G are expected to range from **negligible** adverse to **minor** beneficial for the life of the Project. Impacts to specific species, such as NARW, are uncertain and would depend on several factors, including species-specific displacement effects, the nature and extent of effects to forage resources, and the status of the affected population and sensitivity to effects to individuals.

#### 3.15.2.5.3 Cumulative Impacts

This section discloses potential impacts to marine mammals associated with future offshore wind development, including Alternative G. The cumulative impact analysis for Alternative G includes the proposed configurations of Alternative G, other planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects. Cumulative impacts to marine mammals under Alternative G presented herein would be incremental to and would compound the impacts of baseline conditions on each marine mammal population considered in this EIS (see Table 3.15-2).

##### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: BOEM estimates a cumulative total of 104,781 acres of cabling seafloor disturbance and 10,525 acres of anchoring disturbance for Alternative G, plus all other future offshore wind projects in the GAA. Cumulative impacts would be localized, temporary, **negligible** adverse to marine mammals through anchoring and cabling-related seafloor disturbance and associated increased suspended sedimentation within the GAA. No population-level effects on marine mammals are expected from reduced water quality. However, there could be temporary displacement of marine mammals from preferred habitats, especially during construction activities, due to increased vessel activity. Vessel anchoring and cable emplacement during construction and installation, O&M, and decommissioning are not anticipated to involve equipment, lines, or rigging that could pose a potential entanglement risk to marine mammals. Therefore, Alternative G combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative effects on marine mammals.

Climate change: Cumulative impacts to marine mammals from climate change under Alternative G are expected to be of similar magnitude to those described for the Proposed Action. The nature and potential significance of climate change cumulative impacts to marine mammals from Alternative G are unknown but are likely to range from **minor** to **moderate** adverse. Impacts to specific marine mammal species, such as NARW, would be influenced by the same factors described for the Proposed Action.

Noise: Alternative G would generate underwater noise effects during Project construction, throughout the operational life of the Project, and during Project decommissioning. Those impacts would be similar in magnitude and distribution but reduced in extent relative to the Proposed Action. These effects would combine with similar effects resulting from the construction, O&M, and decommissioning of other planned offshore wind projects on the Mid-Atlantic OCS.

All future actions would be subject to the same independent NEPA analysis and regulatory approvals as Alternative G. BOEM would require all projects to incorporate the same types of EPMs included in Alternative G to avoid and minimize harmful noise effects. While these measures would avoid and minimize impacts to marine mammals to the greatest extent practicable, some unavoidable impacts on individuals are likely to occur. The impacts of each project would result in **minor** to **moderate** adverse effects on marine mammals. Effects to specific marine mammal species would depend on the number of individuals exposed to injury and behavioral level effects, the significance of those effects to survival and reproductive fitness, and the status and sensitivity of the affected population to impacts to individuals. BOEM anticipates that future MMPA approvals would consider the known status of marine mammal stocks and populations, indirectly incorporating the potential combined effects of future projects. Therefore, BOEM concludes that the cumulative effects of construction noise on marine mammals would be **moderate** adverse because of the potential for PTS, TTS, and behavioral impacts during construction activities. NARW could be an exception to this determination because of its perilous population status. Hearing-related injury to even one individual that results in reduced reproductive fitness could contribute to ongoing downward trends in population viability. However, the application of EPMs is expected to minimize the risk of hearing-related injury.

Operational noise impacts would be similar in magnitude and distribution but reduced in extent relative to the Proposed Action. These structures would contribute to and potentially increase ambient noise within each WEA, albeit at levels generally not associated with adverse effects on marine mammals. While the potential for broader effects is unclear, BOEM concludes that the cumulative effects of low-level operational noise could raise to the level of **minor** adverse for certain marine mammal species.

Cumulative impacts to marine mammals from construction of Alternative G are expected to be of similar magnitude to those described for the Proposed Action. Alternative G is likely to result in short-term displacement effects on marine mammals from the areas affected by disturbance from vessel activity, foundation installation, HRG surveys, and related activities. Several projects are expected to be constructed concurrently, potentially resulting in individual marine mammals being exposed to multiple episodes of habitat displacement. BOEM anticipates that the construction schedules for future wind projects would employ the same types of timing restrictions to protect NARW as those included in the Proposed Action, with modifications as needed to adapt to ongoing shifts in the seasonal distribution of this species (e.g., Davis et al. 2017, 2020). However, timing restrictions for NARW would not be protective for all marine mammal species. It is anticipated that future wind projects would also employ a similar range of EPMs to avoid and minimize impacts to marine mammals, but some level of short-term displacement is likely to occur, and some individual animals are likely to be exposed to multiple episodes of displacement. The significance of these potential impacts is unclear, but when all protective measures are considered, cumulative effects are likely to range from **negligible** to **moderate** adverse, varying by species. Impacts to specific species, such as NARW, are uncertain and would depend on several factors, including the nature of cumulative climate change impacts to the availability and distribution of suitable habitat and forage resources, the ability of that species to adapt to these changes, and the status and resilience of the affected population.

<u>Presence of structures:</u> BOEM anticipates that future wind projects within the RI/MA WEA would be constructed using 1 × 1–nm grid spacing, as does the Proposed Action. Foundations spaced at 1 × 1 nm are unlikely to pose a barrier to movement for even the largest marine mammal species. However, the broad-scale development of offshore energy structures would introduce an extended network of biologically productive artificial reefs, most generating low levels of non-impulsive sound that are detectable to marine mammals within a few hundred feet. While the individual effects of each turbine would be **minor** adverse, the broader implications of these habitat changes for marine mammals are unclear. Displacement effects that result in increased interactions between vulnerable populations of marine mammals and commercial shipping and/or fishing activity could have noticeable long-term cumulative effects. Given these uncertainties, the potential for displacement effects is unknown, but there is currently no basis to conclude that these impacts would result in greater than **minor** adverse long-term effects on any species.

The abundance of fish and invertebrate prey resources created by the artificial reef effect are likely to attract predatory marine mammals, particularly seals (e.g., Russel et al. 2014) and potentially dolphins and porpoises. Increased fish biomass around the structures could attract commercial and recreational fishing activity, leading to increased interactions between humans and marine mammals. BOEM anticipates that future offshore wind projects would perform regular inspections to identify and remove derelict fishing gear and other marine debris from offshore structures, reducing associated risks to marine mammals.

The new wind energy structures would also cause hydrodynamic effects. The GAA is characterized by strong seasonal stratification, conditions that tend to limit the hydrodynamic influence of individual foundation structures (van Berkel et al. 2020). As discussed in the previous section, the Proposed Action is not anticipated to result in additive hydrodynamic effects. However, broader scale development of contiguous projects could have more extensive effects. For example, Afsharian et al. (2020) modeled the potential effects from installation of over 400 offshore wind turbines in Lake Erie and determined that their cumulative effect on wind energy could disrupt circulation patterns and affect seasonal stratification and water temperatures over broad scales. However, these findings may not be applicable to the open ocean, where circulation patterns are strongly influenced by tides and ocean currents.

At present, currently available information suggests that hydrodynamic effects of foundation structures are likely to be localized and not additive when spaced at 1 × 1 nm in environments with strong seasonal stratification (van Berkel et al. 2020). Recent modeling of hydrodynamic effects suggests that surface currents could be affected by the presence of multiple wind farms, potentially impacting the distribution of larvae (Johnson et al. 2021). There is insufficient information to determine if this conclusion is valid for broader scale development at the levels planned within the GAA. Therefore, at this time, there is no basis to conclude that the cumulative hydrodynamic impacts of the Proposed Action in combination with planned future actions would have a measurable effect on marine mammals and their prey and forage species.

In summary, the cumulative effects of long-term habitat alteration and hydrodynamic impacts on marine mammals are unclear, could be beneficial or adverse, could range from **negligible** to **moderate** adverse, and are likely to vary depending on several factors. These factors include the nature and extent of effects on habitat suitability and forage availability, the significance of these effects to the survival and reproductive fitness, and the status and sensitivity of affected populations to effects on individuals. Although the type and magnitude of effect from displacement and shifts in prey resources due to the presence of structures are largely unknown, the possibility of changes in distribution relative to commercial fishing activity and increased interaction with fishing gear poses the potential for increased risk of entanglement. Should such changes occur, increased risk of entanglement would constitute a **minor** to **moderate** adverse effect on marine mammals, because this stressor is a documented source of injury and mortality. Effects to each marine mammal species would depend on the number of individual animals exposed to entanglement effects, the nature of the impact (i.e., injury or mortality), and the status and sensitivity of the affected population to impacts to individuals. In the case of NARW, given that entanglement has been identified as a limiting factor in the species' recovery, the potential for increased exposure to entanglement could pose a significant risk; however, specific EPMs have been developed to minimize risk for NARW. The risk of entanglement is therefore not considered to result in a greater than moderate adverse effect for NARW. It is important to stress that the likelihood of this level of effect is unclear because it is not known if the presence of structures would displace NARW and whether displacement would lead to increased fishing gear exposure. These potential long-term impacts would persist until decommissioning is complete and structures are removed. EPMs would help to offset the potential impact of entanglement within derelict fishing gear or marine debris.

<u>Vessel traffic:</u> BOEM estimates that, cumulatively, up to 262 construction vessels could be active within the GAA between 2022 and 2030. As discussed above for Project construction, the majority of vessel operations would be expected to occur at speeds of less than 10 knots. In addition, BOEM anticipates that future projects would adhere to mandatory and voluntary vessel speed restrictions in posted DMAs and SMAs and would implement EPMs similar to those described for the Proposed Action (see Appendix F, Table F-1) to avoid marine mammal collisions BOEM has concluded that these measures would effectively avoid all but minor adverse impacts on sensitive species such as NARW and minimize risk of vessel collisions to other marine mammal species. Therefore, the cumulative effects of increased vessel traffic on marine mammals would range from **negligible** to **moderate** adverse.

#### 3.15.2.5.4 Conclusions

<u>Impacts of Alternative G, the Preferred Alternative</u>. As discussed above, the anticipated impacts from Alternative G reduce the number of WTGs and their associated IACs by approximately 35%, which

would result in an incremental reduction in effects on marine mammals from certain construction and installation, O&M, and conceptual decommissioning impacts. However, BOEM anticipates that any incremental reduction in impacts would not change the resulting effects on marine mammals to the extent necessary to alter the impact-level conclusions for any impact mechanism. The incremental impact of Alternative G, when compared to the No Action Alternative, would be similar to the Proposed Action: **minor** to **moderate** adverse for mysticetes, with moderate adverse impacts to humpback whale due to permanent hearing injury to individuals and to NARW due to potential exposure of several individuals to temporary behavioral disturbance in potentially important seasonal foraging habitats, respectively. Impacts to odontocetes would range from **minor** to **moderate**, with moderate impacts to harbor porpoise from permanent hearing injury to individuals. Pinnipeds would experience **minor** to **moderate** impacts to individuals from behavioral exposure and hearing injury to individuals. Because the implementation of EPMs would avoid mortality and non-auditory injury would not occur as a result of UXO detonation, only a few marine mammals of select species are anticipated to incur PTS incidental to pile driving and UXO detonation, vessel strike risk is very low and not anticipated, and accidental spills are also not anticipated.

The impacts resulting from Alternative G, when including the baseline status of marine mammals into the impact findings and considering all phases of the Project, would be similar to those of the Proposed Action and would be **moderate** for mysticetes except for the NARW, which would be **major**. BOEM anticipates that the impacts resulting from Alternative G would be **minor to moderate** for odontocetes and pinnipeds and could include **minor beneficial** impacts. Adverse impacts are expected to result mainly from underwater noise (e.g., UXO detonations and impact pile driving) and increased vessel traffic potentially leading to vessel strikes. Beneficial impacts for odontocetes and pinnipeds are expected to result from the presence of structures.

<u>Cumulative Impacts of Alternative G, the Preferred Alternative</u>. The incremental impacts contributed by Alternative G to the cumulative impacts on marine mammals would be similar to the Proposed Action and would range from undetectable to noticeable. BOEM anticipates that the cumulative impacts of Alternative G when combined with ongoing and planned activities, including offshore wind, would be the same as the Proposed Action: **major** for NARW and **minor** to **moderate** for all other marine mammals. Some **minor beneficial** impacts to certain odontocetes and pinnipeds could be realized through artificial reef effects.

#### 3.15.2.6 Summary of Impact Determinations to Marine Mammals for Use by NMFS in Review of the MMPA Incidental Take Regulation Application Pursuant to NEPA

This section, which includes Table 3.15-16, has been added to the Final EIS to assist the NMFS Office of Protected Resources to satisfy incremental impact analysis requirements under NEPA in support of their evaluation of Revolution Wind's application under MMPA (16 USC 1371(a)(5)(A)) for an ITR and associated Letter of Authorization and the decision of whether to issue the authorization. The incremental impact determinations presented in Table 3.15-16 summarize the incremental effect of each of the alternatives in Section 3.15.2 in the absence of baseline conditions and cumulative impacts from other planned and permitted offshore wind activities in the GAA.

Under the No Action Alternative, BOEM would not approve the RWF COP. Given this, stressors from construction, O&M, and conceptual decommissioning of the Project would not occur. Baseline conditions of the existing environment would remain unchanged. Therefore, not approving the COP would have no additional incremental effect on marine mammals. The No Action Alternative (i.e., not issuing the requested incidental take authorization under the MMPA) would also have no additional incremental impact on marine mammals and their habitat.

The determinations presented in Table 3.15-16 represent the combined incremental impacts of all IPFs from the associated alternative on the identified marine mammal species or species group. Where appropriate, incremental impacts are presented as a range where the anticipated effects of the alternative would differ between the species within that species group.

**Table 3.15-16. Summary of Incremental Impact Determinations to Marine Mammals across IPFs for Use by NMFS in Review of the MMPA ITR Application Pursuant to NEPA**

| Species | No Action Alternative | Alternative B (Proposed Action) | Alternative C (Habitat Alternative) | Alternative D (Transit Alternative) | Alternative E (Viewshed Alternative) | Alternative F (Higher Capacity Turbine Alternative) | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| NARW | No effect | Moderate | Moderate | Moderate | Moderate | Moderate | Moderate |
| Other mysticetes | No effect | Minor to moderate | Minor to moderate | Minor to moderate | Minor to moderate | Minor to moderate | Minor to moderate |
| Odontocetes | No effect | Minor to moderate | Minor to moderate | Minor to moderate | Minor to moderate | Minor to moderate | Minor to moderate |
| Pinnipeds | No effect | Minor to moderate | Minor to moderate | Minor to moderate | Minor to moderate | Minor to moderate | Minor to moderate |

Note: The incremental impacts of the action alternatives vary between the species within each species group and are therefore presented as a range.

#### 3.15.2.7 Mitigation

Mitigation measures resulting from agency consultations for marine mammals are identified in Appendix F, Table F-2, and addressed in Table 3.15-17. Additional mitigation measures identified by BOEM and cooperating agencies are listed in Appendix F, Table F-3, and summarized in Table 3.15-18.

**Table 3.15-17. Mitigation and Monitoring Measures Resulting from Consultations for Marine Mammals (Appendix F, Table F-2)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Incorporate letter of authorization (LOA) requirements | The measures required by the final MMPA LOA for Incidental Take Regulations (ITRs) would be incorporated into COP approval, and BOEM and/or BSEE would monitor compliance with these measures. | Compliance with LOA requirements would reduce risks for marine mammals under the Proposed Action from pile driving, UXO detonation, HRG surveys, and vessel operations, and provide reporting and enforcement mechanisms to ensure all monitoring and mitigation requirements are implemented. However, this measure would not alter impact determinations for marine mammals because compliance with LOA requirements is an identified EPM that is considered in the analysis of the Proposed Action. |
| DRAFT NMFS BiOp Reasonable and Prudent Measures (RPMs) and Terms and Conditions (T&Cs) | Draft NMFS Biological Opinion Proposed Reasonable and Prudent Measures were issued to BOEM for consideration on June 16, 2023.<br>Final NMFS Biological Opinion Proposed Reasonable and Prudent Measures to be issued to BOEM for consideration on July 21, 2023.<br>RPMs and Terms and Conditions to minimize the impact of incidental take of ESA-listed species were documented in the draft NMFS Biological Opinion dated June 16, 2023. These measures include adherence to mitigation measures specified in the final MMPA ITA to minimize impacts during pile driving and UXO detonation; compliance with requirements for vessel operations within the Delaware River and Delaware Bay included in the Incidental Take Statements provided with the Paulsboro Marine Terminal Biological Opinion (dated July 19, 2022); reporting requirements related to effects to, or interactions with, ESA-listed species; submittal of required plans (e.g., PSO Training Plan for Trawl Surveys, Passive Acoustic Monitoring Plan, Marine Mammal and Sea Turtle Monitoring Plan, Cofferdam Installation and Removal Monitoring Plan, Alternative Monitoring Plan/Night Time Pile Driving Monitoring Plan, Sound Field Verification Plan, North Atlantic Right Whale Vessel Strike Avoidance Plan) to NMFS GARFO with sufficient time for review, comment and approval; and conducting on-site observation and inspection to gather | These RPMs and Terms and Conditions would minimize the exposure of ESA-listed marine mammals to underwater noise impacts from impact and vibratory pile driving, UXO detonation, and HRG surveys. These RPMs and Terms and Conditions would also ensure that all incidental take that occurs is documented and reported to NMFS in a timely manner. Reporting requirements to document take would improve accountability for documenting take associated with the Proposed Action. In some cases, these PRMs and Terms and Conditions provide additional detail or clarification of measures that are included as part of the Proposed Action. Implementation of these RPMs and Terms and Conditions would provide incremental reductions in impacts on marine mammals but would not alter the overall impact determination of the Proposed Action. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | information on the effectiveness and implementation of measures to minimize and monitor incidental take. | |
| NMFS EFH Conservation Recommendations | NMFS EFH Conservation Recommendations were issued to BOEM for consideration on June 16, 2023 (NMFS 2023).<br>EFH Conservation Recommendations for activities under BOEM's jurisdiction were provided identifying proposed removal and relocation (micrositing) of selected WTG foundations and cable segments removal and relocation; construction timing restrictions to avoid potential adverse impacts to Atlantic cod; habitat alteration minimization; noise mitigation; and minimization of impacts during construction, O&M, and decommissioning. EFH Conservation Recommendations for activities under USACE's jurisdiction were provided for in-water work; offshore impact minimization; impact to scientific surveys minimization; and identification and facilitated access to mapping of relocated boulders, berms, scour, and cable protection. | Implementation of Conservation Recommendations, for timing restrictions on all construction activity in the Lease Area from November 1 to April 30, and noise mitigation during construction, such as soft starts, use of noise-dampening equipment, and noise mitigation protocols in consultation with resource agencies prior to construction activities, would avoid and minimize potential underwater noise, vessel traffic, and seabed disturbance impacts on marine mammals during the restricted period. Implementation of Conservation Recommendations to develop monitoring plans for operational noise and vibration effects would benefit marine mammals by ensuring robust experimental design, methods, and data collection/analysis to assess changes in baseline underwater noise conditions. Although implementation of the Conservation Recommendations would provide incremental reductions noise and vessel-related disturbance reductions in the overall impact rating are not anticipated for any of the Proposed Action's IPFs. |
| Marine debris awareness training | The Lessee would ensure that vessel operators, employees, and contractors engaged in offshore activities pursuant to the approved COP complete marine trash and debris awareness training annually. The training consists of two parts: (1) viewing a marine trash and debris training video or slide show (described below); and (2) receiving an explanation from management personnel that emphasizes their commitment to the requirements. The marine trash and debris training videos, training slide packs, and other marine debris related educational material may be obtained at https://www.bsee.gov/debris or by contacting BSEE. The training videos, slides, and related material may be downloaded directly from the website. Operators engaged in marine survey activities must continue to develop and use a marine trash and debris awareness training and certification | Marine debris and trash awareness training would minimize the risk of marine mammal ingestion of or entanglement in marine debris. While adoption of this measure would decrease risk to marine mammals under the Proposed Action, it would not alter the impact determination for accidental releases. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | process that reasonably assures that their employees and contractors are in fact trained. The training process must include the following elements:<br>• Viewing of either a video or slide show by the personnel specified above;<br>• An explanation from management personnel that emphasizes their commitment to the requirements;<br>• Attendance measures (initial and annual); and<br>• Record keeping and the availability of records for inspection by DOI.<br>By January 31 of each year, the Lessee would submit to DOI an annual report that describes its marine trash and debris awareness training process and certifies that the training process has been followed for the previous calendar year. The Lessee would send the reports via email to BOEM (at renewable_reporting@boem.gov) and to BSEE via TIMSWeb with a notification email (at marinedebris@bsee.gov). | |
| Marine debris elimination | Materials, equipment, tools, containers, and other items used in OCS activities which could be lost or discarded overboard are of such shape or properly secured to prevent loss overboard must be clearly marked with the vessel or facility identification. All markings must clearly identify the owner and must be durable enough to resist the effects of the environmental conditions to which they may be exposed. | This measure would complement existing EPMs and regulatory requirements by providing a mechanism for enforcing accountability with EPMs and mitigation requirements, ensuring that impacts from the accidental releases and discharges IPF would remain negligible adverse. |
| Passive acoustic monitoring (PAM) plan | BOEM, BSEE, and USACE would ensure that Revolution Wind prepares a PAM plan that describes all proposed equipment, deployment locations, detection review methodology and other procedures, and protocols related to the required use of PAM for monitoring. This plan must be submitted to NMFS, BOEM, and BSEE (at OSWsubmittals@bsee.gov) for review and concurrence preferably 180 days but no later than 120 days to the planned start of pile driving. Reporting to BSEE must follow JOINT NTL 2023-N01, Appendix B (BSEE and BOEM 2023). | Revolution Wind has committed to implementing passive acoustic monitoring, pile driving monitoring, PSO coverage, sound field verification, and shutdown zones as part of the Proposed Action. Compliance with these EPMs would be enforced by BOEM, BSEE, and NMFS as indicated in Table F-2. Implementation and enforcement of these EPMs would minimize the potential for Level A or Level B exposures to marine mammals during of impact pile driving, vibratory pile driving, HRG surveys, and UXO |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | | detonation, as disclosed in the analysis of the Proposed Action. This agency-proposed mitigation measure specifies plan review and reporting requirements necessary to ensure PAM plan effectiveness and enforcement. While adoption of these measures would increase accountability and ensure the effectiveness of EPMs, it would not alter the impact determination for any marine mammal hearing group or individual species as analyzed herein. |
| Passive acoustic monitoring, long-term | Use PAM buoys or autonomous PAM devices to record ambient noise, marine mammals, and cod vocalizations in the Lease Area before, during, and immediately after construction (at least 25 years of operation (or as may be extended) to monitor Project noise. The archival recorders must have a minimum capability of detecting and storing acoustic data on anthropogenic noise sources (such as vessel noise, pile driving, WTG operation, and whale detections), marine mammals, and cod vocalizations in the Lease Area. Monitoring would also occur during the decommissioning phase. The total number of PAM stations and array configuration will depend on the size of the zone to be monitored, the amount of noise expected in the area, and the characteristics of the signals being monitored to accomplish both monitoring during constructions, and also meet post-construction monitoring needs. Results must be provided within 90 days of construction completion and again within 90 days of the 1-year, 2-year, and 3-year anniversary of collection. The underwater acoustic monitoring must follow standardized measurement and processing methods and visualization metrics developed by the Atlantic Deepwater Ecosystem Observatory Network (ADEON) for the U.S. Mid- and South Atlantic OCS (see https://adeon.unh.edu/). At least two buoys must be independently deployed within or bordering the Lease Area or one or more buoys must be deployed in coordination with other acoustic monitoring efforts in the RI/MA and MA WEAs. | Long-term PAM would provide data useful for documenting marine mammal presence in the Lease Area and vicinity and evaluating changes in population density and habitat use over the life of the project. This measure would not modify impact determinations on marine mammals but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein, and to inform existing uncertainty about potential effects on marine mammal species. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
| --- | --- | --- |
| | As an alternative to conducting PAM in its project area, the lessee may opt to meet this monitoring requirement through an annual deposit to BOEM's Environmental Studies Program in support of its Partnership for an Offshore Wind Energy Regional Observation Network (POWERON) initiative. The lessee's contribution would cover activities within its lease area, such as the purchase of instruments, annual deployments and refurbishment, data processing, and long-term data archiving. Funding from BOEM, other partners, and potentially other lessees will support long-term PAM throughout the region which will enable broader-scale analyses on cumulative effects to marine species. Under this option, the lessee will be expected to cooperate with the POWERON team to facilitate deployment and retrieval of instruments within the project area. If necessary, the lessee may request temporary withholding of the public release of acoustic data that has been collected within its project area. | |
| Sound field verification (SFV) | NMFS, BOEM, BSEE, and USACE would ensure that if the clearance and/or shutdown zones are expanded, PSO coverage is sufficient to reliably monitor the expanded clearance and/or shutdown zones. Additional observers must be deployed on additional platforms for every 1,500 m that a clearance or shutdown zone is expanded beyond the distances modeled prior to verification.<br><br>To validate the estimated sound field, SFV measurements would be conducted during pile driving of the first three monopiles installed over the course of the Project, with noise attenuation activated. A SFV plan would be submitted to NMFS, BOEM, USACE, and BSEE for review and approval preferably 180 days but no later than 120 days prior to planned start of pile driving. This plan would describe how Revolution Wind would ensure that the first three monopile installation sites selected for sound field are representative of the rest of the monopile installation sites and, in the case that they are not, how additional sites would be selected for SFV. This plan would also include methodology for collecting, analyzing, and preparing SFV data for submission to NMFS. The plan would describe how the effectiveness of the sound attenuation methodology would be | Revolution Wind has committed to implementing passive acoustic monitoring, pile driving monitoring, PSO coverage, sound field verification, and shutdown zones as part of the Proposed Action. Compliance with these EPMs would be enforced by BOEM, BSEE, and NMFS as indicated in Table F-2. Implementation and enforcement of these EPMs would minimize the potential for Level A or Level B exposures to marine mammals during of impact pile driving, vibratory pile driving, HRG surveys, and UXO detonation, as disclosed in the analysis of the Proposed Action. This agency-proposed mitigation measure specifies plan review and reporting requirements necessary to ensure SFV plan effectiveness and enforcement. While adoption of these measures would increase accountability and ensure the effectiveness of EPMs, it would not alter the impact determination for any marine mammal hearing group or individual species as analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | evaluated based on the results. In the event that Revolution Wind obtains technical information that indicates a subsequent monopile is likely to produce larger sound fields, SFV would be conducted for those subsequent monopiles. | |
| Shutdown zone and pre-start clearance zone adjustment | BOEM and BSEE, with the approval of NMFS, may consider adjustments in the pre-start clearance and/or shutdown zones based on the initial sound field verification measurements. If initial measurements indicate distances to the isopleths are greater than predicted by modeling, Revolution Wind must implement additional sound attenuation measures prior to conducting additional pile driving. | This measure would not modify the impact determination for noise effects on marine mammals (minor to moderate adverse) but would help to ensure that these effects do not exceed the levels analyzed herein. |
| Pile driving monitoring plan | BOEM, BSEE, and USACE would ensure that Revolution Wind prepares and submits to BSEE (via TIMSWeb and notification email at protectedspecies@bsee.gov) and BOEM (at renewable_reporting@boem.gov) for review and concurrence preferably 180 days but no later than 120 days before start of pile driving. Reporting to BSEE would follow JOINT NTL 2023-N01, Appendix B. The Lessee must not conduct pile driving operations at any time when lighting or weather conditions (e.g., darkness, rain, fog, sea state) prevent visual monitoring of the full extent of the clearance and shutdown zones including not initiating pile driving earlier than 1 hour after civil sunrise or later than 1.5 hours prior to civil sunset.<br><br>Pile driving at night may only occur with prior approval of an Alternative Monitoring Plan (AMP). The Lessee must submit an AMP to BOEM and NMFS for review and approval at least 6 months prior to the planned start of pile-driving. This plan may include deploying additional observers, alternative monitoring technologies such as night vision, thermal, and infrared technologies, or use of PAM and must demonstrate the ability and effectiveness to maintain all clearance and shutdown zones during daytime as outlined below in Part 1 and nighttime as outlined in Part 2 to BOEM's and NMFS's satisfaction. | Revolution Wind has committed to implementing passive acoustic monitoring, pile driving monitoring, PSO coverage, sound field verification, and shutdown zones as part of the Proposed Action. Compliance with these EPMs would be enforced by BOEM, BSEE, and NMFS as indicated in Table F-2. Implementation and enforcement of these EPMs would minimize the potential for Level A or Level B exposures to marine mammals during of impact pile driving, vibratory pile driving, HRG surveys, and UXO detonation, as disclosed in the analysis of the Proposed Action. This agency-proposed mitigation measure specifies plan review and reporting requirements necessary to ensure pile driving monitoring plan effectiveness and enforcement. While adoption of these measures would increase accountability and ensure the effectiveness of EPMs, it would not alter the impact determination for any marine mammal hearing group or individual species as analyzed herein. |

<table>
<tr><th>Mitigation Measure</th><th>Description</th><th>Expected Effect on Impacts from Action Alternatives</th></tr>
<tr><td></td><td>The AMP must include two stand-alone components as described below:<br><br>Part 1 – Daytime when lighting or weather (e.g., fog, rain, sea state) conditions prevent visual monitoring of the full extent of the clearance and shutdown zones. Daytime being defined as one hour after civil sunrise to 1.5 hours before civil sunset.<br><br>Part 2 – Nighttime inclusive of weather conditions (e.g., fog, rain, sea state). Nighttime being defined as 1.5 hours before civil sunset to one hour after civil sunrise.<br><br>If a protected marine mammal or sea turtle is observed entering or found within the shutdown zones after impact pile-driving has commenced, the Lessee would follow shutdown procedures outlined in the Protected Species Mitigation Monitoring Plan (PSMMP; Appendix B). The Lessee would notify BOEM and NMFS of any shutdown occurrence during piling driving operations within 24 hours of the occurrence unless otherwise authorized by BOEM and NMFS.<br><br>The AMP should include, but is not limited to the following information:<br>• Identification of night vision devices (e.g., mounted thermal/IR camera systems, hand-held or wearable NVDs, IR spotlights), if proposed for use to detect protected marine mammal and sea turtle species.<br>• The AMP must demonstrate (through empirical evidence) the capability of the proposed monitoring methodology to detect marine mammals and sea turtles within the full extent of the established clearance and shutdown zones (i.e., species can be detected at the same distances and with similar confidence) with the same effectiveness as daytime visual monitoring (i.e., same detection probability). Only devices and methods demonstrated as being capable of detecting marine mammals and sea turtles to the maximum extent of the clearance and shutdown zones will be acceptable.</td><td></td></tr>
</table>

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | • Evidence and discussion of the efficacy (range and accuracy) of each device proposed for low visibility monitoring must include an assessment of the results of field studies (e.g., Thayer Mahan demonstration), as well as supporting documentation regarding the efficacy of all proposed alternative monitoring methods (e.g., best scientific data available).<br>• Procedures and timeframes for notifying NMFS and BOEM of Revolution Wind's intent to pursue nighttime pile-driving.<br>• Reporting procedures, contacts and timeframes.<br>BOEM may request additional information, when appropriate, to assess the efficacy of the AMP. For mammals see Appendix B MMPA rule. | |
| PSO coverage | BOEM, BSEE, and USACE would ensure that PSO coverage is sufficient to reliably detect marine mammals and sea turtles at the surface in clearance and shutdown zones to execute any pile driving delays or shutdown requirements. If, at any point prior to or during construction, the PSO coverage that is included as part of the proposed action is determined not to be sufficient to reliably detect ESA-listed whales and sea turtles within the clearance and shutdown zones, additional PSOs and/or platforms must be deployed. Determinations prior to construction would be based on review of the Pile Driving Monitoring Plan. Determinations during construction must be based on review of the weekly pile driving reports and other information, as appropriate. | Revolution Wind has committed to implementing passive acoustic monitoring, pile driving monitoring, PSO coverage, sound field verification, and shutdown zones as part of the Proposed Action. Compliance with these EPMs would be enforced by BOEM, BSEE, and NMFS as indicated in Table F-2. Implementation and enforcement of these EPMs would minimize the potential for Level A or Level B exposures to marine mammals during of impact pile driving, vibratory pile driving, HRG surveys, and UXO detonation, as disclosed in the analysis of the Proposed Action. This agency-proposed mitigation measure specifies enforcement necessary to ensure that PSO coverage is sufficient to avoid and minimize adverse impacts to marine mammals. While adoption of these measures would increase accountability and ensure the effectiveness of EPMs, it would not alter the impact determination for any marine mammal hearing group or individual species as analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| Shutdown zones and pre-start clearance zone adjustment | BOEM, BSEE, and NMFS may consider adjustments in the pre-start clearance and/or shutdown zones based on the initial sound field verification (SFV) measurements. Revolution Wind will provide the initial results of each SFV measurement to BOEM, BSEE, and NMFS in an interim report after each monopile installation. Interim reports must be submitted as soon as they are available but no later than 48 hours after each installation.<br>Revolution Wind will conduct a SFV to empirically determine the distances to the isopleths corresponding to Level A harassment and Level B harassment thresholds, including at the locations corresponding to the modeled distances to the Level A harassment and Level B harassment thresholds. If initial SFV measurements indicate distances to the isopleths are less than the distances predicted by modeling assuming 10-dB attenuation, Revolution Wind may request a modification of the clearance and shutdown zones for impact pile driving. For a modification request to be considered, Revolution Wind must have conducted SFV on at least three piles to verify that zone sizes are consistently smaller than predicted by modeling. If initial SFV measurements from any foundation indicate distances to the isopleths are greater than the distances predicted by modeling, Revolution Wind will implement additional sound attenuation measures prior to conducting additional pile driving. Additional measures may include improving the efficacy of the implemented noise attenuation technology and/or modifying the piling schedule to reduce the sound source. If modeled zones cannot be achieved by these corrective actions, Revolution Wind must install an additional noise mitigation system to achieve the modelled ranges. Each sequential modification will be evaluated empirically by SFV of three additional foundations with the new sound attenuation technology. Additionally, in the event that SFV measurements continue to indicate distances to isopleths corresponding to Level A harassment and Level B harassment thresholds are consistently greater than the distances predicted by modeling, BOEM, BSEE, or NMFS may expand the | This measure would not modify the impact determination for noise effects on marine mammals (minor to moderate adverse) but establishes adaptive management measures and an enforcement mechanism to ensure these effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | relevant clearance and shutdown zones and associated monitoring measures. | |
| Vessel strike avoidance plan measures | BOEM must require Revolution Wind to comply with measures and reporting outlined in the final vessel strike avoidance plan per the MMPA ITR LOA, and NMFS's vessel strike avoidance and reporting measures included in the final MMPA ITR and ESA biological opinion. | Revolution Wind has committed to implementing a vessel strike avoidance policy, vessel separation distances, and vessel speed restrictions as part of the Proposed Action and as described in Table F-4. These measures include maintaining specified separation distances for NARW and unidentified large marine mammals, other large whales, and dolphins, porpoises, seals, and sea turtles. Revolution Wind's vessel strike avoidance policy directs that if an animal is sighted in the vessel's path, the vessel will divert or reduce speed and shift gears to neutral (see Table F-4). Project design criteria to minimize vessel interactions with listed species would further clarify the distance at which vessels would divert their path and the distance at which vessels would reduce speed and shift to neutral. Adoption of these measures would further clarify requirements for vessel strike avoidance under the Proposed Action but would not alter the impact determinations for any marine mammal species as analyzed herein. |
| Vessel strike PSO requirements | Protected Species Observer Requirements (Construction)(Operations)(Decommissioning). The Lessee must ensure that vessel operators and crew members maintain a vigilant watch for marine mammals and sea turtles, and reduce vessel speed, alter the vessel's course, or stop the vessel as necessary to avoid striking marine mammals or sea turtles.<br>All vessels must have a visual observer on board who is responsible for monitoring the vessel strike avoidance zone for marine mammals and sea turtles. Visual observers may be PSO or crew members, but crew members responsible for these duties must be provided sufficient training by the Lessee to distinguish marine mammals from other phenomena and must be able to identify a marine mammal as a North Atlantic right whale, other whale | Revolution Wind has committed to implementing passive acoustic monitoring, pile driving monitoring, PSO coverage, sound field verification, and shutdown zones as part of the Proposed Action. Compliance with these EPMs would be enforced by BOEM, BSEE, and NMFS as indicated in Table F-2. Implementation and enforcement of these EPMs would minimize the potential for Level A or Level B exposures to marine mammals during of impact pile driving, vibratory pile driving, HRG surveys, and UXO detonation, as disclosed in the analysis of the Proposed Action.<br>This agency-proposed mitigation measure specifies PSO coverage, monitoring, and notification requirements |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | (defined in this context as sperm whales or baleen whales other than North Atlantic right whales), or other marine mammal. Crew members serving as visual observers must not have duties other than observing for marine mammals while the vessel is operating over 10 kts;<br>Vessel Communication of Threatened and Endangered Species Sightings (Planning) (Construction) (Operations) (Decommissioning). The Lessee must ensure that whenever multiple Project vessels are operating, any detections of ESA-listed species (marine mammals and sea turtles) are communicated in near real time to these personnel on the other Project vessels: Protected Species Observer (PSO), vessel captains, or both.<br>Year-round, all vessel operators must monitor, the project's Situational Awareness System, WhaleAlert, US Coast Guard VHF Channel 16, and the Right Whale Sighting Advisory System (RWSAS) for the presence of North Atlantic right whales once every 4-hour shift during project-related activities. The PSO and PAM operator monitoring teams for all activities must also monitor these systems no less than every 12 hours. If a vessel operator is alerted to a North Atlantic right whale detection within the project area, they must immediately convey this information to the PSO and PAM teams. For any UXO/MEC detonation, these systems must be monitored for 24 hours prior to blasting;<br>Any observations of any large whale by any of the Lessee's staff or contractor, including vessel crew, must be communicated immediately to PSOs and all vessel captains to increase situational awareness. | necessary to avoid and minimize vessel strike risk to marine mammals. While adoption of these measures would increase accountability and ensure the effectiveness of EPMs, it would not alter the impact determination for any marine mammal hearing group or individual species as analyzed herein. |
| Vessel speed requirements | Between November 1st and April 30th, all vessels, regardless of size, must operate at 10 kts or less when traveling between the lease area and ports in New Jersey, New York, Maryland, Delaware, and Virginia;<br>All vessels, regardless of size, must immediately reduce speed to 10 kts or less when any large whale, mother/calf pairs, or large | Revolution Wind has committed to implementing passive acoustic monitoring, pile driving monitoring, PSO coverage, sound field verification, and shutdown zones as part of the Proposed Action. Compliance with these EPMs would be enforced by BOEM, BSEE, and NMFS as indicated in Table F-2. Implementation and enforcement of these EPMs would minimize the potential for Level A or |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | assemblages of non-delphinid cetaceans are observed (within 500 m) of an underway vessel;<br>All vessels, regardless of size, must immediately reduce speed to 10 kts or less when a North Atlantic right whale is sighted, at any distance, by anyone on the vessel;<br>If a vessel is traveling at greater than 10 knots, in addition to the required dedicated visual observer, the Lessee must monitor the transit corridor in real-time with PAM prior to and during transits. If a North Atlantic right whale is detected via visual observation or PAM within or approaching the transit corridor, all crew transfer vessels must travel at 10 kts or less for 12 hours following the detection. Each subsequent detection shall trigger a 12-hour reset. A slowdown in the transit corridor expires when there has been no further visual or acoustic detection in the transit corridor in the past 12 hours;<br>All underway vessels (e.g., transiting, surveying) operating at any speed must have a dedicated visual observer on duty at all times to monitor for marine mammals within a 180° direction of the forward path of the vessel (90° port to 90° starboard) located at an appropriate vantage point for ensuring vessels are maintaining appropriate separation distances. Visual observers must be equipped with alternative monitoring technology for periods of low visibility (e.g., darkness, rain, fog, etc.). The dedicated visual observer must receive prior training on protected species detection and identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements in this subpart. Visual observers may be third-party observers (i.e., NMFS-approved PSOs) or crew members. Observer training related to these vessel strike avoidance measures must be conducted for all vessel operators and crew prior to the start of in-water construction activities. Confirmation of the observers' training and understanding of the ITA requirements must be documented on a training course log sheet and reported to NMFS; | Level B exposures to marine mammals during of impact pile driving, vibratory pile driving, HRG surveys, and UXO detonation, as disclosed in the analysis of the Proposed Action. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | All vessels must maintain a minimum separation distance of 500 m from North Atlantic right whales. If underway, all vessels must steer a course away from any sighted North Atlantic right whale at 10 kts or less such that the 500-m minimum separation distance requirement is not violated. If a North Atlantic right whale is sighted within 500 m of an underway vessel, that vessel must shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 500 m. If a whale is observed but cannot be confirmed as a species other than a North Atlantic right whale, the vessel operator must assume that it is a North Atlantic right whale and take the vessel strike avoidance measures described in this paragraph (b)(2)(xi);<br>All vessels must maintain a minimum separation distance of 100 m from sperm whales and non-North Atlantic right whale baleen whales. If one of these species is sighted within 100 m of an underway vessel, that vessel must shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 100 m;<br>All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all delphinoid cetaceans and pinnipeds, with an exception made for those that approach the vessel (e.g., bow-riding dolphins). If a delphinid cetacean or pinniped is sighted within 50 m of an underway vessel, that vessel must shift the engine to neutral, with an exception made for those that approach the vessel (e.g., bow-riding dolphins). Engines must not be engaged until the animal(s) has moved outside of the vessel's path and beyond 50 m;<br>When a marine mammal(s) is sighted while a vessel is underway, the vessel must take action as necessary to avoid violating the relevant separation distances (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If a marine mammal(s) is sighted within the relevant separation distance, the vessel must reduce speed and shift the engine to neutral, not engaging the engine(s) until the animal(s) is clear of the area. This does not | |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | apply to any vessel towing gear or any situation where respecting the relevant separation distance would be unsafe (i.e., any situation where the vessel is navigationally constrained);<br>All vessels underway must not divert or alter course to approach any marine mammal. Any vessel underway must avoid speed over 10 kts or abrupt changes in course direction until the animal is out of an on a path away from the separation distances; and<br>For in-water construction heavy machinery activities other than impact or vibratory pile driving, if a marine mammal is on a path towards or comes within 10 m of equipment, the Lessee must cease operations until the marine mammal has moved more than 10 m on a path away from the activity to avoid direct interaction with equipment. | |
| Vessel speed restriction | All vessels, regardless of size, would comply with a 10-knot speed restriction in any SMA, DMA, or Slow Zone.<br>On August 1, 2022, NMFS published a proposed rule for changes to NARW vessel speed regulations to further reduce the likelihood of mortalities and serious injuries from vessel collisions (87 Federal Register [FR] 46921. If the proposed rule becomes final, BOEM would require appropriate restrictions per area. | This measure would complement existing EPMs and ensure their effectiveness. Although it would not modify the impact determination for vessel-related displacement effects on marine mammals (minor to moderate adverse), it would help to ensure that these effects do not exceed the levels analyzed herein. |
| Sampling gear | All sampling gear must be hauled out at least once every 30 days, and all gear must would be removed from the water and stored on land between survey seasons to minimize risk of entanglement. | This measure would complement existing EPMs and ensure that entanglement risk and potential impacts on marine mammals remain negligible. |
| Lost survey gear | If any survey gear is lost, all reasonable efforts that do not compromise human safety must be undertaken to recover the gear. All lost gear must be reported to NMFS (nmfs.gar.incidental-take@noaa.gov) and BSEE (via TIMSWeb and notification email at marinedebris@bsee.govOSWIncidentReporting@bsee.gov) within 24 hours of the documented time of missing or lost gear. This report must include information on any markings on the gear and any efforts undertaken or planned to recover the gear. | This measure would complement existing EPMs and ensure that entanglement risk and potential impacts on marine mammals remain negligible. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| Training | At least one of the survey staff onboard the trawl surveys and ventless trap surveys must have completed NEFOP observer training (within the last 5 years) or other training in protected species identification and safe handling (inclusive of taking genetic samples from Atlantic sturgeon). Reference materials for identification, disentanglement, safe handling, and genetic sampling procedures must be available on board each survey vessel. BOEM and BSEE would ensure that Revolution Wind prepares a training plan that addresses how this requirement would be met and that the plan is submitted to NMFS in advance of any trawl or trap surveys. This requirement is in place for any trips where gear is set or hauled. | This measure would complement existing EPMs and ensure that entanglement risk and potential impacts on marine mammals remain negligible. |
| Monthly/ annual reporting requirements | BOEM and BSEE would ensure that Revolution Wind submits regular reports (in consultation with NMFS) necessary to document the amount or extent of take that occurs during all phases of the proposed action. Details of reporting must be coordinated between Revolution Wind, NMFS, BOEM and BSEE. All reports would be sent to: nmfs.gar.incidental- take@noaa.gov and via TIMSWeb and notification email at protectedspecies@bsee.gov. | This measure would not modify the impact determination for marine mammals, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |
| Periodic underwater surveys, reporting of monofilament and other fishing gear around WTG foundations | BOEM will require Lessee to monitor potential loss of fishing gear in the vicinity of WTG foundations by surveying at least ten percent of the total installed foundations annually. Survey design and effort may be modified based upon previous survey results after review and concurrence by BOEM. The Lessee must conduct surveys by remotely operated vehicles, divers, or other means to determine the locations and amounts of marine debris. The Lessee must submit annual reports to BOEM and BSEE by no later than April of the year following the survey. Survey reports will meet all requirements specified in Appendix F, Table F-2. Required data and reports may be archived, analyzed, published, and disseminated by BOEM. | This measure would not modify the impact determination for marine mammals, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |
| Data collection BA BMPs | BOEM and BSEE must ensure that all Project design criteria and BMPs incorporated in the Atlantic Data Collection consultation for | This measure would not modify impact determinations on marine mammals but would provide the information |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | Offshore Wind Activities (BOEM 2021c) shall be applied to activities associated with Project construction and O&M, as applicable. | necessary to ensure that these effects do not exceed the levels analyzed herein. |
| Reporting of all North Atlantic right whale (NARW) sightings | If a NARW is observed at any time by PSOs or personnel on any Project vessels, during any Project-related activity, or during vessel transit, Revolution Wind must report the sighting information to NMFS as soon as feasible and no later than within 24 hours after conclusion of the detection event (the time, location, number of animals, closest point of approach of animals, animal behavior, activities at time of detection, vessel speed, and any mitigation measures implemented) via the WhaleAlert app (http://www.whalealert.org/), NMFS Right Whale Sighting Advisory System hotline (phone), and PR.ITP.MonitoringReports@noaa.gov. | This measure would not modify the impact determination for any IPF but would contribute to improved understanding of marine mammal use of the RWF and vicinity. |
| Long-term PAM (proposed by BOEM) | Long-term monitoring of ambient noise, marine mammal, and cod vocalizations in the Lease Area before, during, and following construction. Continuous recording must occur at least 30 days prior to pile driving, during foundation pile driving, initial operation, and for at least 3 full calendar years of operation to monitor for potential impacts. At least three devices must be independently deployed within the lease area to maximize spatial coverage of the project area based on 10-kilometer spacing between deployment locations or as otherwise agreed between BOEM and the Lessee. The locations of the three buoys must be coordinated with the Regional Wildlife Science Collaborative prior to the plan being submitted to BOEM and BSEE. Devices may be moved to new locations during the recording period, if existing PAM devices will be present in the lease area providing continuous recording. The archival recorders must have a minimum capability of continuously detecting and storing acoustic data on vessel noise, pile-driving, WTG operation, baleen whale vocalizations, and cod vocalizations in the lease area. No later than 180 days prior to buoy deployment, the Lessee must submit to BOEM and BSEE (renewable_reporting@boem.gov and OSWsubmittals@bsee.gov) the PAM plan, which describes all proposed equipment, deployment locations, detection review methodology, and other | Long-term PAM would provide data useful for documenting marine mammal presence in the Lease Area and vicinity and evaluating changes in population density and habitat use over the life of the project. This measure would not modify impact determinations on marine mammals but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein, and to inform existing uncertainty about potential effects on marine mammal species. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | procedures and protocols related to the required use of PAM for monitoring.<br>The PAM plan must detail mooring best practices, data management, storage, measurement, and data processing best practices that are required by BOEM for long-term PAM monitoring. Refer to Regional Wildlife Science Collaborative for Offshore Wind Data Management & Storage Best Practices for Long-term and Archival Passive Acoustic Monitoring (PAM) Data. Other best practices consistent with COP approval should be detailed in the plan. The long-term PAM Plan must include the proposed equipment, sample rate, mooring design, deployment locations, methods for baleen whale and cod detections, and metrics for ambient noise analysis. The long-term PAM plan must be submitted to BOEM and BSEE (at renewable_reporting@boem.gov and OSWsubmittals@bsee.gov) for review and concurrence. BOEM and BSEE will review the long-term PAM Plan and provide comments, if any, on the plan within 45 calendar days, but no later than 90 days of its submittal. The plan must satisfy all outstanding comments to BOEM's and BSEE's satisfaction. The Lessee will receive written concurrence from DOI upon acceptance of the final long-term PAM plan. If DOI does not provide comments on the long-term PAM Plan within 90 calendar days of its submittal, the Lessee may conclusively presume DOI's concurrence with the long-term PAM Plan.<br>Long-term PAM monitoring results must be provided within 180 days of buoy collection and again within 180 days of the annual anniversaries of each the PAM device deployments. All raw data must be sent to NCEI for archiving no later than 6 months following the date of each recorder recovery.<br>As an alternative to conducting long-term PAM in its project area, the lessee may opt to meet this monitoring requirement through an annual deposit to BOEM's Environmental Studies Program in support of its Partnership for an Offshore Wind Energy Regional Observation Network (POWERON) initiative. The lessee's contribution would cover activities within the area of potential | |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | effect of the project, such as the purchase of instruments, annual deployments and refurbishment, data processing, and long-term data archiving. Funding from BOEM, other partners, and potentially other lessees will support long-term PAM throughout the region which will enable broader-scale analyses on cumulative effects to marine species. Under this option, the Lessee will be expected to cooperate with the POWERON team to facilitate deployment and retrieval of instruments within the project area. If necessary, the Lessee may request temporary withholding of the public release of acoustic data that has been collected within its project area. Record long-term measurements of ambient noise, marine mammal, and cod vocalizations in the Lease Area before, during, and following construction. | |

**Table 3.15-18. Additional Mitigation and Monitoring Measures Under Consideration for Marine Mammals (Appendix F, Table F-3)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| Federal survey mitigation | There are 14 NMFS scientific surveys that overlap with wind energy development in the northeast region and eight of these surveys overlap with the Project. As per NMFS and BOEM Survey Mitigation strategy actions 1.3.1, 1.3.2, 2.1.1, and 2.1.2 (Hare et al. 2022), within 120 calendar days of COP Approval, the Lessee must submit to BOEM a draft survey mitigation agreement between NMFS and the Lessee. The survey mitigation agreement will describe how the Lessee will mitigate the Project impacts on the eight NMFS surveys. If after consultation with NMFS NEFSC, BOEM deems the survey mitigation agreement acceptable, the mitigation will be considered required as a term and condition of the Project's COP approval.<br>As soon as reasonably practicable, but no later than 30 days after the issuance of the Project's COP Approval, the Lessee will initiate coordination with NMFS NEFSC to develop the survey mitigation agreement described above. Mitigation activities specified under the agreement will be designed to mitigate the Project impacts on the | This measure provides a mechanism to avoid and minimize adverse impacts of project O&M on scientific surveys used to monitor the status of marine mammal populations and their forage and prey organisms. The implementation of this measure would ensure that federal surveys continue to provide the data and information necessary to monitor marine mammal population status. Federal survey data will be used to ensure that impacts to marine mammals remain within the levels considered in this FEIS, and to address uncertainties identified in impact analysis. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
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| | following NMFS NEFSC surveys: (a) Spring Bottom Trawl survey; (b) Autumn Multi-species Bottom Trawl survey; (c) Ecosystem Monitoring survey; (d) NARW aerial survey; (e) Aerial marine mammal and sea turtle survey; (f) Shipboard marine mammal and sea turtle survey; (g) Atlantic surfclam and ocean quahog survey; and (h) Atlantic sea scallop survey. At a minimum, the survey mitigation agreement will describe actions needed and the means to address impacts on the affected surveys due to the preclusion of sampling platforms and impacts on statistical designs. In terms of statistical design, the project will be viewed as a discrete stratum in surveys that use a random stratified design. Other anticipated Project impacts on NMFS surveys such as changes in habitat and increased operational costs due to loss of sampling efficiencies may also be addressed in the agreement.<br>The survey mitigation agreement will identify activities that will result in the generation of data equivalent to data generated by NMFS's affected surveys for the duration of the Project. The survey mitigation agreement will describe the implementation procedures by which the Lessee will work with NEFSC to generate, share, and manage the data required by NEFSC for each of the surveys impacted by the Project, as mutually agreed upon between the Lessee and NMFS/NEFSC. The survey mitigation agreement must also describe the Lessee's participation in the NMFS NEFSC Northeast Survey Mitigation Program to support activities that address regional-level impacts for the surveys listed above. | |

#### 3.15.2.7.1 Measures Incorporated into the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits listed in Table 3.15-16 and in Appendix F, Table F-2, are incorporated into Alternative G (Preferred Alternative). BOEM has identified additional measures in Table 3.15-17. These measures, if adopted, would further define how the effectiveness and enforcement of EPMs would be ensured and improve accountability for compliance with EPMs by requiring the submittal of plans for approval by the enforcing agency(ies) and by defining reporting requirements. Because these measures ensure the effectiveness of and compliance with EPMs that are already analyzed as part of the Proposed Action, implementation of these measures would not further reduce the impact level of the Proposed Action from what is described in Section 3.15.2.

# 3.16 Navigation and Vessel Traffic

## 3.16.1 Description of the Affected Environment for Navigation and Vessel Traffic

Geographic analysis area: The GAA for navigation and vessel traffic impacts includes the Lease Area, all other wind energy lease areas (for the cumulative effects analysis), and the bays surrounding each of the ports listed in Section 3.11 as being potentially used by the Project during construction or operations, as shown in Figure 3.16-1.

In Figure 3.16-1, "Wind Farm Ports (Listed in the COP)" are those potentially used for construction or operations activities, including WTG tower, nacelle, and blade storage; pre-commissioning and marshalling; foundation marshalling and advanced foundation component fabrication; and construction hub and/or O&M activities (see COP Table 3.3.10-1 [VHB 2023]). "Commercial Fishing Only" refers to those ports identified as commercial fishing or for-hire recreational fishing ports, as discussed in Section 3.11.

The OCS-A 0501 and OCS-A 0517 wind energy lease areas are included under Alternative A. The other wind energy lease areas considered in the cumulative analysis include the following RI/MA WEA and MA WEA Lease Areas: OCS-A 0487, OCS-A 0500, OCS-A 0520, OCS-A 0521, and OCS-A 0522. See Table E-3 in Appendix E for more information.

Affected environment: The navigational safety risk assessment (NSRA) (DNV GL Energy USA, Inc. 2020) analyzed all vessels with Automatic Identification System (AIS) data[45] using data for July 1, 2018, through June 30, 2019, supplemented with vessel monitoring system (VMS) data for calendar year 2016, density maps, the final USCG (2020) report *The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study* (MARIPARS), and stakeholder input (DNV GL Energy USA, Inc. 2020). The assessment used a 5-mile radius around the Project to determine the vessel types transiting in the area during this time period and evaluation incidents; AIS data suggest that primarily only fishing and other/unidentified vessels currently transit within the Lease Area.

[45] AIS data cover those vessels that are required to carry a transponder—or that choose to carry one—according to AIS requirements at 33 CFR 164.01, 164.02, 164.46, and 164.53. Most smaller vessels are not covered in the data. AIS data underestimate the scale of commercial fishing vessel activities, as transponders are only required for vessels over 65 feet and can be turned off after 12 nm. See Section 3.9 for a discussion of VMS data used for commercial fishing vessels.

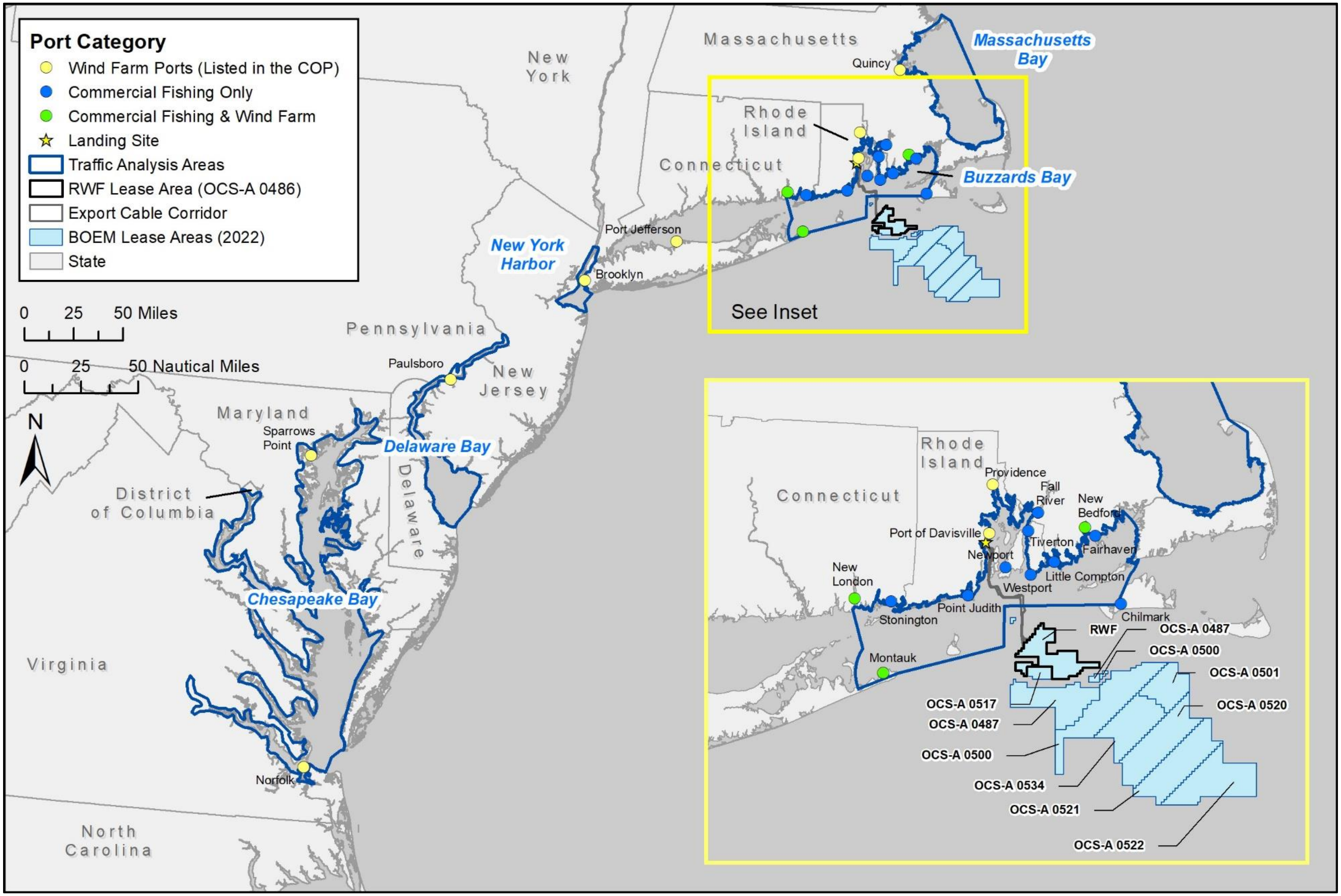


**Figure 3.16-1. Geographic analysis area for navigation and vessel traffic.**

MARIPARS analyzed AIS data within the leased areas of the RI/MA WEA and MA WEA (study area) shown in Figure 3.16-1[46] (USCG 2020:Figure 3). The MARIPARS study found 13,000 to 46,900 annual vessel transits through the study area. Activity during the summer months was quadruple that of January and February. The study concluded that vessel activity in the study area was largely commercial fishing. Fishing vessels primarily originated from several ports in Rhode Island, Massachusetts, or New York and transited the study area to reach fishing grounds and other areas southeast of the study area. Recreational vessels were more expected to transit within the structure arrays and less expected to use USCG designated routes. Passenger vessels largely did not transit the study area. Deep draft and towing vessels transited the study area, mostly on the west side, and tug and towing vessels had a low frequency of transit in the study area. MARIPARS did not evaluate other and unidentified vessels, although many appeared to be misclassified fishing vessels.

AIS data for 2019 (Office for Coastal Management [OCM] 2020) were further analyzed to measure the time and distance that vessels spent within the Lease Area. In 2019, vessels traveled 42,424 miles in the Lease Area. The majority of miles are attributed to fishing vessels, which accounted for 39% of all vessel miles traveled. Pleasure craft accounted for 6% of miles (Table 3.16-1). Table 3.16-2 summarizes activity in the basins in the GAA, as measured by miles traveled. Chesapeake Bay had the most activity, and pleasure craft/sailing vessels were the most common vessel there. New York Harbor was the second busiest, with passenger vessels contributing more than half of the activity. Tug tow vessels accounted for a substantial number of miles traveled in Chesapeake Bay, New York Harbor, and Delaware Bay (each with more than 500,000 miles traveled). Fishing vessels had the most activity in Buzzards Bay. Deep draft vessels accounted for very little of the activity; the largest contribution was in Chesapeake Bay, with 537,000 miles of 3,775,000 miles total.

**Table 3.16-1. Distance Vessels Traveled inside Lease Area (miles)**

| Vessel Type | Revolution Wind Lease Area | Other Contiguous Rhode Island/Massachusetts Wind Energy Area Lease Areas* |
|---|---|---|
| Cargo | 208 | 3,127 |
| Fishing | 16,336 | 84,599 |
| Not available | 10,700 | 11,789 |
| Other | 12,173 | 18,744 |
| Passenger | 498 | 2,208 |
| Pleasure craft/Sailing | 2,363 | 6,137 |
| Tanker | 97 | 4,054 |
| Tug tow | 49 | 529 |
| **Total** | **42,424** | **131,188** |

Source: OCM (2020).
* Refer to Figure 1.1-2 for location of the RI/MA and MA WEAs.

[46] MARIPARS includes the following BOEM lease areas in the RI/MA and MA WEAs: OCS-A 0486 (now subdivided as OSC-A 0517 and OCS-A 0486 [RWF]), OCS-A 0487, OCS-A 0500, OCS-A 0501, OCS-A 0520, OCS-A 0521, and OCS-A 0522. See Table E-3 in Appendix E for more information.

**Table 3.16-2. Distance Vessels Traveled inside Basins (thousands of miles)**

| Port | Cargo | Fishing | Not Available | Other | Passenger | Pleasure Craft/Sailing | Tanker | Tug Tow | Total |
|---|---|---|---|---|---|---|---|---|---|
| Buzzards Bay | 30 | 312 | 115 | 93 | 328 | 654 | 21 | 256 | 1,810 |
| Chesapeake Bay | 537 | 108 | 233 | 278 | 367 | 1,179 | 41 | 1,030 | 3,775 |
| Delaware Bay | 248 | 16 | 125 | 77 | 165 | 92 | 108 | 554 | 1,386 |
| Maine | 2 | 42 | 2 | 3 | 6 | 35 | 4 | 5 | 99 |
| Massachusetts Bay | 23 | 68 | 137 | 83 | 409 | 233 | 21 | 227 | 1,200 |
| New York Harbor | 79 | 4 | 517 | 117 | 1,991 | 152 | 40 | 563 | 3,464 |

Source: Developed using OCM (2020).

Figures 3.16-2 and 3.16-3 show close-up views of the Project with vessel traffic (based on AIS data). Tanker cargo vessels and tug and towing vessels generally travel in the internationally designated traffic separation schemes to the north and west of the Lease Area. These vessels can approach or exit the Narragansett Bay traffic separation scheme in a northwest–southeast orientation, leading some to transit through the Lease Area. East of and at the approximate latitude of Old Harbor, cargo vessels diverge from the north–south traffic lanes, and some transit through the Lease Area. Passenger vessels, typically ferries or cruise ships, generally avoid the Lease Area and would often follow a similar route. The Lease Area is located outside the designated lanes used by most commercial vessel traffic.

Fishing vessels operate all over the region, sometimes fishing and often transiting, with their vessel movements recorded through AIS, VMS, or not at all (see Section 3.9.1). Relative to the areas closer to the coast and traffic lanes, there is less vessel traffic near the Lease Area.

The NSRA modeled vessel incident data, showing no collisions or allisions in the Lease Area and estimating a total of 0.7543 collisions per year and no allisions in the NSRA's study area, which included the Lease Area (DNV GL Energy USA, Inc. 2020:Table E-6). The results of the model show that fishing vessels would experience the most frequent rate of incidents, accounting for nearly all of the collisions, at 0.7325 per year.

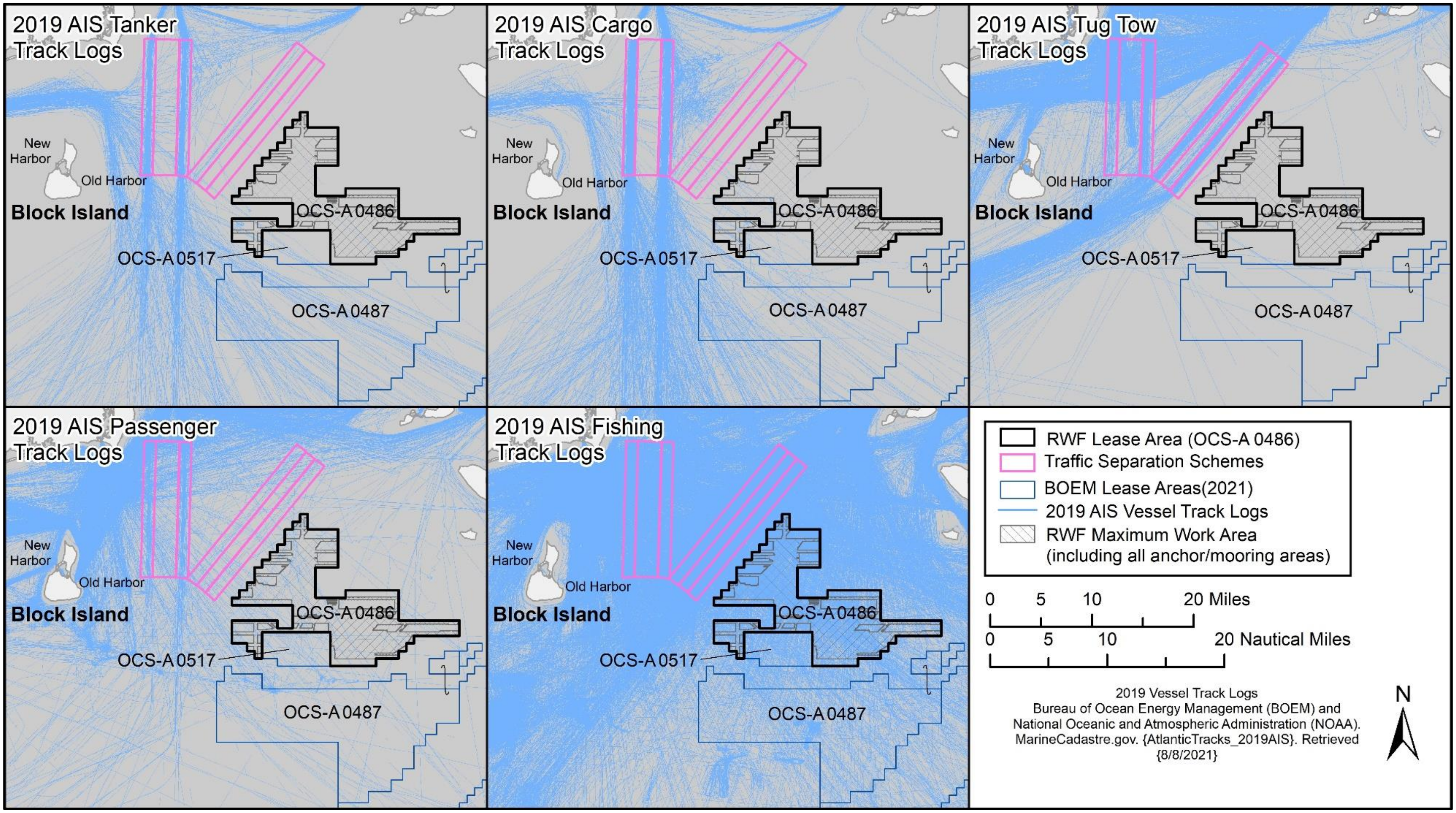


**Figure 3.16-2. Vessel traffic near the Lease Area.**

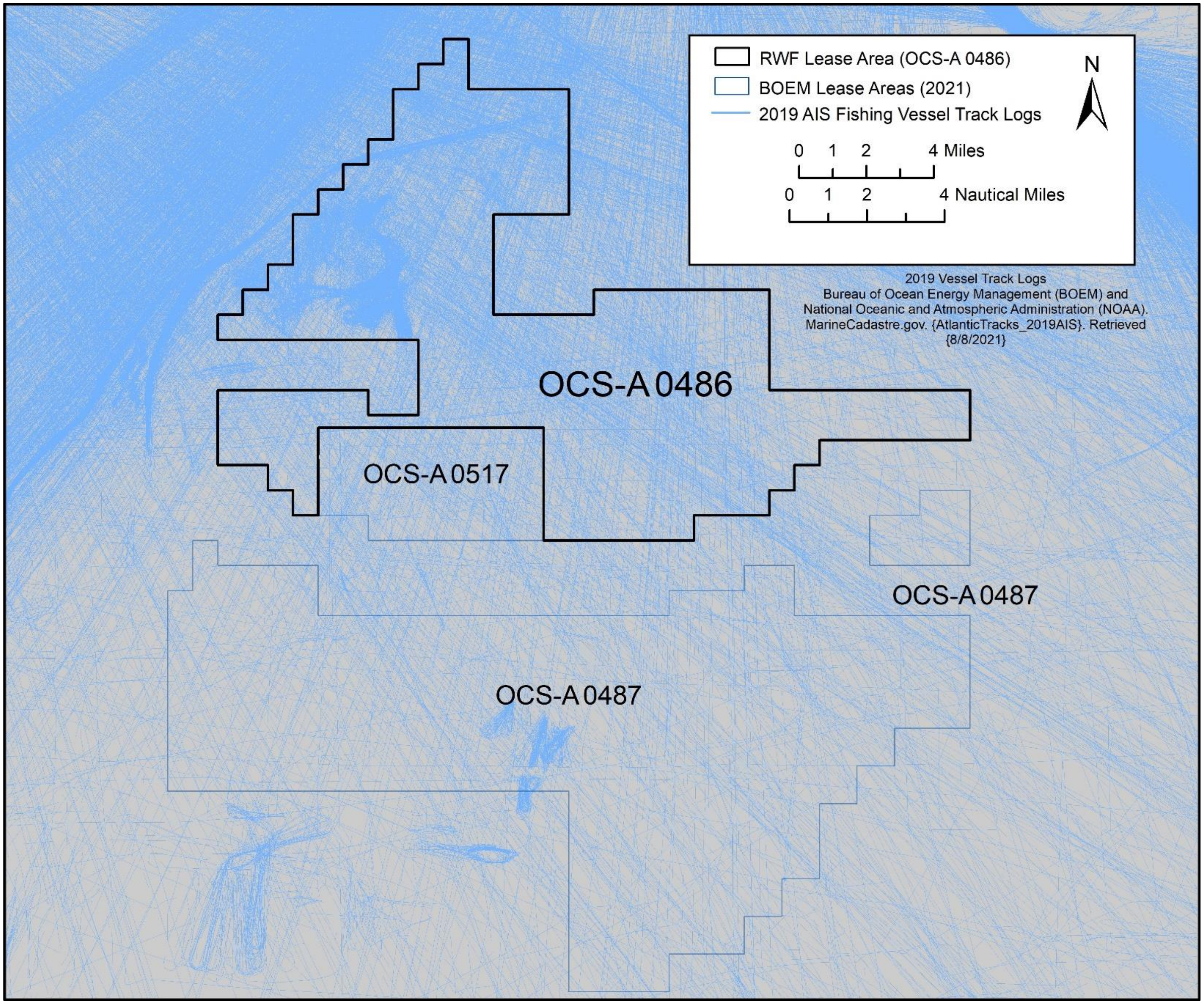


**Figure 3.16-3. Detail of fishing vessel traffic near the Lease Area.**

## 3.16.2 Environmental Consequences

### 3.16.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). If Revolution Wind implements a less impactful scenario within the PDE, smaller amounts of construction or infrastructure development would result in lower impacts but would not likely result in different impact ratings than those described below.

The relevant design parameters for impacts to navigation and vessel traffic are the number and layout of WTGs and OSSs (i.e., the presence of structures) within the Lease Area. If the number of structures is reduced, the change in impact would be based on the location of the WTGs removed. Removal of rows or columns of structures would have the greatest change in impacts due to the increased navigation space created. Removal of select structures not organized in rows or columns would have less of an impact due to the navigational constraints and layout of the remaining grid pattern. Changes to the layout that move away from a standard 1 × 1–nm grid would increase the navigational complexity and the risk of incidents, including collisions, allisions, and accidental releases.

See Appendix E1 for a summary of IPFs analyzed for navigation and vessel traffic across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible effect are excluded from Chapter 3 and provided in Table E2-13 in Appendix E1.

Table 3.16-3 provides a comparison of all evaluated IPFs for navigation and vessel traffic across alternatives. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component.

The conclusion section within each alternative analysis discussion includes rationale for the overall effect call determination.

Under all of the options overall impact to navigation and vessel traffic from any alternative would be long term **moderate** adverse, as impacts would be notable, but the resource would recover completely when the impacting agents are removed and remedial or mitigating actions are taken. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

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**Table 3.16-3. Alternative Comparison Summary for Navigation and Vessel Traffic**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative G (Preferred Alternative) | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| Anchoring and new cable emplacement/ maintenance | **Offshore**: Anchoring vessels used in the construction of offshore wind energy projects would pose a navigational hazard to vessels. Although anchoring impacts would occur primarily during Project construction, some impacts could also occur during O&M and decommissioning. All impacts would be localized (within a few hundred yards of an anchored vessel) and temporary (hours to days). Impacts on navigation and vessel traffic would be temporary localized **minor** adverse, and navigation and vessel traffic would fully recover following the disturbance.<br>Offshore cable emplacement would have temporary localized **minor** adverse impacts on boating because vessels would need to navigate around work areas, and some boaters would prefer to avoid the noise and disruption caused by installation. | **Offshore**: The Project would have no impact on ordinary anchoring activity in the area. The Project may have some impact on anchoring near the cable route, provided that a vessel might need to anchor in an emergency. Cable laying would have a temporary **negligible** to **minor** adverse impact on vessels entering or exiting commercial shipping lanes and the precautionary area during construction. Impacts of anchoring and new cable emplacement/maintenance on deep draft vessels during operations would be long term **negligible** adverse.<br>BOEM estimates a total of 25,019 acres of cabling- and anchoring-related seafloor disturbance for the Proposed Action plus all other future offshore wind projects in the contiguous RI/MA and MA WEA lease areas. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have short-term **minor** to **moderate** adverse cumulative impacts on navigation and vessel traffic. | **Offshore**: Alternatives C through F would reduce the IAC proportionally based on the number of WTGs but would still require cables to connect the extent of the WTGs. The construction impacts from anchoring and new cable emplacement/maintenance would be similar to the Proposed Action. Ordinary anchoring activity would occur outside the Lease Area and not be affected. When combining any of the action alternatives (C–F) with the Proposed Action, anchoring and new cable emplacement/maintenance impacts during construction and installation could be slightly reduced. However, this reduction would not result in a change in the overall impact conclusion when compared to that alternative by itself. Overall, there would be a temporary **negligible** to **minor** adverse impact on vessels entering or exiting commercial shipping lanes and the precautionary area from cable laying and a temporary **moderate** adverse impact on commercial fishing vessels.<br>During operation, as with the Proposed Action, the Project would have no impact on ordinary vessel anchorage operations, although risks would still exist for emergency anchoring and vessels transiting the area at a reduced level due to the smaller footprints. Impacts of anchoring and new cable emplacement/maintenance on deep draft vessels during operations would be long term **negligible** adverse.<br>The alternatives would contribute to the cumulative impacts of offshore wind projects but to a lesser extent than the Proposed Action based on the alternative chosen. The change from Alternatives C through F would be negligible relative to all future activity in the contiguous RI/MA and MA WEA lease areas and it is unexpected that Project cable installation would overlap with other project cable routes. When considered in combination with past, present, and other reasonably foreseeable projects the Project would have short-term **minor** to **moderate** adverse cumulative impacts on navigation and vessel traffic. | | | | **Offshore**: Alternative G's construction impacts from anchoring and new cable emplacement/maintenance would be similar to the Proposed Action. Ordinary anchoring activity would occur outside the Lease Area and not be affected. Anchoring and new cable emplacement/maintenance impacts during construction and installation could be slightly reduced, though this would not result in a change in the overall impact conclusion. Overall, there would be a temporary **negligible** to **minor** adverse impact on vessels entering or exiting commercial shipping lanes and the precautionary area from cable laying, and a temporary **moderate** adverse impact on commercial fishing vessels.<br>During operation, as with the Proposed Action, the Project would have no impact on ordinary vessel anchorage operations, although risks would still exist for emergency anchoring and vessels transiting the area at a reduced level. Impacts of anchoring and new cable emplacement/maintenance on deep draft vessels during operations would be long term **negligible** adverse.<br>The alternatives would contribute to the cumulative impacts of offshore wind projects but to a lesser extent than the Proposed Action. The change would be negligible relative to all future activity in the contiguous RI/MA and MA WEA lease areas, and it is not expected that Project cable installation would overlap with other project cable routes. When considered in combination with past, present, and other reasonably foreseeable projects, the Project would have short-term **minor** to **moderate** adverse cumulative impacts on navigation and vessel traffic. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action)<br>up to 100 WTG | Alternative C<br>(Habitat Alternative)<br>64–65 WTGs | Alternative G<br>(Preferred Alternative) | Alternative E<br>(Viewshed Alternative)<br>64–81 WTGs | Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs | Alternative G<br>(Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| Port utilization | **Offshore**: Construction and operation of improvements at various ports in support of reasonably foreseeable offshore wind projects could coincide with the forecasted port improvements listed in Appendix E, some of which are intended to directly support offshore wind energy development. Port improvements could increase vessel congestion and stress port capacity during construction, leading to temporary localized **minor** to **moderate** adverse impacts based on how the different projects manage their port utilization. | **Offshore**: Because of the small number of vessels involved with Project construction, any ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades; therefore, the impact to port operations or port congestion would be temporary **negligible** to **minor** adverse.<br>Any ports used by vessels conducting maintenance would have a long-term **negligible** adverse impact because ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades.<br>Project port activity and upgrades (via dredging and in-water work) could coincide with other forecasted projects. Port activities could be delayed or ports could experience congestion or changes in utilization as a result of the overlap in construction activities. Therefore, the cumulative impacts of the Proposed Action when combined with past, present, and reasonably foreseeable future projects would have long-lasting overall but temporary impacts on specific ports (depending on how each project manages its port utilization) with localized **minor** to **moderate** adverse impacts on port utilization. | **Offshore**: Alternatives C through F would reduce the number and duration of vessel activity. Therefore, construction impacts on port utilization would be reduced from the levels of the Proposed Action depending on the alternative chosen, but still temporary **negligible** adverse.<br>Alternatives C through F would reduce the number and duration of vessels working on maintenance activity, although due to the vessels primarily working on-site, the change to port utilization would be negligible. Ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades. Therefore, Alternative C through F would have the same impact from port utilization as the Proposed Action: long term **negligible** adverse.<br>Port upgrades and vessel activity associated with the Project could result in negligible impacts to navigation and vessel traffic. Alternatives C through F would require fewer construction vessels than the Proposed Action and would therefore reduce the potential impact on ports, reducing its share of cumulative impacts, depending on the alternative chosen. However, port activity and upgrades (via dredging and in-water work) could coincide with other forecasted projects, and a reduced footprint relative to the Proposed Action would not likely have much of an impact overall. The cumulative impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable future projects would have long-lasting overall but temporary impacts on specific ports (depending on how each project manages its port utilization), with localized **minor** to **moderate** adverse impacts on port utilization. | | | | **Offshore**: Alternative G would reduce the number and duration of vessel activity. Therefore, construction impacts on port utilization would be reduced from the levels of the Proposed Action, but would still be temporary **negligible** adverse.<br>The alternative would also reduce the number and duration of vessels working on maintenance activity, although due to the vessels primarily working on-site, the change to port utilization would be negligible. Ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades. Therefore, Alternative G would have the same impact from port utilization as the Proposed Action: long term **negligible** adverse.<br>Port upgrades and vessel activity associated with the Project could result in negligible impacts to navigation and vessel traffic. Alternative G would require fewer construction vessels than the Proposed Action and would therefore reduce the potential impact on ports, reducing its share of cumulative impacts, depending on the alternative chosen. However, port activity and upgrades (via dredging and in-water work) could coincide with other forecasted projects, and a reduced footprint relative to the Proposed Action would not likely have much of an impact overall. The cumulative impact of Alternative G when combined with past, present, and reasonably foreseeable future projects would have long-lasting overall but temporary impacts on specific ports (depending on how each project manages its port utilization), with localized **minor** to **moderate** adverse impacts on port utilization. |
| Presence of structures | **Offshore**: Using the assumptions in Appendix E4, the No Action Alternative would include 81 foundations, with a cumulative total of 1,025 foundations. The | **Offshore**: Revolution Wind would develop a mariner communication plan, limit construction activities to periods of good weather, and request the USCG implement temporary safety zones | **Offshore**: As with the Proposed Action, Revolution Wind would develop a mariner communication plan, limit construction activities to periods of good weather conditions, and request the USCG implement temporary safety zones around the locations with active construction. In addition to the reduced footprint, depending on the option(s) chosen, this | | | | **Offshore**: As with the Proposed Action, Revolution Wind would request the USCG implement temporary safety zones around the locations with active |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative G (Preferred Alternative) | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| | placement of these structures in the contiguous RI/MA WEA and MA WEA lease areas would have long-term **negligible** to **moderate** adverse impacts on vessels through the risk of allision, navigation hazards, space-use conflicts, the presence of cable infrastructure, and visual impacts. | around the locations with active construction. This would minimize impacts from offshore RWEC construction. The impact would be temporary and increase from **negligible** to **moderate** adverse as structures are added.<br>For vessels that generally travel within and through the Lease Area, a vessel's view could be obstructed for as much as 7.8 seconds. Because of the 1 × 1–nm spacing of the Project structures, the impact on visibility would be further reduced. The Project would use USCG-approved lighting to make nearby vessels aware of structure locations (see Appendix F for EPMs). The structures would not impact a mariner's ability to use navigation aids or the coastline as a reference for navigation. Overall, spacing and placement of the structures would result in a long-term **negligible** adverse impact to visibility and a long-term **moderate** adverse impact from the presence of structures due to increased navigational complexity and allision risk.<br>The Proposed Action would add up to 100 additional WTGs and two OSSs to the No Action Alternative's 1,015 cumulative structures, which would increase navigational complexity and therefore the risk of collision, allision, and potential spills. Additional structures could also interfere with marine radars and aircraft engaging in search and rescue efforts. The Proposed Action would more than double the number of existing structures, though it would account for 10% of the total future structures in the contiguous RI/MA and MA WEA lease areas and would implement a 1 × 1–nm uniform north–south and east–west grid spacing, consistent with other contiguous RI/MA and MA WEA lease areas. The cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominantly of impacts described under the No Action Alternative, which would represent a long-term **moderate** adverse impact on navigation and vessel traffic. | would minimize impacts from offshore RWEC construction (see Appendix F). Due to controls in the working area, Alternatives C through F would have impacts slightly reduced but similar to the Proposed Action for the presence of structures: temporary and increasing from **negligible** to **moderate** adverse as structures are added.<br>The removal of structures from the northern and northwestern sections of the Lease Area under Alternative E would, in particular, move construction activity away from areas with the greatest commercial fishing activity, resulting in a temporary impact on commercial fishing vessel navigation that would increase from **negligible** to **minor** adverse as structures are added during construction. Fishing activity would see the greatest reduction in impacts relative to the Proposed Action.<br>During operations, Alternatives C through F would reduce the number of WTGs in the Lease Area, which would alleviate some navigational complexity in areas where WTGs are not present. Detailed analysis is provided in Section 3.16.2.3.<br>Alternatives C through F would add to the 81 structures present under the No Action Alternative and 1,025 total cumulative structures including future offshore wind energy projects, which would increase navigational complexity; increase the risk of collision, allision, and potential spills; and potentially interfere with marine radar or aircraft conducting search and rescue efforts. See Section 3.17 (Other Uses) for a discussion of potential impacts to search and rescue efforts. The footprint of each alternative would have varying impacts on these activities based on other actions. Detailed analysis is provided in Section 3.16.2.3. | | | | construction, develop a mariner communication plan, and limit construction activities to periods of good weather conditions. In addition to the reduced footprint, this would minimize impacts from offshore RWEC construction (see Appendix F). Due to controls in the working area, Alternative G would have impacts slightly reduced but similar to the Proposed Action for the presence of structures: temporary and increasing from **negligible** to **moderate** adverse as structures are added.<br>The removal of structures from the southwest section of the Lease Area would move construction activity away from areas with some commercial fishing traffic, resulting in a temporary impact on commercial fishing vessel navigation that would increase from **negligible** to **minor** adverse as structures are added during construction. Fishing activity would see a small reduction in impacts relative to the Proposed Action.<br>During operations, Alternative G would reduce the number of WTGs in the Lease Area relative to the Proposed Action, which would alleviate some navigational complexity in areas where WTGs are not present, resulting in long term **minor** to **moderate** adverse impacts. Detailed analysis is provided in Section 3.16.2.3.<br>The alternative would add to the 81 structures present under the No Action Alternative, which would increase navigational complexity; increase the risk of collision, allision, and potential spills; and potentially interfere with marine radar or aircraft conducting search and rescue efforts. See Section 3.17 (Other Uses) for a discussion of potential impacts to search and rescue efforts. The footprint of each alternative would have varying impacts on these activities based on other actions. Detailed analysis is provided in Section 3.16.2.3. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action)<br>up to 100 WTG | Alternative C<br>(Habitat Alternative)<br>64–65 WTGs | Alternative G<br>(Preferred Alternative) | Alternative E<br>(Viewshed Alternative)<br>64–81 WTGs | Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs | Alternative G<br>(Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| | | | | | | | The cumulative impacts associated with the Preferred Action would be similar to that of the Proposed Action: long term **moderate** adverse on navigation and vessel traffic. |
| Vessel traffic | **Offshore**: Vessel activity could peak in 2025, with as many as 210 vessels involved in the construction and operation of current and reasonably foreseeable projects (see Table 3.16-4). Construction activities would result in increased vessel traffic near the lease areas and ports used as well as obstructions to navigation and changes to navigation patterns. Additional impacts would include delays within or approaching ports; increased navigational complexity; detours to offshore travel or port approaches; or increased risk of incidents such as collision, strikes or allisions, and groundings.<br>As a whole, this level of traffic activity would represent a long-term overall but temporary **minor** to **moderate** adverse impact on individual ports and a **minor** to **moderate** adverse impact to navigation under the No Action Alternative because the construction would be located outside major shipping lanes and the number of vessels would be small compared to the overall level of traffic near each of the potential developments. The vessels impacted under this alternative would be primarily commercial fishing and other types of vessels that have historically transited to and operated within or near each of the potential developments. | **Offshore**: Project effects on navigation and vessel traffic would include increased vessel traffic near the RWF, offshore RWEC, and ports used by the Project; obstructions to navigation; delays within or approaching ports; increased navigational complexity; changes to navigation patterns; detours to offshore travel or port approaches; or increased risk of incidents such as allisions. There would be a short-term **minor** adverse impact on deep draft, tug, and towing vessels and commercial fishing vessels would experience temporary **moderate** adverse impacts. Because of the small number of vessels involved in construction, Project construction would have a temporary (for the duration of construction activities) **negligible** adverse impact on commercial traffic as a whole.<br>Maintenance would have a long-term **negligible to minor** adverse impact on navigation and vessel traffic because of the infrequent nature of monitoring and inspection. Maintenance would primarily impact commercial fishing and other vessels operating at the same time and place that maintenance is performed. Because of the low frequency of allision and collision incidents and Project EPMs, the expected risks to navigation would be long term **negligible** adverse. Decommissioning of the Project would have similar short-term (for the duration of decommissioning activities) **minor** to **moderate** adverse impacts as construction.<br>The Proposed Action would add as many as 56 construction vessels during construction in 2024 and 2025 to conditions under the No Action Alternative. BOEM estimates a peak of 259 vessels at sea on a daily basis due to offshore wind Project construction and O&M over a 10-year time frame, with most of these vessels remaining in the vicinity of their respective lease areas. Therefore, cumulative impacts associated with the Project when combined with past, present, | **Offshore**: As with the Proposed Action, Project construction could impact navigation and vessel traffic. Project effects on navigation and vessel traffic would include increased vessel traffic near the RWF, offshore RWEC, and ports used by the Project; obstructions to navigation; delays within or approaching ports; increased navigational complexity; changes to navigation patterns; detours to offshore travel or port approaches; or increased risk of incidents such as allisions. These impacts would be reduced proportionally with the smaller footprint on the chosen alternative due to a smaller area under construction.<br>Alternatives D3 and E2 have a reduced potential for affecting vessel traffic by extending the buffer around and moving construction away from the traffic separation scheme. Likewise, the combinations of D1+D3 and D1+D2+D3 would have reduced potential for affecting vessel traffic.<br>Construction of offshore components of the Project under Alternatives C through F would likely require less time than anticipated for the Proposed Action (see COP Section 3.2). The NSRA indicates the highest risk would be from smaller non-Project vessels operating close to construction and work vessels; this risk would be reduced based on the smaller footprint (DNV GL Energy USA, Inc. 2020). There would be a temporary (for the duration of construction activities) minor adverse impact on smaller vessels, which would need to reroute around the Project. Commercial fishing vessels would experience temporary moderate adverse impacts. However, because of the small number of vessels involved in construction and due to controls in the working area, Project construction would have a temporary (for the duration of construction activities) **negligible** adverse impact on commercial traffic as a whole.<br>Operational impacts to navigation would be reduced from the Proposed Action in vessel traffic, though not meaningfully so, due to the decreased footprint of Alternatives C through F and removal of structures from the trafficked areas. All alternatives would still be located within the Lease Area and would primarily affect vessels that normally would be present, in particular, fishing vessels. Most vessel transits would take place outside the Lease Area; impacts due to the presence of structures are addressed above. Overall, the net effect is that Alternatives C through F would have the same impact from vessel traffic as the Proposed Action: long term **negligible** adverse. Decommissioning of the Project under Alternatives C through F would have similar short-term (for the duration of decommissioning activities) **minor** to **moderate** adverse impacts as construction because decommissioning would use similar numbers of vessels and implement the same EPMs. After the Project is decommissioned, the navigation conditions in the area would return to pre-Project conditions pursuant to 30 CFR 585.910.<br>Alternatives C through F would add construction vessels in 2024 and 2025 to conditions under the No Action Alternative at a level proportionally lower than the maximum-case scenario under the Proposed Action based on the alternative chosen. Non-Project traffic would largely avoid the work area and transiting construction vessels, with potentially fewer adjustments needed based on the vessels' routes and the reduced work area. Project O&M vessel traffic under Alternatives C through F would be less than that of the Proposed Action. When compared to all future activities considered in this analysis, these reductions in the Project's impact would cause a meaningful reduction in cumulative impacts. The reduction would to some extent depend on the actions taken by other future activities. Alternative D1, for example, would result in less of a | | | | **Offshore**: As with the Proposed Action, Project construction could impact navigation and vessel traffic. Project effects on navigation and vessel traffic would include increased vessel traffic near the RWF, offshore RWEC, and ports used by the Project; obstructions to navigation; delays within or approaching ports; increased navigational complexity; changes to navigation patterns; detours to offshore travel or port approaches; or increased risk of incidents such as allisions. These impacts would be reduced proportionally with the smaller footprint on the chosen alternative due to a smaller area under construction.<br>Alternative G would have a slightly reduced potential for affecting vessel traffic by eliminating WTGs in the southwest portion of the Lease Area.<br>Construction of offshore components of the Project would likely require less time than anticipated for the Proposed Action. The NSRA indicates the highest risk would be from smaller non-Project vessels operating close to construction and work vessels; this risk would be reduced based on the smaller footprint (DNV GL Energy USA, Inc. 2020). There would be a temporary (for the duration of construction activities) **minor** adverse impact on smaller vessels, which would need to reroute around the Project. Commercial fishing vessels would experience temporary **moderate** adverse impacts. However, because of the small number of vessels involved in construction and due to controls in the working area, Project construction would have a temporary (for the duration of |

| **Impact-Producing Factor** | **No Action Alternative** | **Alternative B (Proposed Action) up to 100 WTG** | **Alternative C (Habitat Alternative) 64–65 WTGs** | **Alternative G (Preferred Alternative)** | **Alternative E (Viewshed Alternative) 64–81 WTGs** | **Alternative F (Higher Capacity Turbine Alternative) 56 WTGs** | **Alternative G (Preferred Alternative)** |
|---|---|---|---|---|---|---|---|
| | | and reasonably foreseeable future activities would be short term **minor** adverse. | reduction in impacts if an adjacent lease area were to be developed to its full extent than it would if that development were to accommodate the proposed transit location. Therefore, Alternatives C through F would result in a minor adverse cumulative impact to vessel traffic and, when combined with past, present, and reasonably foreseeable future activities, an overall short- to long-term **minor** adverse cumulative impact. | | | | construction activities) **negligible** adverse impact on commercial traffic as a whole.<br>Operational impacts to navigation would be reduced from the Proposed Action in vessel traffic, though not meaningfully so, due to the slightly reduced footprint. The Project would primarily affect vessels that normally would be present in the Lease Area, in particular, fishing vessels. Most vessel transits would take place outside the Lease Area; impacts due to the presence of structures are addressed above. Overall, the net effect is that Alternative G would have the same impact from vessel traffic as the Proposed Action: long term **negligible** adverse. Decommissioning of the Project under Alternative G would have similar short-term (for the duration of decommissioning activities) **minor** to **moderate** adverse impacts as construction because decommissioning would use similar numbers of vessels and implement the same EPMs. After the Project is decommissioned, the navigation conditions in the area would return to pre-Project conditions pursuant to 30 CFR 585.910.<br>Alternative G would add construction vessels in 2024 and 2025 to conditions under the No Action Alternative at a level lower than the Proposed Action. Non-Project traffic would largely avoid the work area and transiting construction vessels, with potentially fewer adjustments needed based on the vessels' routes and the reduced work area. Project O&M vessel traffic would be less than that of the Proposed Action. Alternative G would result in a **minor** adverse cumulative impact to vessel traffic and, when combined with past, present, and reasonably foreseeable future activities, an overall short- to long-term **minor** adverse cumulative impact. |

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### 3.16.2.2 Alternative A: Impacts of the No Action Alternative on Navigation and Vessel Traffic

#### 3.16.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for navigation and vessel traffic (see Section 3.16.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the geographic analysis area. These IPFs are described and analyzed in Appendix E1.

#### 3.16.2.2.2 Cumulative Impacts

This section discloses potential cumulative navigation impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

<u>Anchoring and new cable emplacement/maintenance:</u> BOEM estimates approximately 3,848 acres of seafloor would be disturbed by anchoring associated with offshore wind activities. Anchoring vessels used in the construction of offshore wind energy projects would pose a navigational hazard to vessels. Although anchoring impacts would occur primarily during Project construction, some impacts could also occur during O&M and decommissioning. All impacts would be localized (within a few hundred yards of an anchored vessel) and temporary (hours to days). Therefore, the effects of offshore wind energy–related anchoring on commercial fisheries and for-hire recreational fishing are expected to be short term **minor** adverse.

Future offshore wind developers are expected to coordinate with the maritime community and the USCG to avoid laying export cables through any traditional or designated lightering/anchorage areas, meaning that any risk for deep draft vessels would come from anchoring in an emergency scenario, specifically in or near the Buzzards Bay and Narragansett Bay traffic separation schemes. Generally, larger vessels accidently dropping anchor on top of an export cable (buried or mattress protected) to prevent drifting in the event of vessel power failure would result in damage to the export cable, risks to the vessel associated with an anchor contacting an electrified cable, and impacts to the vessel operator’s liability and insurance. Impacts on navigation and vessel traffic would be temporary localized **minor** adverse, and navigation and vessel traffic would fully recover following the disturbance.

Under the No Action Alternative, up to 2,952 miles of cable could be installed in the contiguous RI/MA WEA and Massachusetts Wind Energy Area (MA WEA) lease areas to support future offshore wind projects (see Figure 1.1-2 for location of RI/MA and MA WEAs). Offshore cable emplacement would have temporary localized **minor** adverse impacts on boating because vessels would need to navigate around work areas, and some boaters would prefer to avoid the noise and disruption caused by installation.

<u>Port utilization:</u> Construction and operation of improvements at various ports in support of reasonably foreseeable offshore wind projects could coincide with the forecasted port improvements listed in Appendix E, some of which are intended to directly support offshore wind energy development. Port improvements could increase vessel congestion and stress port capacity during construction, leading to temporary localized **minor** to **moderate** adverse impacts based on how the different projects manage

their port utilization. However, state and local agencies would be responsible for minimizing the potential adverse impacts of additional port utilization by managing traffic to ensure continued access to ports.

Presence of structures: Using the assumptions in Appendix E3, future offshore wind energy projects under the No Action Alternative would include 1,015 foundations. The placement of these structures in the contiguous RI/MA WEA and MA WEA lease areas would have long-term adverse impacts on vessels through the risk of allision, navigation hazards, space-use conflicts, the presence of cable infrastructure, and visual impacts. While lease areas are generally located in low vessel traffic areas, they do receive some use. Table 3.16-1 summarizes the miles traveled by vessels within the Lease Area and other lease areas in 2019.

The presence of offshore wind structures would increase the GAA's navigational complexity, thereby increasing the risk of allision or collision. Deep draft, tug, and towing vessels would need to minimally divert to avoid traveling near structures. Vessels that generally travel within and through lease areas could require an adjustment of navigation practices. The attraction of artificial reef effects would increase vessel congestion and the risk of allision, collision, and spills near structures. BOEM assumes that all offshore wind developments in the GAA would use the developer-agreed-upon 1 × 1–nm spacing in fixed east–west rows and north–south columns and would evaluate each of those individual projects in their respective NEPA analyses. Because this layout supports traditional east–west active fishing operations, this arrangement would reduce, but not eliminate, navigational complexity and space-use conflicts during the operations phases of the projects.

Vessel traffic: Applying vessel activity estimates developed by BOEM based on its 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019) and applying construction vessel activity estimates presented in *Vineyard Wind I Offshore Wind Energy Project Final Environmental Impact Statement Volume I* (BOEM 2021), if construction of the Project does not occur, vessel activity could peak in 2025, with as many as 210 vessels involved in the construction and operation of current and reasonably foreseeable projects (Table 3.16-4).

**Table 3.16-4. Cumulative Construction and Operations Vessels from Current and Future Activities**

| Vessels | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 |
|---|---|---|---|---|---|---|---|
| Average construction vessels | 1 | 0 | 72 | 106 | 102 | 16 | 0 |
| Maximum construction vessels | 1 | 0 | 132 | 194 | 188 | 28 | 0 |
| Average operations vessels | 1 | 1 | 1 | 3 | 8 | 12 | 12 |
| Maximum operations vessels | 1 | 1 | 1 | 9 | 22 | 34 | 36 |
| Average daily vessels, total | 2 | 1 | 73 | 109 | 110 | 28 | 12 |
| Maximum daily vessels, total | 2 | 1 | 133 | 203 | 210 | 62 | 36 |

Source: Developed using offshore wind projects listed in Table E-1 in Appendix E and estimates of average (maximum) daily vessels per foundation of 0.245 (0.451) for construction and 0.010 (0.029) for operations from BOEM (2021).

Construction activities would result in increased vessel traffic near the lease areas and ports used as well as obstructions to navigation and changes to navigation patterns. Additional impacts would include delays within or approaching ports; increased navigational complexity; detours to offshore travel or port approaches; or increased risk of incidents such as collision, strikes or allisions, and groundings. Other reasonably foreseeable future offshore projects would produce additional vessel traffic during construction, but because of their timing, they are not anticipated to use the same traffic routes. Construction of other offshore wind projects are anticipated to be scheduled to minimize overlapping construction periods and reduce the number of construction vessels in operation at any given time, effectively reducing the cumulative impact on port congestion and construction vessel rerouting. As a whole, this level of traffic activity would represent a long-term overall but temporary **minor** to **moderate** adverse impact on individual ports and a **minor** to **moderate** adverse impact to navigation under the No Action Alternative because the construction would be located outside major shipping lanes and the number of vessels would be small compared to the overall level of traffic near each of the potential developments.

Cumulative impacts during O&M of reasonably foreseeable offshore wind projects (see Table 3.16-3) would also represent a long-term **negligible** to **minor** adverse impact to navigation due to the smaller number of vessels and lower frequency of activities (growing to an average of 12 vessel trips per day by 2027). Decommissioning of each of the projects is anticipated to have cumulative impacts similar to those experienced during construction. All reasonably foreseeable offshore wind projects would be required to prepare an NSRA in compliance with the guidelines in USCG NVIC 01-19 (USCG 2019), which would serve to minimize impacts to marine navigation.

#### 3.16.2.2.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on navigation associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term **minor** to **moderate** impacts on navigation, primarily through existing traffic activity, port use, and the presence of structures.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities, especially the presence of structures, port utilization, and vessel traffic, would be long term minor to moderate adverse. As described in Appendix E1, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would also be long term minor to moderate adverse. Future projects would increase vessel activity, which could lead to congestion at affected ports, the possible need for port upgrades beyond those currently envisioned, and an increased likelihood of collisions and allisions, with a resultant increased risk of accidental releases. In addition, the presence of new structures would also increase the risk for collisions, allisions, and resultant accidental releases and threats to human health and safety.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in long-term **minor** to **moderate** adverse impacts because the overall effect would be notable, but vessels would be able to adjust to account for disruptions and EPMs would reduce impacts.

### 3.16.2.3 Alternative B: Impacts of the Proposed Action on Navigation and Vessel Traffic

#### 3.16.2.3.1 Construction and Installation

#### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: The nearest anchorage area is 6.7 nm from the Project (DNV GL Energy USA, Inc. 2020:Section 2.2.2.5), and the Project would have no impact on ordinary anchoring activity in the area. The Project may have some impact on anchoring near the cable route, provided that a vessel might need to anchor in an emergency. Cable laying would have a temporary **negligible** to **minor** adverse impact on vessels entering or exiting commercial shipping lanes and the precautionary area.

Port utilization: Because of the small number of vessels involved with Project construction, any ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades; therefore, the impact to port operations would be temporary **negligible** to **minor** adverse. See Section 3.11 for a list of potential port facilities the Project could use and how they would be used. There would be a temporary **negligible** to **minor** adverse impact on port congestion.

Presence of structures: Revolution Wind would develop a mariner communication plan, limit construction activities to periods of good weather conditions, and request the USCG implement temporary safety zones around the locations with active construction (see Table F-1 in Appendix F). This would minimize impacts from offshore RWEC construction, though the addition of 100 structures would more than double the 81 structures under the No Action Alternative. The impact would be temporary and increase from **negligible** to **moderate** adverse as structures are added.

Vessel traffic: Project construction could impact navigation and vessel traffic. Project effects on navigation and vessel traffic would include increased vessel traffic near the RWF, offshore RWEC, and ports used by the Project; obstructions to navigation; delays within or approaching ports; increased navigational complexity; changes to navigation patterns; detours to offshore travel or port approaches; or increased risk of incidents such as allisions.

Construction of offshore components of the Project would require approximately 8 months for the RWEC, 5 months for WTG foundations, 5 months for the IAC, 8 months for WTGs, and 8 months for OSSs (see Chapter 2, Figure 2.1-9). The NSRA indicates the highest risk would be from smaller non-Project vessels operating close to construction and work vessels. Because of the small number of vessels used for construction and the location of the Project outside shipping lanes (see Figures 3.16-2 and 3.16-3), there would be a short-term (for the duration of construction activities) **minor** adverse impact on deep draft, tug, and towing vessels, which would need to reroute around the Project for a slightly longer route, and smaller passenger vessels, which could reroute closer to shore, increasing grounding potential. During construction and installation, commercial fishing vessels would need to avoid work areas and could be adversely impacted, depending on the location of the exploitable biomass and whether there are suitable alternative locations; with respect to navigation, commercial fishing vessels would experience temporary **moderate** adverse impacts. Because of the small number of vessels involved in construction, Project construction would have a temporary (for the duration of construction activities) **negligible** adverse impact on commercial traffic as a whole.

#### 3.16.2.3.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> The nearest anchorage area is 6.7 nm away from the Project (DNV GL Energy USA, Inc. 2020:Section 2.2.2.5), and the Project would have no impact to ordinary vessel anchorage operations, although risks would still exist for emergency anchoring and vessels transiting the area. Impacts of anchoring and new cable emplacement/maintenance on deep draft vessels during operations would be long term **negligible** adverse.

<u>Port utilization:</u> Any ports used by vessels conducting maintenance would have a long-term **negligible** adverse impact because ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades.

<u>Presence of structures:</u> For vessels that generally travel within and through the Lease Area, the NSRA mapped out the placement of the structures and evaluated the time of potential visual obstruction each would present based on a vessel's speed (DNV GL Energy USA, Inc. 2020:Section 9). At a speed of 5 knots, a vessel's view could be obstructed for as much as 7.8 seconds. The NSRA notes that this is a conservative estimate because it reflects the view of a single moving vessel and not multiple moving vessels that would enhance each vessel's ability to see the others. Because of the 1 × 1–nm spacing of the Project structures, the impact on visibility would be further reduced. The Project would use USCG-approved lighting to make nearby vessels aware of structure locations (see Appendix F for EPMs). The structures would not impact a mariner's ability to use navigation aids or the coastline as a reference for navigation. Overall, spacing and placement of the structures would result in a long-term **negligible** adverse impact to visibility. NOAA also would identify and chart the structures and offshore RWEC.

Under the Proposed Action, there is a modeled increase of 1.4 incidents per year in the NSRA's study area over baseline conditions as a result of changes to travel patterns to certain vessel types (DNV GL Energy USA, Inc. 2020:Table 11-2). More than 99% of total incidents would be allisions, and 92% of total incidents would involve fishing vessels. Based on the NSRA results, there would be a negligible increase (0.004) in collisions.

The Project calls for a standard and uniform grid pattern with 1-nm spacing between structures (WTGs and OSSs) across the contiguous RI/MA and MA WEA lease areas, which provides sufficient space for certain vessels that fish in the RI/MA and MA WEAs to continue fishing after the wind farms are constructed. See Figure 1.1-2 for location of the RI/MA and MA WEAs. The USCG has determined that if structures are developed along a standard and uniform grid pattern, formal or informal vessel routing measures would not be required because such a grid pattern would provide space for dispersal of the fleet that can safely accommodate both transits through and fishing within the RI/MA and MA WEAs. The USCG believes the 1 × 1–nm aligned and gridded layout should be sufficient to maintain navigational safety and provide vessels with multiple straight-line options to transit safely throughout the contiguous RI/MA and MA WEA lease areas (USCG 2020). Marine vessel radars are not optimized to operate in a WTG environment due to a combination of factors ranging from the slow adoption of solid-state technology to the electromagnetic characteristics of WTGs (National Academies of Sciences, Engineering, and Medicine 2022). USCG also noted in its final *The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study* (USCG 2020) that various factors play a role in potential marine radar interference by offshore wind infrastructure, stating that "the potential for interference with marine radar is site specific and depends on many factors including, but not limited to, turbine size, array layouts, number of turbines, construction material(s), and the vessel types." It is anticipated that industry will adopt both technological and non-technological-based measures to reduce impacts on marine radar, including greater use of AIS and electronic charting systems, use of new technologies like LiDAR, employing more watchstanders, and avoiding wind farms altogether.

The USCG has reviewed all available studies on radar interference and found that although these studies show that structures could have some effect upon radar, as discussed in the MARIPARS report, they do not render radar inoperable and do not inform planning decisions about structure arrangement or spacing (USCG 2020).

Overall, as the number of structures increases from 81 under the No Action Alternative to 181 structures under the Proposed Action, there would be a long-term **moderate** adverse impact from the presence of structures due to increased navigational complexity and allision risk.

<u>Vessel traffic:</u> During operations, maintenance is expected on a periodic basis for each offshore component (offshore transmission facilities, WTG and OSS foundations, and WTGs) (see COP Sections 3.5.2 through 3.5.4). This limited operation activity would have a long-term **negligible to minor** adverse impact on navigation and vessel traffic, with impacts primarily on commercial fishing and other vessels operating at the same time and place as maintenance vessels.

Because of the low frequency of allision and collision incidents and Project EPMs (see Table F-1 in Appendix F), the expected risks to navigation would be long term **negligible** adverse. Most deep draft vessel traffic already avoids the area and would not need to meaningfully reroute, as shown in Figures 3.16-2 and 3.16-3. The Project is outside existing traffic lanes and is not expected to require significant rerouting of traffic to avoid Project components (DNV GL Energy USA, Inc. 2020:Table 5-1).

Impacts to traffic from offshore RWEC maintenance would be temporary **negligible** adverse because of the infrequent nature of monitoring and inspection. Decommissioning of the Project would have similar short-term (for the duration of decommissioning activities) **minor** to **moderate** adverse impacts as construction because decommissioning would use similar numbers of vessels and implement the same EPMs. After the facility is decommissioned, the navigation conditions in the area would return to pre-Project conditions.

#### 3.16.2.3.3 Cumulative Impacts

### Offshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> The Proposed Action would add up to 7,213 acres of seafloor disturbance from RWEC, OSS-link, IAC installation, and anchoring/mooring activity to the seafloor cable–related disturbance estimated under the No Action Alternative. This would result in localized temporary **minor** adverse cumulative impacts on navigation and vessel traffic due to increased collision and spill risk during construction. BOEM estimates a total of 25,019 acres of seafloor disturbance for the Proposed Action plus all other future offshore wind projects in the GAA. During installation and maintenance, other vessels could also be forced to reroute to avoid installation and maintenance vessels. Cable installation for the Project is not expected to overlap with other project cable routes or installation based on the location of other offshore wind projects and proposed construction schedules (see Appendix E). Therefore, when considered in combination with past, present, and other

reasonably foreseeable projects, the Project would have short-term **minor** to **moderate** adverse cumulative impacts on navigation and vessel traffic.

Port utilization: Port upgrades and vessel activity associated with the Proposed Action could result in negligible impacts to navigation and vessel traffic. The Proposed Action is expected to require as many as 56 construction vessels during construction in 2024 (primarily) and 2025 (see COP Table 3.3.10-2 and COP Figure 3.2-1). There would be 1,400 vessel return trips (see COP Table 3.3.10-2), although most vessels would be concentrated in the work area, with fewer vessels transporting crew and materials back and forth from ports. This additional vessel traffic could cause delays or changes in berthing patterns at primary ports. It could lead to operators being redirected to use alternate ports or facilities on a temporary basis. To some extent, individual ports could independently undertake facility improvement projects in anticipation of this demand to relieve some of the potential congestion. The Project's impact on port capacity would also be limited due to the small number of additional vessels.

Project port activity and upgrades (via dredging and in-water work) could coincide with other forecasted projects. Port activities could be delayed or ports could experience congestion or changes in utilization as a result of the overlap in construction activities. Therefore, the cumulative impacts of the Proposed Action when combined with past, present, and reasonably foreseeable future projects would have long-lasting overall but temporary impacts on specific ports (depending on how each project manages its port utilization) with localized **minor** to **moderate** adverse impacts on port utilization.

Presence of structures: The Proposed Action would add up to 100 additional WTGs and two OSSs to the 1,015 structures present under the No Action Alternative, which would increase navigational complexity and therefore the risk of collision, allision, and potential spills. Additional structures could also interfere with marine radars and aircraft engaging in search and rescue efforts. See Table 3.16-1 for a summary of miles traveled by vessels carrying AIS within the Lease Area and other lease areas in 2019. The commercial fisheries discussion in Appendix G presents VMS numbers for commercial fishing vessels. The Proposed Action would account for 10% of the total future structures in the GAA; however, Revolution Wind would implement a 1 × 1–nm uniform north–south and east–west grid spacing, consistent with other contiguous RI/MA and MA WEA lease areas. Therefore, the Project would contribute a long-term **moderate** adverse impact from the presence of structures due to increased navigational complexity and allision risk. The cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominantly of impacts described under the No Action Alternative, which would represent a long-term **moderate** adverse impact on navigation and vessel traffic.

Vessel traffic: The Proposed Action would add as many as 56 construction vessels during construction in 2024 and 2025 to conditions under the No Action Alternative (see COP Table 3.3.10-2). The Proposed Action represents up to 22% of the total maximum vessels potentially present in 2024. Non-Project traffic would be able to adjust routes and avoid the work area and transiting construction vessels. Project O&M vessel traffic would be substantially less because the RWF would represent 10% of the WTGs in service by 2027 under the No Action Alternative, all of which are assumed to have similar O&M vessel traffic generation. Therefore, the Proposed Action would result in a **minor** adverse impact to vessel traffic. BOEM estimates a peak of 259 vessels at sea on a daily basis due to offshore wind Project construction and O&M over a 10-year time frame, with most of these vessels remaining in the vicinity of their respective lease areas. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be short term **minor** adverse.

#### 3.16.2.3.4 Conclusions

Project construction and installation, O&M, and decommissioning would impact navigation and vessel traffic, primarily through increased traffic; obstructions to navigation; delays within or approaching ports; increased navigational complexity; changes to navigation patterns; detours to offshore travel or port approaches; or increased risk of incidents such as collision, strikes, or allisions, and groundings. BOEM anticipates the impacts resulting from the Proposed Action alone would be long term **moderate** adverse. Therefore, BOEM expects the overall impact on navigation from the Proposed Action alone to be long term **moderate** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from temporary to long term **negligible** to **moderate** adverse. The main IPF of concern is the presence of structures, which increase navigational complexity and therefore the risk of collision/allision. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **moderate** adverse impacts to navigation. The overall effect to navigation and vessel traffic would be notable, but the resource would recover completely when the impacting agents are removed and remedial or mitigating actions are taken.

### 3.16.2.4 Alternatives C, D, E, and F

#### 3.16.2.4.1 Operations and Maintenance and Decommissioning

##### Offshore Activities and Facilities

<u>Presence of structures:</u> The Habitat Alternative would reduce the number of WTGs in the central area of the Lease Area, which would alleviate some navigational complexity around that area, where WTGs are not present. However, the presence of an OSS in the center of the area that would otherwise be clear of WTGs (under both C1 and C2) would introduce some complexity, and the presence of three WTGs to the northeast of the OSS (under C2) would create further complexity. Further, the presence of structures in the adjacent OCS-A 0517 lease area could create navigational issues. Overall, the net effect is that Alternative C (under both C1 and C2) would have a slightly reduced impact from the presence of structures from the Proposed Action: long term **minor** to **moderate** adverse.

For the Transit Alternative, Alternative D1 would result in a long-term **moderate** adverse impact from the increased navigational complexity and allision risk. Alternative D2 would result in a long-term **minor** to **moderate** adverse impact from the increased navigational complexity and allision risk, specifically reducing impacts on the fishing and passenger vessels that transit through this area, as it would remove an “ungrouped” section of structures, making navigation through this area more predictable. Alternative D3 would result in a long-term **minor** to **moderate** adverse impact from the presence of structures due to the increased navigational complexity and allision risk. Alternative D3 would result in a somewhat reduced impact from the Proposed Action (although not enough to change the impact rating), as it would remove structures adjacent to the inbound lane of the Buzzards Bay Traffic Separation Scheme that fall within the USCG’s Marine Planning Guidelines buffers (USCG 2019). This would reduce risks specifically to commercial and international vessels (e.g., deep draft cargo and tanker). Alternatives D1+D2, D1+D3, and D1+D2+D3 would have a long-term **minor** to **moderate** adverse impact from the presence of structures.

For the Viewshed Alternative, Alternative E2 would expand the traffic separation scheme buffer from 1 nm to 2 nm, reducing the potential for conflict with vessel traffic. Overall, spacing and placement of the structures would result in a long-term **minor** to **moderate** adverse impact to visibility, although navigational complexity would increase from the concentration of traffic in the open area and increase the likelihood that fishing activities will occur there. This could lead to conflicting uses and, accordingly, increased risk of allision/collision. Removal of structures under this alternative would primarily affect commercial fishing vessels, which are active in the area. Alternatives E1 and E2 would reduce impacts to fishing vessels and would result in a long-term **minor** adverse impact to fishing vessel navigation from the presence of structures due to the increased allision risk.

For the Higher Capacity Turbine Alternative, the presence of structures impacts during operations and maintenance and decommissioning could be slightly reduced but similar to the Proposed Action (long term **moderate** adverse) depending on the alternative (C, D, or E) chosen and the location(s) of foundations affected by the reduction.

#### 3.16.2.4.2 Cumulative Impacts

### Offshore Activities and Facilities

Presence of structures: The Habitat Alternative would create an apparent passage through the middle of the Lease Area along a northeast–southwest route, which could encourage traffic to transit through that area. Therefore, Alternative C (under both C1 and C2) would have the same cumulative impact from presence of structures as the Proposed Action: long term **moderate** adverse.

For the Transit Alternative, under Alternative D1, the fishing industry–proposed transit lane intersects four contiguous BOEM lease areas: OCS-A 0486 (RWF), OCS-A 0487, OCS-A 0500, and OCS-A 0517.[47] If a similar east–west opening were to be incorporated into the selected alternatives for proposed wind energy projects in the OCS-A 0487, OCS-A 0500, and OCS-A 0517 lease areas, it would reduce the number of structures but may also increase navigational complexity by concentrating traffic in the open area and increasing the likelihood that fishing activities will occur there. This could lead to conflicting uses and, accordingly, increased risk of allision/collision, resulting in a long-term moderate adverse impact on navigation. However, if any of those other lease areas are approved with wind energy project configurations that do not incorporate a similar opening, Alternative D1 would increase the navigational complexity and may result in a long-term **moderate** adverse impact on navigation.

Under Alternative D2, the fishing industry–proposed transit lane intersects four contiguous BOEM lease areas: OCS-A 0486, OCS-A 0487, OCS-A 0500, and OCS-A 0501.[48] Under this alternative, the easternmost reach of the RWF Lease Area would be open for vessel traffic. If the selected alternatives for proposed wind energy projects in the OCS-A 0487, OCS-A 0500, and OCS-A 0501 lease areas to the south of this section were to adopt a similar transit alternative to allow north–south traffic, it would reduce the number of structures but may also increase navigational complexity by concentrating traffic in

[47] Note that OCS-A 0517 is part of the No Action Alternative.
[48] Note that OCS-A 0501 is part of the No Action Alternative.

the open area and increasing the likelihood that fishing activities will occur there. This could lead to conflicting uses and, accordingly, increased risk of allision/collision, resulting in a cumulative long-term to moderate adverse impact on navigation. If the other projects were to develop structures that preclude north–south transit, the cumulative impact on navigation would be long term **moderate** adverse.

Under Alternative D3, the setback proposed would intersect only the OCS-A 0486 Lease Area (RWF). Under this alternative, the lack of structures along the northwestern edge of the Lease Area would extend the traffic separation scheme buffer from 1 nm to 2 nm. No other RI/MA and MA WEA lease areas would be affected by this change, resulting in a long-term **moderate** adverse cumulative impact to navigation.

Combining alternatives would result in combined effects. It would reduce the number of structures but may also increase navigational complexity by concentrating traffic in the open area and increasing the likelihood that fishing activities will occur there. This could lead to conflicting uses and, accordingly, increased risk of allision/collision, Alternatives D1+D2, D1+D3, and D1+D2+D3 would result in long-term **moderate** adverse cumulative impacts.

For the Viewshed Alternative, structures removed by this alternative relative to the Proposed Action are positioned away from other lease areas and would not cause additional interactions with structures in those other areas. As a result, the cumulative impact of each of the Alternative E layouts would be long term **minor** adverse to navigation.

Under the Higher Capacity Turbine Alternative, presence of structures impacts from cumulative activities could be slightly reduced but similar to the Proposed Action (long term **moderate** adverse) depending on the alternative (C, D, or E) chosen and the location(s) of foundations affected by the reduction.

#### 3.16.2.4.3 Conclusions

Although these alternatives would reduce the number of WTGs when compared to the maximum-case scenario under the Proposed Action and, in turn, the associated IACs and vessel activity, Alternatives C through F would maintain uniform north–south and east–west grid spacing and separation of 1 nm. Therefore, BOEM expects that the impacts resulting from each alternative alone would be similar to the Proposed Action: long term **moderate** adverse.

In the context of other future actions, BOEM expects the alternative’s impacts would depend on development in nearby lease areas. Alternative C would add sources of navigation impacts (e.g., structures, noise, port utilization) to the No Action Alternative at quantities and durations similar to the Proposed Action. Therefore, the overall impact on navigation and vessel traffic when combined with past, present, and reasonably foreseeable activities would be the same as under the Proposed Action: long term intermittent **moderate** adverse.

Alternative D could reduce impacts to **minor** to **moderate** adverse if other lease areas likewise limit development to create an east–west area that is open to traffic. However, if the other lease areas were to develop fully, the impacts of each Alternative D scenario when combined with other future activities would be the same level as the Proposed Action: long term **moderate** adverse.

For Alternative E, the locations where structures would be eliminated would not interact with development in other lease areas. Therefore, BOEM expects Alternative E’s impacts would be long term **minor** to **moderate** adverse.

For Alternative F, the locations where structures would be eliminated cannot be determined. Depending on those locations, the Project could or could not interact with development in other lease areas. Therefore, BOEM expects Alternative F's impacts would be similar to that of the Proposed Action (long term **moderate** adverse) depending on the alternative (C, D, or E) chosen.

### 3.16.2.5 Alternative G: Impacts of the Preferred Alternative on Navigation and Vessel Traffic

#### 3.16.2.5.1 Operations and Maintenance and Decommissioning

##### Offshore Activities and Facilities

Presence of structures: Alternative G would avoid placement of WTGs in the southwest section of the Lease Area as well as in numerous central locations. The avoidance of the southwest section could alleviate some navigational complexity around that area, though it would not have an impact on transiting vessels due to the presence of WTGs to the north of this area and the adjacent SFWF (OCS-A 0517). Alternative G would avoid an area used by some fishing vessels, as shown in Figure 3.16-3. The removal of WTGs in central locations would not affect transits but could affect vessels operating within the Lease Area. From a navigation and vessel traffic perspective, Alternatives G, G1, G2, and G3 would have similar impacts, slightly reduced from the Proposed Action: long term **minor** to **moderate** adverse.

#### 3.16.2.5.2 Cumulative Impacts

##### Offshore Activities and Facilities

Presence of structures: Under Alternative G, impacts from the presence of structures could be slightly reduced but similar to the Proposed Action (long term **moderate** adverse) due to other wind lease areas south of the Lease Area. Although the removal of WTGs would open the southwest section of the Lease Area to vessels, the other lease areas would prevent vessels from transiting in that area.

#### 3.16.2.5.3 Conclusions

Although Alternative G would reduce the number of WTGs when compared to the Proposed Action, it would maintain its uniform north–south and east–west grid spacing and separation of 1 nm. It would eliminate WTGs in the southwest section of the Lease Area, but that impact would be mitigated by the presence of the SFWF (OCS-A 0517). Therefore, BOEM expects that the impacts resulting from Alternative G would be slightly reduced from the Proposed Action: long term **minor** to **moderate** adverse.

In the context of other future actions, the presence of additional wind lease areas to the south would result in impacts similar to that of the Proposed Action: long term **moderate** adverse.

### 3.16.2.6 Mitigation

Mitigation measures resulting from agency consultations for navigation and vessel traffic are identified in Appendix F, Table F-2, and addressed in Table 3.16-5.

**Table 3.16-5. Mitigation and Monitoring Measures Resulting from Consultations for Navigation and Vessel Traffic (Appendix F, Table F-2)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Submarine cable system burial plan | Revolution Wind shall submit a copy of the submarine cable system burial plan as part of their facility design report and fabrication and installation report that depicts precise planned locations and burial depths of the entire cable system. | This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein. |
| Boulder relocation reporting | The locations of any boulder (which would protrude > 2 meters or more on the seafloor) relocated during cable installation activities must be reported to BOEM, USCG, NOAA, and the local harbormaster. These locations must be reported in latitude and longitude degrees to the nearest 10 thousandth of a decimal degree (roughly the nearest meter), or as precise as practicable. | This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein. |
| Vessel safety practices | All Project vessels involved in construction, O&M, and decommissioning activities would comply with U.S. or international Safety of Life at Sea standards, as applicable, with regard to vessel construction, vessel safety equipment, and crewing practices. | This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein. |
| WTG and OSS marking | Each WTG and OSS would be marked with private aids to navigation (PATONs), subject to the approval of the Commander (dpw-1), First Coast Guard District. Revolution Wind would do the following:<br>Provide BOEM and USCG with a proposed lighting, marking, and signaling plan, which must be approved by BOEM after consultation with the USCG. The plan should conform to the International Association of Marine Aids to Navigation and Lighthouse Authorities Recommendation G1162, The Marking of Man-Made Offshore Structures. Should any part of the recommendation conflict with federal law or regulation, or if SFW seeks an alternative to the recommendation, Revolution Wind must consult with the USCG.<br>Mark each individual WTG and OSS with clearly visible, unique, alphanumeric identification characters.<br>Light each WTG and OSS in a manner that is visible by mariners in a 360-degree arc around the WTG and OSS.<br>Apply to the First Coast Guard District to establish PATONs for the facility. Approval for all PATONs must be obtained before installation of the Revolution Wind structures begins. | This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | Ensure each WTG is lighted with red obstruction lighting consistent with the FAA Advisory Circular 70/7460-1L Change 2 (FAA 2018), so long as this requirement does not preclude the use of an ADLS.<br>Provide signage that covers 360-degrees of the wind turbine structures warning vessels of the air draft of the turbine blades as determined at highest astronomical tide.<br>Cooperate with USCG and NOAA to ensure that cable routes and wind turbines are depicted on appropriate government produced and commercially available nautical charts.<br>Provide mariner information sheets on Revolution Wind's website with details on the location of the turbines and specifics such as blade clearance above sea level. | |
| WTG shut-down mechanism | Equip all WTG rotors (blade assemblies) with control mechanisms operable from the Revolution Wind control centers available 24 hours a day, 7 days a week. The control mechanisms shall enable control room operators to shut down the requested WTGs within an agreed upon time of notification between the USCG and Revolution Wind. A formal shut-down procedure would be part of the standard operating procedures and periodically tested. Normally, USCG-ordered shut downs would be limited to those WTGs in the immediate vicinity of an emergency and for as short a period as is safely practicable under the circumstances, as determined by the USCG. | This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein. |
| USCG training and exercises | Revolution Wind would participate in periodic USCG-coordinated training and exercises to test and refine notification and shut-down procedures and to provide SAR training opportunities for USCG vessels and aircraft. | This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein. |
| Operations and maintenance plan | Prior to operation of the Project, Revolution Wind shall submit a written plan for operations and maintenance, which includes control center(s), for review by BOEM and the USCG. The plan must demonstrate that the control center(s) would be adequately staffed to perform standard operating procedures, communications capabilities, and monitoring capabilities. The plan shall include the following topics, which may be modified through ongoing discussions with the USCG: | This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | Standard operating procedures: Methods for establishing and testing WTG rotor shut-down; methods of lighting control; method(s) for notifying the USCG of mariners in distress or potential/actual SAR incidents; method(s) for notifying the USCG of any events or incidents that may impact maritime safety or security; and methods for providing the USCG with environmental data, imagery, communications and other information pertinent to SAR or marine pollution response.<br>Staffing: Number of personnel intended to staff the control center(s) to ensure continuous monitoring of WTG operations, communications, and surveillance systems.<br>Communications: Capabilities to be maintained by the control center(s) to communicate with the USCG and mariners within and in the vicinity of the Project area. Communications capability shall at a minimum include VHF marine radio and landline and wireless for voice and data.<br>Monitoring: The control center(s) should maintain the capability to monitor the Project's installation and operations in real time (including night and periods of poor visibility) for determining the status of all PATONs, and to detect any survivor who has climbed to the survivor’s platform, if installed, on any WTG or OSS. | |
| WTG/OSS installation | No WTG/OSS installation work will begin in the Lease Area (i.e., on or under the water) without prior review by BOEM and USCG of a plan submitted by Revolution Wind that describes the schedule and process for erecting each WTG, including all planned mitigations to be implemented to minimize any adverse impacts on navigation while installation is ongoing. Appropriate Notice to Mariners submissions would accompany the plan. | This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein. |
| USCG reporting | Complaints: On a monthly basis during installation, Revolution Wind shall provide USCG with a description of any complaints received (either written or oral) by boaters, fishermen, commercial vessel operators, or other mariners regarding impacts on navigation safety allegedly caused by construction vessels, crew transfer vessels, barges, or other equipment. Describe any remedial action taken in response to complaints received. | This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | Correspondence: Revolution Wind shall provide to USCG copies of any correspondence received by Revolution Wind from other federal, state, or local agencies that mention or address navigation safety issues.<br>Maintenance: Revolution Wind would provide the USCG with its planned WTG maintenance schedule, forecasted out to at least one quarter. Appropriate Notice to Mariners submissions would accompany each maintenance schedule. | |
| Public participation | To ensure sufficient opportunity for the public to receive information directly from the owners/operators of the wind energy facility, Revolution Wind would attend periodic meetings of the Southeastern Massachusetts and Rhode Island Port Safety and Security Forums to provide briefs on the status of construction and operations and on any problems or issues encountered with respect to navigation safety. | This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein. |
| Helicopter landing platforms | If Revolution Wind's OSSs include helicopter-landing platforms, those platforms would be designed and built to accommodate up to and including USCG H-60-sized rescue helicopters. | This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein. |

#### 3.16.2.6.1 Measures Incorporated into the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits listed in Table 3.16-5 and in Appendix F, Table F-2, are incorporated into Alternative G (Preferred Alternative). These measures, if adopted, would further define how the effectiveness and enforcement of EPMs would be ensured and improve accountability for compliance with EPMs by requiring the submittal of plans for approval by the enforcing agency(ies) and by defining reporting requirements. Because these measures ensure the effectiveness of and compliance with EPMs that are already analyzed as part of the Proposed Action, implementation of these measures would not further reduce the impact level of the Proposed Action from what is described in Section 3.16.2. Agency-proposed measures related to vessel speed restrictions would expand upon Revolution Wind's EPMs to require that all vessels regardless of size would comply with speed restrictions in any seasonal management area, dynamic management area, or slow zone. Although adoption of these measures would reduce risk to marine mammals (see Section 3.15) and sea turtles (see Section 3.19) under the Proposed Action, it would not alter the impact determinations for navigation and vessel traffic.

# 3.17 Other Marine Uses

## 3.17.1 Description of the Affected Environment for Other Marine Uses

Geographic analysis area: The GAA for other marine uses: scientific research and surveys includes the footprint of the Proposed Action and all reasonably foreseeable projects between Maine and mid-North Carolina (Figure 3.17-1). This area encompasses locations where scientific research and surveys are anticipated.

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of GAAs for additional other marine uses categories analyzed in the EIS (aviation and air traffic, land-based radar, military and national security, and undersea cables).

### 3.17.1.1 Aviation and Air Traffic

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to aviation and air traffic from implementation of the Proposed Action and other considered alternatives.

### 3.17.1.2 Land-Based Radar

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to land-based radar from implementation of the Proposed Action and other considered alternatives.

### 3.17.1.3 Military and National Security

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to military and national security from implementation of the Proposed Action and other considered alternatives.

### 3.17.1.4 Scientific Research and Surveys

Affected environment: Government-managed fisheries surveys, both state and federal, occur within the region at varying times of year. As an example, through the Ecosystems Surveys Branch, NOAA Fisheries collects fishery-independent data using standardized research vessel surveys from Cape Hatteras, North Carolina, to the Scotian shelf. These data are used for assessment, management, and a variety of research programs (NOAA Fisheries 2018). NOAA Fisheries' seasonal survey locations vary and are randomly selected and stratified by depth. BOEM and NOAA have developed a federal survey mitigation strategy for the northeast U.S. region that addresses potential impacts of offshore wind energy development on NOAA Fisheries' scientific surveys (Hare et al. 2022). Because of the depths and acreage in the region, there is a likelihood of sample survey locations being placed within the RWF and waters along the RWEC. It is likely that other surveys conducted by academic institutions and non-governmental organizations occur within the region (VHB 2023).

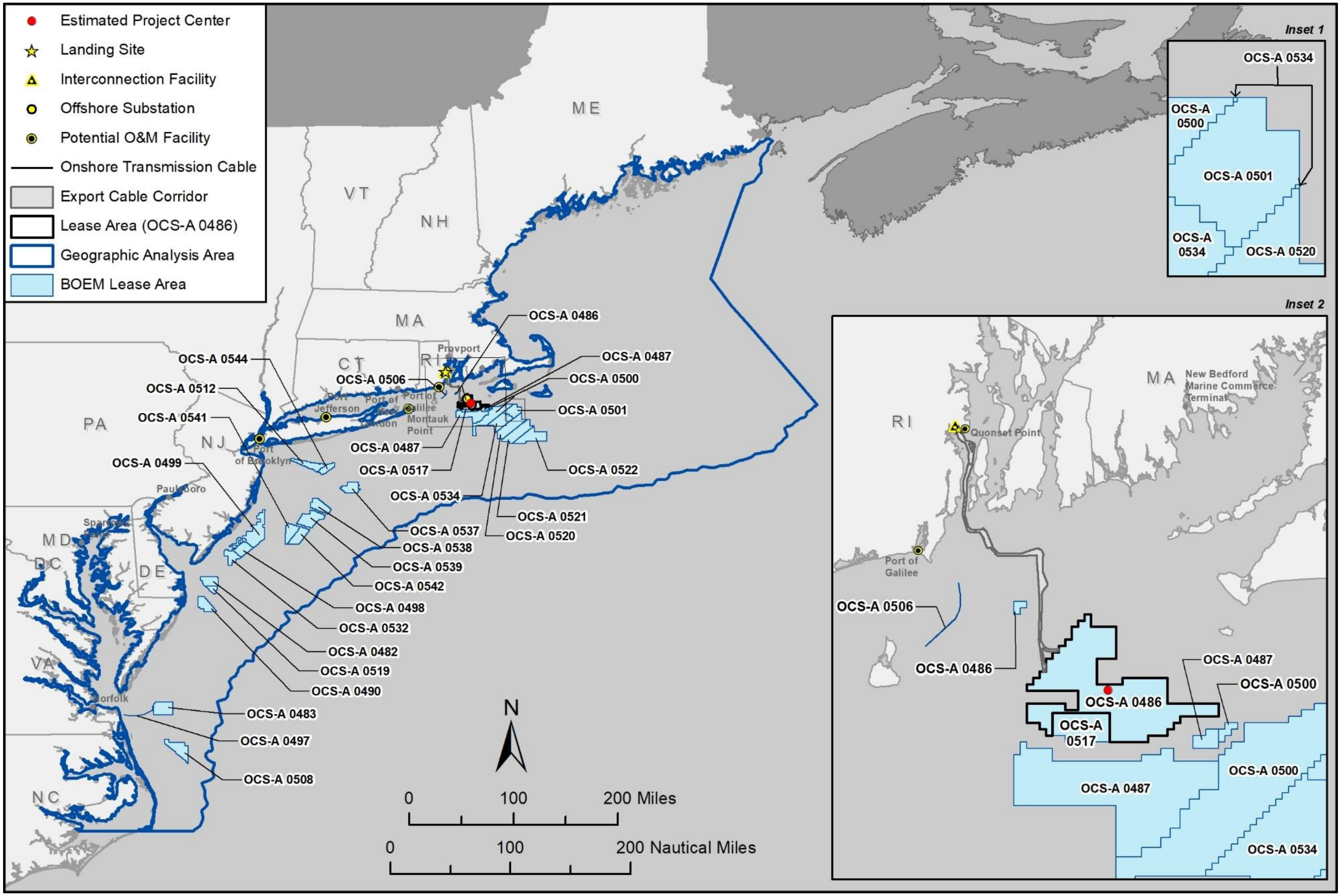


**Figure 3.17-1. Geographic analysis areas for other marine uses: scientific research and surveys.**

Regular fisheries management and ecosystem monitoring surveys conducted by or in coordination with the NEFSC would overlap offshore wind lease areas in the New England region and south into the mid-Atlantic region. Surveys include 1) the NEFSC Bottom Trawl Survey, a more than 50-year multispecies stock assessment tool using a bottom trawl; 2) the NEFSC Sea Scallop/Integrated Habitat Survey, a sea scallop stock assessment and habitat characterization tool using a bottom dredge and camera tow; 3) the NEFSC Surfclam/Ocean Quahog Survey, a stock assessment tool for both species using a bottom dredge; 4) the NEFSC Ecosystem Monitoring Program, a more than 40-year shelf ecosystem monitoring program using plankton tows and conductivity, temperature, and depth units; 5) NOAA's Atlantic Marine Assessment Program for Protected Species aerial and shipboard survey; and 6) North Atlantic Right Whale Sighting Advisory System aerial survey (BOEM 2021). As future wind development continues, alternative platforms, sampling designs, and sampling methodologies would be needed to maintain surveys conducted in or near the Project.

#### 3.17.1.5 Undersea Cables

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to undersea cables from implementation of the Proposed Action and other considered alternatives.

### 3.17.2 Environmental Consequences

#### 3.17.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

The analysis presented in this section considers the impacts resulting from the maximum design scenario under the PDE approach developed by BOEM to support offshore wind project development (Rowe et al. 2017). The maximum design size specifications defined in Appendix D, Table D-1, are PDE parameters used to conduct this analysis.

The following design parameters would result in different impacts relative to those generated by the design elements considered under the PDE:

- The selection of lower capacity WTG designs would reduce the total WTG height from 873 to as low as 648 feet, reducing impacts to low-flying aircraft.
- The selection of a higher capacity WTG design would reduce the total number of fixed structures that survey vessels could be required to avoid.

See Appendix E1 for a summary of IPFs analyzed for other marine uses across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E1, Tables E2-15 to E2-21. Other marine uses subsections that are determined by BOEM to have a minor or less adverse effect from the action alternatives (aviation and air traffic, military uses, land-based radar, and undersea cables) are provided in Appendix E2.

Table 3.17-1 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers the implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts on other marine uses. These EPMs are summarized in Appendix F, Table F-1.

A detailed analysis of the Proposed Action follows Table 3.17-1. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4 to facilitate reader comparison across alternatives.

The conclusion section within each alternative analysis discussion includes rationale for the effects determinations. The overall effect determination for each alternative is **major** adverse for scientific research and surveys.

**Table 3.17-1. Alternative Comparison Summary for Other Marine Uses**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative G (Preferred Alternative) | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| **Scientific Research and Surveys** | | | | | | | |
| Anchoring and new cable emplacement/ maintenance | **Offshore: O**ffshore energy facility construction of new cable emplacement and maintenance of cables would involve increased vessel traffic, which could impact scientific research and surveys by increasing the number of vessels, increasing navigational complexity and risk of collisions. However, these impacts are expected to be limited because cable emplacement vessels would be restricted to emplacement corridors and their activities would be of short duration. Therefore, the effects of anchoring and new cable emplacement and maintenance on scientific research and surveys would be **negligible** adverse. | **Offshore:** Vessel anchoring, cable installation, seafloor preparation, and placement of cable protection activities would occur during Project construction and O&M that could impact scientific research and survey uses. Impacts are expected to be limited because cable emplacement vessels would be restricted to emplacement corridors, and their activities would be of short duration. Therefore, the effects of anchoring and new cable emplacement and maintenance under the Proposed Action on scientific research and studies would be **negligible** adverse.<br>Reasonably foreseeable future actions in combination with the Proposed Action could result in up to 11,631 acres that could be affected by anchoring and mooring and up to 105,390 acres for cable installation activities during offshore wind energy development within the GAA. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **minor** adverse impacts on scientific research and survey. | **Offshore:** all offshore impacts under Alternatives C through F would result in a noticeably smaller offshore impact compared to the maximum case under the Proposed Action. The effects of this IPF would therefore be the same or slightly reduced relative to those described for the Proposed Action: **negligible** adverse for construction and O&M and **minor** adverse for cumulative. | | | | Offshore: All offshore impacts under Alternatives G would result in a noticeably smaller offshore footprint and reduced IAC cable length compared to the maximum case under the Proposed Action. The estimated construction impact footprint for this IPF is 4,291 acres under Alternative G and 3,803 to 3,812 acres under Alternatives G1 through G3. The effects of this IPF would therefore be similar to the Proposed Action but reduced in extent: **negligible** adverse for construction and O&M and **minor** adverse for cumulative. |
| Light | **Offshore:** Future offshore wind activities without the Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. The increase in light in the area could change conditions or species' behavior, which could impact the results of scientific research and surveys. Therefore, impacts from structural lighting alone on scientific research and surveys under the No Action Alternative would be **minor** adverse. | **Offshore:** Construction and installation and O&M of the Proposed Action would result in an increase in lighting on WTGs offshore, which could have minor adverse effects on scientific research and surveys by impacting the natural environment and changing conditions compared to other areas used for scientific research and surveys that do not have artificial light. The increase in light in the area could change species' behavior, which could impact the results of scientific research and surveys. Therefore, impacts from structural lighting alone on scientific research and surveys under the No Action Alternative would be **minor** adverse. | **Offshore:** While Alternatives C through F could result in a reduction in construction and operational lighting, the effects of this IPF on scientific research and surveys would otherwise be similar to those described for the Proposed Action. Therefore, the impact on scientific research and surveys under this alternative would be **minor** adverse. | | | | Offshore: Although Alternatives G would result in a reduction in construction and operational lighting, the effects of this IPF on scientific research and surveys would otherwise be similar to the Proposed Action. Therefore, the impact on scientific research and surveys under this alternative would be **minor** adverse. |
| Presence of structures | **Offshore:** Offshore wind facilities could adversely affect scientific surveys by preclusion of NOAA survey vessels and aircraft from sampling in survey strata and impacts on the random-stratified | **Offshore:** NMFS scientific research and protected species surveys could be curtailed within the Lease Area due to Project activities, and NMFS believes that construction of the RWF and the | **Offshore:** While the offshore footprint would be reduced under all configurations, the effects of this IPF on scientific research and surveys under Alternatives C through F would otherwise be similar to those described for the Proposed Action. Therefore, the impact of this IPF on scientific research and surveys would be **major** adverse**.** | | | | Offshore: Although the offshore footprint would be reduced under Alternative G (e.g., the maximum construction disturbance footprint is estimated at 583 acres for Alternative G and 482 acres for Alternatives G1 |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative G (Preferred Alternative) | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| | statistical design that is the basis for assessments, advice, and analyses. Scientific survey and protected species survey operations would therefore be reduced or eliminated as offshore wind facilities are constructed (BOEM 2021).<br>Overall, the No Action Alternative would have **major** adverse effects on NMFS' scientific research and protected species surveys, potentially leading to impacts on fishery participants and communities, as well as potential **major** adverse impacts on monitoring and assessment activities associated with recovery and conservation programs for protected species. | survey adjustments needed would constitute a long-term **major** adverse impact on those surveys. | | | | | through G3), the effects of this IPF on scientific research and surveys would otherwise be similar to the Proposed Action. Therefore, the impact of this IPF on scientific research and surveys would be **major** adverse. |
| Vessel traffic | **Offshore:** Increased vessel traffic due to future offshore wind facilities could lead to course changes of scientific and research vessels, congestion and delays at ports, and increased traffic along vessel transit routes. Therefore, the effects of vessel traffic on scientific and research surveys under the No Action Alternative would be **minor** adverse. | **Offshore:** Increased vessel traffic due to construction and installation and O&M of the Proposed Action could lead to course changes of scientific and research vessels and increased traffic along vessel transit routes. Additionally, offshore construction activities of Project facilities could be a hazard to scientific research vessels as they could experience hazards from passing Project construction vessels. With EPMs, however, the Proposed Action would be **minor** adverse for vessel traffic.<br>Vessel activity could peak with as many as 262 vessels involved in construction of reasonably foreseeable projects. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **minor** adverse. | **Offshore:** Vessel traffic associated with Alternatives C through F may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. While the offshore footprint would be reduced under all configurations, vessel traffic is expected to remain at similar levels as vessel traffic under the Proposed Project. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to those described for the Proposed Action. Therefore, impacts on scientific research and surveys would be **minor** adverse under all Project phases. | | | | Offshore: Vessel traffic associated with Alternatives G may be slightly reduced in the Lease Area and around ports, given the smaller offshore footprint. Although the offshore footprint and IAC cable length would be reduced, vessel traffic is expected to remain at similar levels as vessel traffic under the Proposed Action. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to the Proposed Action. Therefore, impacts on scientific research and surveys would be **minor** adverse under all Project phases. |

#### 3.17.2.2 Alternative A: Impacts of the No Action Alternative on Aviation and Air Traffic

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to aviation and air traffic control from implementation of the No Action Alternative.

#### 3.17.2.3 Alternative A: Impacts of the No Action Alternative on Land-Based Radar

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to aviation and air traffic control from implementation of the No Action Alternative.

#### 3.17.2.4 Alternative A: Impacts of the No Action Alternative on Military and National Security (including Search and Rescue)

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to aviation and air traffic control from implementation of the No Action Alternative.

#### 3.17.2.5 Alternative A: Impacts of the No Action Alternative on Scientific Research and Surveys

##### 3.17.2.5.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for scientific research and surveys (see Section 3.17.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

##### 3.17.2.5.2 Cumulative Impacts

This section discloses potential scientific research and surveys impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

<u>Anchoring and new cable emplacement/maintenance:</u> Up to 8,427 acres could be affected by anchoring/mooring activities and up to acres of 101,381 acres of cable installation during offshore wind energy development within the GAA. This offshore energy facility construction of new cable emplacement and maintenance of cables would involve increased vessel traffic, which could impact scientific research and surveys by increasing the number of vessels within the GAA. Increased vessel traffic due to anchoring and cable maintenance of wind facilities could lead to course changes of scientific research vessels, thereby increasing navigational complexity and risk of collisions. These impacts are expected to be the highest during construction phases and lower during infrequent yearly routine maintenance and monitoring of offshore wind activities. Therefore, the effects of anchoring and new cable emplacement and maintenance under the No Action Alternative on scientific research and surveys would be **negligible** adverse.

<u>Light:</u> Future offshore wind activities without the Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have

navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize allision risks. Implementation of navigational lighting and marking per FAA and BOEM requirements and guidelines would further reduce the risk of scientific research vessel collisions. This would result in a general increase of lights in the GAA, which could impact the natural environment and alter research conditions compared to other areas used for scientific research and surveys that do not have artificial light. The increase in light in the area could change species' behavior, which could impact the results of scientific research and surveys. Therefore, impacts from structural lighting alone on scientific research and surveys under the No Action Alternative would be **minor** adverse.

Presence of structures: This EIS incorporates, by reference, the detailed analysis of potential impacts to scientific research and surveys provided in the Vineyard Wind final EIS (BOEM 2021). Activities associated with offshore wind development such as site assessment activities, construction of reasonably foreseeable offshore wind farms (including placement of structures such as OSSs and WTGs), associated cable systems, and vessel activity would present additional navigational obstructions for sea and air-based scientific surveys. If construction of all projected future offshore wind facilities occurs along the Atlantic coast, these developments would add up to as many as 3,088 structures between by 2030. Collectively, these developments would prevent NMFS from continuing ongoing scientific research surveys or protected species surveys under current vessel capacities and could reduce future opportunities for NMFS' scientific research in the area.

NMFS scientific surveys that overlap with wind development areas collectively represent over 277 survey-years of total effort by dedicated NOAA ship and aircraft resources. Data gathered from these surveys represent some of the most comprehensive data on marine ecosystems in the world, and data within offshore wind development areas are essential to those datasets in the Northwest Atlantic Ocean. These data support fisheries assessments and management actions, protected species assessments and management actions, ecosystem-based fisheries management, and regional and national climate assessments, as well as a number of regional, national, and international science activities.

Within offshore wind facility areas, survey operations would be curtailed or eliminated under current vessel capacities and monitoring protocols. Specifically, coordinators of large vessel survey operations or operations deploying mobile survey gear have currently determined activities within offshore wind facilities are not within their safety and operational limits. The need for survey vessels to navigate around large offshore wind projects to access survey stations would cause a loss of efficiency for surveys conducted outside the wind energy areas by reducing sampling time available with limited sea day allocations for survey vessels. In addition, changes in required flight altitudes due to proposed turbine height would affect aerial survey design and protocols. Stock assessment surveys for fisheries and protected species and ecological monitoring surveys considered in this analysis include, but are not limited to the NMFS spring and fall multi-species bottom trawl surveys; the NMFS surf clam survey; the NMFS ocean quahog survey; the NMFS integrated benthic survey/Atlantic scallop survey (optical and dredge); NMFS winter, spring, summer and fall ecosystem monitoring surveys; the NMFS North Atlantic right whale photographic sightings surveys (aerial); the NMFS marine mammal, sea turtle, and seabird vessel surveys; the NMFS marine mammal and sea turtle aerial surveys; the Virginia Institute of Marine Science scallop dredge survey; and the Northeast Area Monitoring and Assessment Program surveys.

In summary, offshore wind facilities could adversely affect scientific surveys by preclusion of NOAA survey vessels and aircraft from sampling in survey strata and impacts on the random-stratified statistical design that is the basis for assessments, advice, and analyses. Scientific survey and protected species survey operations would therefore be reduced or eliminated as offshore wind facilities are constructed (BOEM 2021). Offshore wind facilities would disrupt survey sampling statistical designs, such as random stratified sampling. Impacts to the statistical design of region-wide surveys violate the assumptions of probabilistic sampling methods. Development of new survey technologies, changes in survey methodologies, and required calibrations could help to mitigate losses in accuracy and precision of current practices due to the impacts of wind development on survey strata.

Other offshore wind projects could also require implementation of mitigation and monitoring measures through BOEM approvals or consultations. Identification and analysis of specific measures are speculative at this time; however, these measures could further impact NMFS's ongoing scientific research surveys or protected species surveys because of the increased vessel activity and/or in-water structures from these other projects.

BOEM and NOAA have developed a federal survey mitigation strategy for Vineyard Wind that is currently undergoing public review and that addresses potential impacts of offshore wind energy development on NOAA Fisheries' scientific surveys (Hare et al. 2022).

Overall, the No Action Alternative would have **major** adverse effects on NMFS' scientific research and protected species surveys, potentially leading to impacts on fishery participants and communities, as well as potential **major** adverse impacts on monitoring and assessment activities associated with recovery and conservation programs for protected species. Therefore, the effects of the presence of structures on scientific research and surveys under the No Action Alternative would be **major** adverse.

<u>Vessel traffic:</u> Although no future non–offshore wind stationary structures were identified within the Lease Area, increased vessel traffic due to future offshore wind facilities located outside of the Lease Area could lead to course changes of scientific and research vessels, congestion and delays at ports, and increased traffic along vessel transit routes. Vessel activity could peak in 2025 with as many as 210 vessels involved in construction of reasonably foreseeable OSW projects. While construction periods of various wind energy facilities may be staggered, some overlap would result in a cumulative impact to traffic loads. Therefore, the effects of vessel traffic on scientific and research surveys under the No Action Alternative would be **minor** adverse.

#### 3.17.2.5.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on other marine uses associated with the Project would not occur. However, ongoing and future activities would have **major** adverse impacts on scientific research and surveys due to the presence of structures that reduce future opportunities for NMFS' scientific research in the area.

BOEM anticipates **moderate** adverse impacts on scientific research and surveys due to the impacts of ongoing offshore wind activities (BIWF). BOEM anticipates that the impacts to reasonably foreseeable offshore wind activities would be **major** adverse, primarily because of the potential impacts of structures to NMFS survey efforts. The No Action Alternative would forgo the fisheries and benthic habitat monitoring that Revolution Wind has committed to voluntarily perform. Therefore, the results of this monitoring would not be available to provide an understanding of the effects of offshore wind development; benefit future management of finfish, invertebrates, and EFH; or inform planning of other offshore developments. However, other ongoing and future surveys could still provide similar data to support similar goals.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore would result in **major** adverse impacts for scientific research and surveys and USCG SAR activities (of people or marine mammals). The presence of stationary structures could prevent or hamper continued NMFS scientific research surveys using current vessel capacities and monitoring protocols or reduce opportunities for other NMFS scientific research surveys in the area. Coordinators of large vessel survey operations or operations deploying mobile survey gear have determined that activities within offshore wind facilities would not be within current safety and operational limits. In addition, changes in required flight altitudes due to the proposed WTG height would affect aerial survey design and protocols. BOEM acknowledges that NOAA's Office of Marine and Aviation Operations endorses the restriction of large vessel operations to greater than 1 nm from wind installations due to safety and operational challenges.

#### 3.17.2.6 Alternative A: Impacts of the No Action Alternative on Undersea Cables

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to aviation and air traffic control from implementation of the No Action Alternative.

#### 3.17.2.7 Alternative B: Impacts of the Proposed Action on Aviation and Air Traffic

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to aviation and air traffic control from implementation of the Proposed Action and other considered alternatives.

#### 3.17.2.8 Alternative B: Impacts of the Proposed Action on Land-Based Radar

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to land-based radar from implementation of the Proposed Action and other considered alternatives.

#### 3.17.2.9 Alternative B: Impacts of the Proposed Action on Military and National Security (including Search and Rescue)

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to military and national security from implementation of the Proposed Action and other considered alternatives.

### 3.17.2.10 Alternative B: Impacts of the Proposed Action on Scientific Research and Surveys

#### 3.17.2.10.1 Construction and Installation

**Offshore Activities and Facilities**

Anchoring and new cable emplacement/maintenance: Vessel anchoring, cable installation, seafloor preparation, and placement of cable protection activities would occur during Project construction. This would involve increased construction vessel traffic that could impact scientific research and survey uses by increasing the number of vessels within the GAA. Additionally, cable emplacement could impact bottom-trawl NMFS surveys that are planned in wind areas, although it is likelier that the development of the RWF would preclude scientific research and studies from occurring in the GAA, which would result in a greater impact discussed under Presence of Structures. Impacts specific to anchoring and cable emplacement during Project construction would be restricted to cable emplacement corridors, which would result in limited contact with cable emplacement installation vessels. Therefore, the effects of anchoring and new cable emplacement and maintenance under the Proposed Action on scientific research and studies would be **negligible** adverse.

Light: Construction and installation of the Proposed Action would result in an increase in temporary construction lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks. This would result in a general increase of lights in the GAA, which could have minor adverse effects on scientific research and surveys by impacting the natural environment and changing conditions compared to other areas used for scientific research and surveys that do not have artificial light. The increase in light in the area could change species' behavior, which could impact the results of scientific research and surveys. Therefore, impacts from structural lighting alone on scientific research and surveys under the No Action would be **minor** adverse.

Presence of structures and vessel traffic: Scientific research and protected species surveys could be affected from the construction of the RWF and RWEC. Some vessels or low-flying aircraft could be required to alter course to avoid WTGs. During review of other wind energy proposals, BOEM found that that NOAA Fisheries experienced reduced sampling productivity because of impacts associated with the presence of wind energy structures (Hare et al. 2022). NOAA has concluded that, within offshore wind facility areas, survey operations would be curtailed, if not eliminated, under current vessel capacities and monitoring protocols. Specifically, coordinators of large vessel survey operations or operations deploying mobile survey gear have currently determined that activities within offshore wind facilities are not within their safety and operational limits. Vessels could be required to make minor course adjustments to avoid collisions but would not be completely blocked from using the areas around the WTGs. Nevertheless, NMFS scientific research and protected species surveys could be curtailed within the Lease Area, and NMFS believes that construction of the RWF and the survey adjustments needed would constitute a long-term **major** adverse impact on those surveys.

Increased vessel traffic due to construction and installation of the Proposed Action could lead to course changes of scientific and research vessels and increased traffic along vessel transit routes. Additionally, offshore construction activities of Project facilities could be a hazard to scientific research vessels as they could experience hazards from passing Project construction vessels. Two primary means of reducing this risk are updates to mariners from the Project and safety zones around construction activity. Revolution Wind has committed to informing fishermen and other mariners about offshore activities related to the RWF. Fisheries liaisons and a team of fisheries representatives are based in regional ports, and updates would be provided to mariners online and via twice-daily updates on very high frequency channels. Safety zones can also protect mariners from potential hazards during construction activities. It is anticipated that the Coast Guard would implement safety zones during construction of the Project, as they did for the construction of the BIWF (USCG 2016). To reduce the likelihood of allision or collision during construction, Project safety vessel(s) would be on scene to advise mariners of construction activity (DNV GL Energy USA, Inc. 2020).

Because NMFS surveys could be curtailed in the Lease Area and because of increased collision risk, the effects of presence of structures and vessel traffic on scientific and research surveys under the Proposed Action would be **major** adverse for presence of structures and **minor** adverse for vessel traffic**.**

#### 3.17.2.10.2 Operations and Maintenance and Decommissioning

#### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Vessel anchoring and cable maintenance would occur during Project O&M and decommissioning. This would involve a slight increase in construction vessel traffic that could impact scientific research and survey uses by increasing the number of vessels within the GAA. Impacts specific to anchoring and cable emplacement during Project O&M and decommissioning are expected to be restricted to cable emplacement corridors, which would result in limited contact with cable emplacement and maintenance vessels. Cables associated with the RWF would be removed as part of decommissioning. Therefore, the effects of anchoring and new cable emplacement and maintenance under the Proposed Action on scientific research and studies would be **negligible** adverse.

Light: O&M and decommissioning of the Proposed Action would result in an increase in permanent lighting on up to 100 WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks. Implementation of navigational lighting and marking per USCG and BOEM requirements and guidelines would further reduce the risk of scientific vessel collisions. This would result in a general increase of lights in the GAA, which could have a negative impact on scientific research and surveys by impacting the natural environment and changing conditions compared to other areas used for scientific research and surveys that do not have artificial light. The increase in light in the area could change species' behavior, which could impact the results of scientific research and surveys. Light impacts are expected to be **minor** adverse compared with other impacts discussed below in Presence of structures and vessel traffic. Lighting would be removed as part of WTG and OSS decommissioning. Therefore, impacts from structural lighting alone on scientific research and surveys under the Proposed Action would be **minor** adverse.

Presence of structures and vessel traffic: Scientific research and protected species surveys could be affected from the O&M and decommissioning of the RWF and RWEC. Some vessels or low-flying aircraft could be required to alter course to avoid WTGs. During review of other wind energy proposals, BOEM found that that NOAA Fisheries experienced reduced sampling productivity because of impacts associated with the presence of wind energy structures (Hare et al. 2022). NOAA has concluded that, within offshore wind facility areas, survey operations would be curtailed, if not eliminated, under current vessel capacities and monitoring protocols. Specifically, coordinators of large vessel survey operations or operations deploying mobile survey gear have currently determined that activities within offshore wind facilities are not within their safety and operational limits. Vessels could be required to make minor course adjustments to avoid collisions but would not be completely blocked from using the areas around the WTGs. Nevertheless, NMFS scientific research and protected species surveys could be curtailed within the Lease Area, and NMFS believes that construction of the RWF and the survey adjustments needed would constitute a long-term **major** adverse impact on those surveys.

Increased vessel traffic due to O&M and decommissioning of the Proposed Action could lead to course changes of scientific and research vessels and increased traffic along vessel transit routes. However, less vessel traffic is anticipated during O&M and decommissioning than during construction and installation activities. Additionally, during operations, each WTG foundation would serve as an aid to navigation (ATON) for mariners as they are large structures that would be lighted and marked as required by applicable law and regulation, and as included in any/all conditions the Coast Guard may impose in conjunction with its private aids to navigation (PATON) permits. The Project structures and seaward components would be clearly marked on applicable NOAA nautical charts, including Chart No. 13218 (NOAA 2020). Revolution Wind would work closely with the USCG and NOAA to chart all elements of the Project (DNV GL Energy USA, Inc. 2020; Orsted 2020).

Therefore, the effects of presence of structures and vessel traffic on scientific and research surveys under the Proposed Action for O&M and decommissioning would be **major** adverse for presence of structures and **minor** adverse for vessel traffic.

#### 3.17.2.10.3 Cumulative Impacts

##### Offshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> Up to 11,631 acres could be affected by anchoring/mooring activities and up to 105,390 acres could be affected by cable installation during construction and installation of offshore elements of the RWF, combined with other reasonably foreseeable future actions. Construction of offshore elements of the RWF would involve cable emplacement, which would involve increased vessel traffic. This could create conflicts with scientific and research vessels by increasing the number of vessels within the GAA and the number of cables constructed. However, the cable emplacement vessels would be restricted to cable emplacement corridors, which would result in limited contact with scientific and research vessels. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **minor** adverse impacts on scientific research and surveys.

<u>Light:</u> The Proposed Action would result in an increase in temporary lighting and permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks. Implementation of navigational lighting and marking per USCG and BOEM requirements and guidelines would further reduce the risk of scientific vessel collisions. This would result in a general increase of lights in the GAA, which could have an impact on scientific and research surveys by increasing navigational complexity. Reasonably foreseeable activities combined with the Proposed Action would also increase lighting in the area and would include up to 3,190 additional lighted structures in the GAA.

Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **minor** adverse.

<u>Presence of structures:</u> This EIS incorporates by reference the detailed analysis of potential impacts to scientific research and surveys provided in the Vineyard Wind final EIS (BOEM 2021). In response to the impacts to scientific surveys identified in the Vineyard Wind final EIS, BOEM and NOAA developed a federal survey mitigation strategy for offshore wind energy development in the northeast region (see Section 3.17.2.22 and Table F-2, Appendix F).

Without this mitigation, the Proposed Action would result in long-term **major** adverse impacts to scientific research and surveys through the installation of up to 100 WTGs and two OSSs. The Proposed Action structures represent a 3% increase over the total estimated 3,088 WTG and OSS foundations under the No Action Alternative that could be present along the Atlantic coast if all projected future offshore wind facilities are constructed. Within the GAA, BOEM estimates a cumulative total of 3,190 offshore WTG and OSS foundations for the Proposed Action plus all other future offshore wind projects. These structures would result in adverse impacts to NMFS' scientific research and protected species surveys due to 1) WTG blade tip height that would exceed the survey altitude for current surveying methodologies, and 2) Lease Area geographic overlap with ongoing NMFS' Northeast Fisheries Science Center fishery resource monitoring surveys. Research and monitoring proposed by the lessees and/or conducted by other scientific institutions would continue in offshore wind facilities. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action Alternative, which would represent a long-term **major** adverse impact on NMFS's scientific research and protected species surveys and the resulting stock assessments.

<u>Vessel traffic:</u> The Proposed Action would result in increased vessel traffic due to construction and installation, O&M, and decommissioning of the Proposed Action that could lead to course changes of scientific and research vessels and increased traffic along vessel transit routes. Additionally, increased vessel traffic due to reasonably foreseeable future actions could lead to course changes of scientific and research vessels, congestion and delays at ports, and increased traffic along vessel transit routes. Vessel activity could peak with as many as 262 vessels involved in construction of reasonably foreseeable projects. While construction periods of various wind energy facilities could be staggered, some overlap would result in a cumulative impact to traffic loads. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **minor** adverse.

### 3.17.2.10.4 Conclusions

Project construction and installation, O&M, and decommissioning would affect ongoing scientific research studies occurring in the GAA. Similar impacts from Project O&M would occur, although at a lesser extent and duration for some uses. BOEM anticipates that the impacts resulting from the Proposed Action alone would range from **negligible** to **major** adverse. Therefore, BOEM expects that the overall impact on scientific research and surveys from the Proposed Action alone to be **major** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **major** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the

Proposed Action when combined with past, present, and reasonably foreseeable activities would be **major** adverse for scientific research and surveys.

#### 3.17.2.11 Alternative B: Impacts of the Proposed Action on Undersea Cables

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to undersea cables from implementation of the Proposed Action and other considered alternatives.

#### 3.17.2.12 Alternatives C, D, E, and F: Aviation and Air Traffic

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to aviation and air traffic control from implementation of the Proposed Action and other considered alternatives.

#### 3.17.2.13 Alternatives C, D, E, and F: Land-Based Radar

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to land-based radar from implementation of the Proposed Action and other considered alternatives.

#### 3.17.2.14 Alternatives C, D, E, and F: Military and National Security (including Search and Rescue)

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to military and national security from implementation of the Proposed Action and other considered alternatives.

#### 3.17.2.15 Alternatives C, D, E, and F: Scientific Research and Surveys

Table 3.17-1 provides a summary of IPF findings by alternative.

##### 3.17.2.15.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel traffic, BOEM expects that the impacts resulting from each alternative alone would be the same as the Proposed Action: **major** adverse. The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **major** adverse for scientific research and protected species surveys.

#### 3.17.2.16 Alternatives C, D, E, and F: Undersea Cables

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to undersea cables from implementation of the Proposed Action and other considered alternatives.

#### 3.17.2.17 Alternative G: Impacts of the Preferred Alternative on Aviation and Air Traffic

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to aviation and air traffic control from implementation of the Proposed Action and other considered alternatives.

#### 3.17.2.18 Alternative G: Impacts of the Preferred Alternative on Land-Based Radar

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to land-based radar from implementation of the Proposed Action and other considered alternatives.

#### 3.17.2.19 Alternative G: Impacts of the Preferred Alternative on Military and National Security (including Search and Rescue)

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to military and national security from implementation of the Proposed Action and other considered alternatives.

#### 3.17.2.20 Alternative G: Impacts of the Preferred Alternative on Scientific Research and Surveys

Table 3.17-1 provides a summary of IPF findings for this alternative.

##### 3.17.2.20.1 Conclusions

The construction and installation, O&M, and decommissioning of Alternative G would affect ongoing scientific research studies occurring in the GAA through the same mechanisms described for the Proposed Action, including increased vessel activity, presence of structures, light, and anchoring and cable emplacement. Although the overall extent of impacts to scientific research and surveys would be reduced under Alternative G relative to the Proposed Action, the significance of those effects would be the same. Therefore, the impacts of Alternative G alone on scientific research and surveys would be **major** adverse. Considering all IPFs together, BOEM anticipates that the overall impacts associated with Alternative G when combined with past, present, and reasonably foreseeable activities would be **major** adverse for scientific research and surveys.

#### 3.17.2.21 Alternative G: Impacts of the Preferred Alternative on Undersea Cables

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to undersea cables from implementation of the Proposed Action and other considered alternatives.

#### 3.17.2.22 Mitigation

Mitigation measures resulting from agency consultations for other marine uses (scientific research and surveys) are identified in Appendix F, Table F-2, and addressed in Table 3.17-2. Additional mitigation measures identified by BOEM and cooperating agencies are described in detail in Appendix F, Table F-3, and addressed in Table 3.17-3. If one or more of the measures analyzed below are adopted by BOEM and/or cooperating agencies, some adverse impacts could be further reduced.

**Table 3.17-2. Mitigation and Monitoring Measures Resulting from Consultations for Other Marine Uses (scientific research and surveys) (Appendix F, Table F-2)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| WTG shutdown mechanism | Equip all WTG rotors (blade assemblies) with control mechanisms operable from the RWF control centers available 24 hours a day, 7 days a week. The control mechanisms shall enable control room operators to shut down the requested WTGs within an agreed-upon time of notification between the USCG and Revolution Wind. A formal shutdown procedure would be part of the standard operating procedures and periodically tested. Normally, USCG-ordered shutdowns would be limited to those WTGs in the immediate vicinity of an emergency and for as short a period as is safely practicable under the circumstances, as determined by the USCG. | This measure would not alter the impact determination for military and national security activities but would ensure that effects of project operations to SAR, pollution events, and other emergency response activities would be limited to levels considered herein. |
| USCG training and exercises | Revolution Wind would participate in periodic USCG-coordinated training and exercises to test and refine notification and shutdown procedures and to provide SAR training opportunities for USCG vessels and aircraft. | This measure would not alter the impact determination for military and national security activities but would ensure that effects of project operations to SAR, pollution events, and other emergency response activities would be limited to levels considered herein. |
| Operations and maintenance plan | Before the project becomes operational, Revolution Wind shall submit a written plan for O&M, which includes control center(s), for review by BOEM and the USCG. The plan must demonstrate that the control center(s) would be adequately staffed to perform standard operating procedures, communications capabilities, and monitoring capabilities necessary to support USCG activities. The plan shall include, but not be limited to, the following topics, which may be modified through ongoing discussions with the USCG:<br>Standard operating procedures: Methods for establishing and testing WTG rotor shutdown; methods of lighting control; method(s) for notifying the USCG of mariners in distress or potential/actual SAR incidents; method(s) for notifying the USCG of any events or incidents that may impact maritime safety or | This measure would not alter the impact determination for military and national security activities but would ensure that effects of project operations to SAR, pollution events, and other emergency response activities would be limited to levels considered herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | security; and methods for providing the USCG with environmental data, imagery, communications, and other information pertinent to SAR or marine pollution response.<br>Staffing: Number of personnel intended to staff the control center(s) to ensure continuous monitoring of WTG operations, communications, and surveillance systems.<br>Communications: Capabilities to be maintained by the control center(s) to communicate with the USCG and mariners within and near the Lease Area. Communications capability shall at a minimum include very high frequency (VHF) marine radio and landline and wireless for voice and data.<br>Monitoring: The control center(s) should maintain the capability to monitor RWF installation and operations in real time (including night and periods of poor visibility) for determining the status of all PATONs and detection of a survivor who has climbed to the survivor's platform, if installed, on any WTG or OSS. | |
| Helicopter landing platforms | If Revolution Wind's OSSs include helicopter landing platforms, those platforms would be designed and built to accommodate up to and including USCG H-60-sized rescue helicopters. | This measure would not alter the impact determination for military and national security activities but would ensure that effects of project operations to SAR, pollution events, and other emergency response activities would be limited to levels considered herein. |
| Fiber-optic sensing technology | Distributed fiber-optic sensing technology proposed for the Project or associated transmission cables would be reviewed by the DOD to ensure that distributed fiber-optic sensing is not used to detect sensitive data from DOD activities, to conduct any other type of surveillance of U.S. Government operations, or to otherwise pose a threat to national security. | This measure would not alter the impact determination for military and national security but would ensure that these impacts remain negligible. |
| NOAA Fisheries scientific surveys | The project should be required to mitigate the major impacts to NOAA Fisheries scientific surveys consistent with NMFS-BOEM Federal Survey Mitigation Strategy - Northeast U.S. Region. Revolution Wind's plans to mitigate these impacts at the project and regional levels should be provided to NMFS for review and | This measure would not alter the impact determination for scientific research and surveys but would provide a planning and coordination process to ensure the effectiveness of measures used to avoid and minimize adverse impacts on scientific survey activities. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | approval prior to BOEM's decision on its acceptance. Mitigation is necessary to ensure that NOAA Fisheries can continue to accurately, precisely, and timely execute our responsibilities to monitor the status and health of trust resources. | |
| Locations of boulders, berms, and protection measures | Locations of relocated boulders, created berms, and scour protection, including cable protection measures (i.e., concrete mattresses) should be provided to NMFS and the public as soon as possible to help inform marine users, including, but not limited to the fishing industry and entities conducting scientific surveys of potential gear obstructions. | This measure would not alter the impact determination for scientific research and surveys but would help to avoid and minimize adverse impacts on experimental design and sampling gear used to conduct these activities. |

**Table 3.17-3. Additional Mitigation and Monitoring Measures Under Consideration for Other Marine Uses (scientific research and surveys) (Appendix F, Table F-3)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Federal survey mitigation | There are 14 NMFS scientific surveys that overlap with wind energy development in the northeast region and eight of these surveys overlap with the Project. As per NMFS and BOEM Survey Mitigation strategy actions 1.3.1, 1.3.2, 2.1.1, and 2.1.2 (Hare et al. 2022), within 120 calendar days of COP Approval, the Lessee must submit to BOEM a draft survey mitigation agreement between NMFS and the Lessee. The survey mitigation agreement will describe how the Lessee will mitigate the Project impacts on the eight NMFS surveys. If after consultation with NMFS NEFSC, BOEM deems the survey mitigation agreement acceptable, the mitigation will be considered required as a term and condition of the Project's COP approval.<br><br>As soon as reasonably practicable, but no later than 30 days after the issuance of the Project's COP Approval, the Lessee will initiate coordination with NMFS NEFSC to develop the survey mitigation agreement described above. Mitigation activities specified under the agreement will be designed to mitigate the Project impacts on the following NMFS NEFSC surveys: (a) Spring Bottom Trawl survey; (b) Autumn Multi-species Bottom Trawl survey; (c) Ecosystem Monitoring survey; (d) NARW aerial survey; (e) Aerial marine mammal and sea turtle survey; (f) Shipboard marine mammal and sea turtle survey; (g) Atlantic surfclam and ocean quahog survey; and (h) Atlantic sea scallop survey. At a minimum, the survey mitigation agreement will describe actions needed and the means to address impacts on the affected surveys due to the preclusion of sampling platforms and impacts on statistical designs. In terms of statistical design, the project will be viewed as a discrete stratum in surveys that use a random stratified design. Other anticipated Project impacts on NMFS surveys such as changes in habitat and increased operational costs due to loss of sampling efficiencies may also be addressed in the agreement.<br><br>The survey mitigation agreement will identify activities that will result in the generation of data equivalent to data generated by NMFS's affected | This measure would complement existing EPMs. The federal survey mitigation strategy is a long-term plan to help ensure the quality of NOAA's fisheries surveys and data is maintained. Eventually, major long-term impacts to scientific research and surveys could be reduced to minor if monitoring becomes direct mitigation. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | surveys for the duration of the Project. The survey mitigation agreement will describe the implementation procedures by which the Lessee will work with NEFSC to generate, share, and manage the data required by NEFSC for each of the surveys impacted by the Project, as mutually agreed upon between the Lessee and NMFS/NEFSC. The survey mitigation agreement must also describe the Lessee's participation in the NMFS NEFSC Northeast Survey Mitigation Program to support activities that address regional-level impacts for the surveys listed above. | |

#### 3.17.2.22.1 Measures Incorporated into the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits listed in Table 3.17-4 and in Appendix F, Table F-2, are incorporated into Alternative G (Preferred Alternative). These measures, if adopted, would further define how the effectiveness and enforcement of EPMs would be ensured and would improve accountability for compliance with EPMs by requiring the submittal of plans for approval by the enforcing agency(ies) and by defining reporting requirements. Because these measures would ensure the effectiveness of and compliance with EPMs that are already analyzed as part of the Proposed Action, implementation of these measures would not further reduce the impact level of the Proposed Action from what is described in Section 3.17.2.

## 3.18 Recreation and Tourism

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to recreation and tourism from implementation of the Proposed Action and other considered alternatives.

## 3.19 Sea Turtles

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to sea turtles from implementation of the Proposed Action and other considered alternatives.

# 3.20 Visual Resources

## 3.20.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Visual Resources

Geographic analysis area: The GAA for non-historic visual resources encompasses a 40-mile radius extending from the boundary of the Lease Area and a 3-mile radius encompassing the OnSS and visually sensitive resources within New York, Connecticut, Rhode Island, and Massachusetts (Figure 3.20-1). The GAA comprises approximately 6,113 square miles of open ocean and 1,488 square miles of land and shoreline. Approximately 28 towns or communities in Rhode Island, 33 in Massachusetts, six in Connecticut, and two in New York are within the GAA (EDR 2023). This section addresses information and impacts related to non-historic visual resources. Information and impacts related to historic visual resources can be found in Section 3.10.

Visual resource impacts associated with the Project were evaluated and determined based primarily on information and findings associated with the RWF visual impact assessment (VIA) (EDR 2023) and the application of recently implemented BOEM impact assessment methodology, *Methodology for Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States* (seascape, landscape, and visual impact assessment [SLVIA]) (Sullivan 2021). At the request of BOEM, Revolution Wind applied the SLVIA methodology to assess impacts to the viewer's visual experience and impacts to ocean, seascape, and landscape character (Sullivan 2021:29–33). To the extent possible, Revolution Wind used previously documented information associated with the VIA, which pre-dates the SLVIA.

The SLVIA methodology was compared with the VIA to extract previously documented existing view information and landscape similarity zone characteristics (EDR 2023) and was translated into ocean character areas (OCAs), seascape character areas (SCAs), and landscape character areas (LCAs) at a generalized scale following the SLVIA as well as visual conditions and information. A total of 37 viewing condition scenarios (e.g., daytime, sunset, and nighttime) associated with 28 individual key observation points (KOPs) were assessed in the VIA and include photo simulations (EDR 2023:91–145). Additionally, OCA, SCA, and LCA visibility computations, based on SLVIA guidance and VIA information, were compiled and are presented in Tables G-VIS1a through G-VIS10c in Appendix G. For each action alternative, data were compiled and organized based on the best-known information provided in the VIA and compared to the Proposed Action. Additionally, the visibility analysis for each action alternative was analyzed associated with OCAs, SCAs, LCAs, and specially designated areas (SDAs) as was the proximity of KOPs in relation to action alternative variations (e.g., closest WTG and closest removed WTG based on the alternative) to provide geographic context of the overall distance in relation to the KOP. Analysis distances associated with KOPs may deviate between various resources (e.g., cultural and historic resources) based on location-specific analysis criteria. Identifying the closest WTG and closest removed WTG in relation to each KOP provides a tabular understanding of how action alternatives relate to each KOP (see Appendix G). Not all KOPs were evaluated for all action alternatives. The orientation of specific KOPs in relation to action alternatives was reviewed and selected for further analysis based on the geographic proximity of each action alternative.

Affected environment: Three distinct visual settings occur within the GAA and are categorized into OCAs, SCAs, and LCAs based on their inherent physical and built characteristics. These character areas aid in understanding the types of sensitive viewers and locations along with uses that occur within the GAA. The

OCA includes approximately 6,113 square miles of open ocean environment, which includes state waters (shoreline to 3 nm from shoreline) and federal waters (3 nm from shore and beyond) within the GAA. The OCA consists of the Atlantic Ocean and interconnected bodies of water such as Rhode Island Sound, Block Island Sound, Narragansett Bay, Fisher's Island Sound, Buzzards Bay, Mount Hope Bay, Vineyard Sound, Nantucket Sound, and other bays and coves. Depending on weather conditions, the texture of the ocean surface can range from smooth to choppy, and its color can range from blue, to silver, to dark gray. The ocean within the GAA can be categorized as a working water landscape that supports a variety of uses and associated human-made features, including recreational and commercial fishing, commercial shipping, ferry transportation, pleasure boating, and associated maritime activities and features (buoys, channel markers, warning lights, etc.) (EDR 2023). Within the GAA, SCAs and LCAs have been combined to include the land area inland from the ocean edge based on best available data sources and general descriptive characteristics using landscape similarity zone information from the VIA. SLVIA tables for each action alternative in Appendix G have landscape similarity zones from the VIA categorized as SCAs and LCAs based on descriptive characteristics and with SLVIA metrics applied as appropriate. The total land area associated with the SCA and LCA as described in the following narrative accounts for roughly 1,488 square miles within the GAA and is used for comparison purposes related to the visibility of alternatives (see Appendix G).

Areas that can be considered SCAs consist of Long Island; Block Island; Conanicut Island; Cuttyhunk Island; Prudence Island; Aquidneck Island; the Elizabeth Islands; Martha's Vineyard; Nantucket; and several smaller islands scattered along the coast of Connecticut, Massachusetts, and Rhode Island. Topography is typically undulating to gently rolling, with dunes and/or steep bluffs occurring along shorelines. Elevations range from sea level to a maximum of approximately 600 feet amsl near West Greenwich, Rhode Island. Cuttyhunk Island, Block Island, and Long Island have high points ranging from 130 to 200 feet amsl. Vegetation is typically characterized by a mix of scrub forest, grassy dunes, salt marshes, freshwater wetlands, and open fields (agricultural and successional). LCAs within the GAA consist of Connecticut, Rhode Island, and Massachusetts (mainland New York does not occur within the GAA) and are categorized by low hills, and valleys are primarily forested with scattered freshwater lakes, ponds, and occasional agricultural land. Residential and urbanized development occurs throughout the LCAs and consists of seasonal and year-round homes, villages, roads, and ports, with the highest density found in villages and towns. Outside of the village and town center areas, inland development is more scattered at a lower density and is in a largely forested landscape (EDR 2023).

The VIA (EDR 2023) located in COP Appendix U3 further categorizes the above visual settings into landscape similarity zones, which are based on the similarity of landscape character and visual features such as landform, vegetation, and water and land use patterns such as recreation, residential and commercial development, and transportation. Descriptions of each of the 17 landscape similarity zones identified within the GAA can be found in the VIA (EDR 2023:15–25).

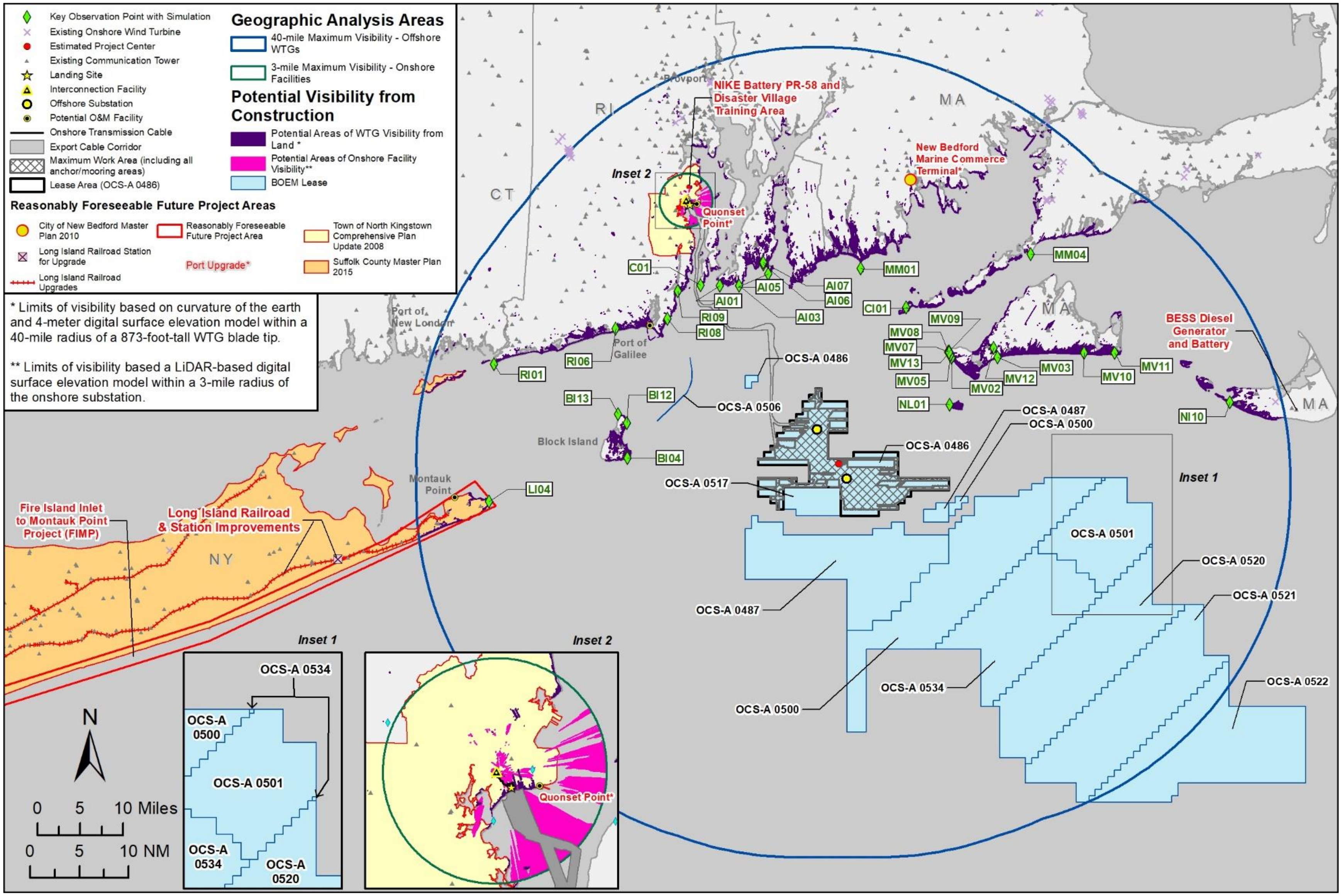


Figure 3.20-1. Geographic analysis areas for visual resources.

Viewers within the GAA have been categorized into five general user groups (local residents, through-travelers, tourists and vacationers, recreational users, and the fishing community [recreational and commercial]) based on their relative viewer experience within the GAA and their perceived sensitivity to visual changes in the landscape. Local residents are those who live, work, and travel for their daily business within the GAA. They generally view the landscape from their yards, homes, local roads, and places of employment. Residents' sensitivity to visual quality is variable, and how they experience their surroundings on a day-to-day basis is based on the location and or locations they visually interact with either in residential, workplace, or recreational settings. Through-travelers are typically vehicle-based and moving, thus having a relatively narrow field of view oriented along the axis of the roadway, and are most often destination-oriented, viewing the landscape either from the driver or passenger perspective. Through-travelers who are not residents of the area or vacationers are unlikely to be particularly sensitive to visual change and often engage with visual experiences at that time and place rather than over a consistent period of time where visual change can be more noticeable. Tourists and vacationers consist of out-of-town visitors and seasonal-weekend residents who come to the area to experience its scenic and recreational resources. Tourists and vacationers in the area are generally involved in outdoor recreational activities in settings where the experience can be directly connected to the activity or location, such as parks, trails, and beaches, and in natural settings such as forests, dunes, and the ocean.

Recreational users are generally considered to have relatively high sensitivity to aesthetic quality and changes in landscape character. Information regarding the types of recreation for both onshore and offshore users is described in Section 3.18. The fishing community is represented by recreational and commercial fishermen who work in and experience the coastal and open ocean environment on a regular basis. Despite the focused activity associated with harvesting seafood, the fishing community is particularly sensitive to changes to the visual seascape because there is often nothing in the immediate environment except for open ocean and horizon. The fishing community can have prolonged visual exposure to the open ocean, seascape, and coastal environment, in which fleets spend hours to days setting gear and harvesting fish. Those who use the ocean recreationally (e.g., boating, whale watching, sightseeing) and commercially (e.g., fishing, commercial transportation) are distinct user groups that would have foreground and middle ground views of the Project, whereas the other user groups are largely land-based and restricted to background and extended background views (EDR 2023).

## 3.20.2 Environmental Consequences

### 3.20.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

The PDE provides for a range of WTGs sized from 8 to 12 MW. The analysis of impacts to visual resources is based on the PPAs being met using 648-foot 8-MW WTGs. This would result in a total of up to 100 WTGs and up to two OSSs for a total of 102 structures in the Lease Area.

If Revolution Wind instead installs sixty-four 12-MW WTGs, the maximum height of the blade tip for WTGs would be 873 feet above the surface compared to 648 feet for the 8-MW WTGs. Because the WTGs would exceed 699 feet, BOEM guidance, consistent with FAA requirements, would require additional mid-tower lighting in addition to lighting at the top of the nacelle (BOEM 2019). BOEM guidance further recommends that lighting color be of a red infrared wavelength between 675 and 900 nanometers based on LED light sources and that red flashing lights flash simultaneously at 30 flashes per minute (BOEM 2019). Although the 12-MW WTG option would reduce the number of WTGs, the 226-

foot taller WTGs and additional lighting would be similar in contrast in the seascape character and potentially would result in greater visual impacts within the GAA associated with the viewers' visual experience, as the WTGs may be visible at greater distances in comparison with the 8-MW WTGs.

See Appendix E1 for a summary of IPFs associated with visual resources across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E2-11 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4 to facilitate reader comparison across alternatives.

Table 3.20-1 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. A detailed analysis of other considered action alternatives is also provided below the table if the analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Analysis findings that identify an action alternative (C, D, E, F, or G) that has the greatest potential for reduced visual impacts (least impactful) as a result of the removal of turbines in relation to KOPs or character areas have been carried forward in Table 3.20-1 in lieu of describing impacts for all action alternatives. Overall SLVIA impact summaries for KOPs, SDAs, and character areas are provided in Tables 3.20-2 through 3.20-4. Further details and information related to all action alternatives are comprehensively compiled in Appendix G. The Conclusion section within each alternative discussion includes rationale for the effects determinations.

Under all action alternative configurations (options), overall impacts to non-historic visual resources from any alternative would range from long term **negligible** to **major** adverse for KOPs, SDAs, and character areas related to the overall visual change and magnitude of change based on analysis findings that indicate the largest number of overall impact determinations. Individual KOPs where sensitivity may influence impacts such as tribal concerns or recreation associated with scenic beaches may indicate higher impacts and are individually identified in Appendix G. Impacts would be substantial, but the resource would recover completely when the impacting agents are removed.

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**Table 3.20-1. Alternative Comparison Summary for Visual Resources**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| Light | **Offshore**: Development of offshore wind lease areas would increase the amount of offshore light sources associated with construction and installation, O&M, and decommissioning during the life of future projects. Lighting associated with night construction and decommissioning for future projects would be localized and temporary. However, light sources, depending on quantity, intensity, and location, could be visible from unobstructed onshore and offshore KOPs based on viewer distance.<br>The existing offshore wind lease areas, following established grid spacing guidelines within the RI/MA and MA WEAs, have space for up to an estimated 936 WTGs. BOEM lighting guidelines require a minimum of three red flashing lights at the midsection of each tower and one at the top of each WTG nacelle. The potential full build-out of the existing offshore wind lease areas could result in up to 936 WTGs with lighting and would have long-term **minor** to **major** adverse impacts to onshore and offshore KOP distance and angle of view, assuming no obstructions.<br>Under the No Action Alternative, visual resource impacts would be short term during construction and long term during O&M, with **negligible** to **major** adverse impacts to KOPs, character areas, and SDAs based on the observed warning light distances discussed in Section 3.20.2.2.2. Impacts to nighttime seascape character would also be short term during construction and long term during O&M, with **negligible** to **major** adverse impacts based on the relationship of the lease areas inherent nighttime visual characteristics and | **Offshore**: The Proposed Action would require nighttime lighting for construction vessels traveling and working within the Lease Area, as well as the addition of warning lighting systems at each WTG and OSS during an 8-month construction period. This lighting could be visible and impact the viewer's nighttime visual experience and inherent nighttime seascape character. Nighttime visibility of warning lighting may be perceived anywhere from approximately 23.3 nm (26.8 miles) to 31.3 nm (36 miles) from the viewer or farther. During construction, visual impacts to the viewer's nighttime visual experience and inherent nighttime character would be temporary when associated with vessel traffic and construction lighting. These impacts would be **negligible** to **major** adverse based on viewer distance and existing night sky environment. Aquinnah Overlook (MV07), the closest occupied KOP to the Proposed Action, is located approximately 11.10 nm (13.7 miles) distant. The farthest KOP from the Proposed Action, Madeaket Beach (NI10), is located approximately 30.0 nm (34.6 miles) distant. These two KOPs are the representative minimum and maximum KOP distances in relation to perceivability of warning lighting. KOP distances in relation to the nearest WTG are described in Appendix G.<br>During O&M, the Proposed Action would contribute to nighttime lighting due to required warning lighting on up to 100 WTGs and two OSSs. Revolution Wind has committed to implementing ADLS as an EPM to reduce the duration of lighting impacts associated with the Project.<br>Because of the limited duration and frequency of anticipated warning lighting activations with ADLS and the visibility of warning lighting, the Proposed Action would result in short duration, long-term intermittent **negligible** impacts when lights are off to **major** adverse impacts to KOPs and character areas when lights are activated. Not all KOPs or character areas would experience the same level of impact due to variances in atmospheric conditions and natural and physical barriers to the view. | **Offshore**: No measurable change from Proposed Action construction impacts is anticipated under Alternatives C through F because the number and duration of construction vessels and work areas requiring nighttime lighting, as well as the assembly of WTGs and associated OSS warning lighting, would result in temporary long-term **negligible** to **major** adverse impacts based on viewer distance and existing night sky condition, similar to the Proposed Action.<br>Alternatives C through F would reduce nighttime O&M lighting by a range of 7% to 43%, across the alternative scenarios, as compared to the maximum-case scenario for the Proposed Action due to required warning lighting of fewer WTGs. Alternative D1+D2+D3 would have the greatest reduction of lighting-related impacts within the northeastern and northwestern portions of the Lease Area, which are in closest proximity to more KOPs. Impacts associated with Alternative D1+D2+D3 would be **negligible** to **minor** adverse based on viewer distance (see Section 3.20.2.2.2) and the existing night sky environment, and given this, it would have the fewest impacts to visual resources collectively. KOP distances in relation to WTGs are described in Appendix G.<br>Offshore construction activities would add new WTGs and two OSSs as compared to the No Action Alternative. Construction vessels would employ navigational safety lighting, and offshore structures would employ aviation and navigation hazard lighting. Lighting from Alternatives C through F would contribute to an approximately 6% to 10% increase in lighting sources from past, present, and reasonably foreseeable future projects within the GAA. Cumulatively, when combined with other past, present, and reasonably foreseeable projects, Alternatives C through F would result in long-term **negligible** adverse impacts when lights are off to **major** adverse impacts when lights are activated on nighttime viewers and the existing night sky environment, with Alternative E1 having the greatest contribution to reducing cumulative lighting impacts. | | | | **Offshore**: Similar to Alternatives C through F, no measurable change from construction impacts under Alternative G is anticipated because the number and duration of construction vessels and work areas requiring nighttime lighting, as well as the assembly of WTGs and associated OSS warning lighting, would result in temporary long-term **negligible** to **major** adverse impacts based on viewer distance and existing night sky condition, similar to the Proposed Action.<br>Alternative G would reduce nighttime O&M lighting by 23.5% to 42.4%, as compared to the maximum-case scenario for the Proposed Action, due to required warning lighting of fewer WTGs. Alternatives G2 and G3 would have the greatest reduction of lighting-related impacts within the northern, northeastern, and southwestern portions of the Lease Area, which are in proximity to KOPs associated with Rhode Island, Martha's Vineyard and Block Island.<br>Impacts associated with Alternatives G2 and G3 would be **negligible** to **minor** adverse based on viewer distance (see Section 3.20.2.2.2) and the existing night sky environment, and given this, they would have the fewest impacts to visual resources collectively. KOP distances in relation WTGs are described in Appendix G.<br>Similar to Alternatives C through F, offshore construction activities would add new WTGs and two OSSs to the No Action Alternative. Construction vessels would employ navigational safety lighting, and offshore structures would employ aviation and navigation hazard lighting. Lighting from Alternative G would contribute to an approximately 7.5% (Alternatives G1, G2, and G3) to 9% (Alternative G) increase in lighting sources from past, present, and reasonably foreseeable future projects within the GAA. Cumulatively, when combined with other past, present, and reasonably foreseeable projects, Alternative G would result in long-term |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | projects' inconsistences with those nighttime characteristics. After decommissioning, the adverse impacts associated with O&M would cease. | Impacts during decommissioning would be similar to the impacts during construction and installation: long term, short duration, and intermittent **negligible** to **major** adverse.<br>Lighting from the Proposed Action would add up to 102 in-water structures to the lighting impacts from past, present, and reasonably foreseeable future projects (assumed to be up to 893 structures) for a combined total of up to 995 lighted structures within the GAA, a 11% increase in lighting compared to the No Action Alternative (Table E4-1). Nighttime vessel and construction area lighting during construction of the Proposed Action would be limited in duration and cease when construction is complete. Atmospheric and environmental conditions would influence visibility and perceivability from KOPs, character areas, and SDAs. Cumulatively, when combined with other past, present, and reasonably foreseeable projects, the Proposed Action would result in long-term **negligible** adverse impacts when lights are off to **major** adverse impacts to nighttime viewers and the existing night sky environment when lights are activated. | | | | | **negligible** adverse impacts when lights are off to **major** adverse impacts when lights are activated on nighttime viewers and the existing night sky environment, with Alternatives G1, G2, and G3 having the greatest contribution to reducing cumulative lighting impacts based on the number of associated WTGs (65) and OSSs (two). |
| | **Onshore**: Future onshore components of offshore projects could require OnSSs, ICFs, O&M facilities, and port upgrades depending on project needs and could introduce additional or new infrastructure elements into SCAs and/or LCAs. However, specific locations and project designs have not been determined. Infrastructure and associated nighttime lighting to support other offshore wind projects (e.g., OnSS or O&M facilities) are anticipated to occur in areas of existing development or where similar infrastructure and development exist to aid in co-location of similar resources. Therefore, additional onshore nighttime lighting sources associated with infrastructure to support future offshore wind projects would be a noticeable change over time and would have long-term **negligible** to | **Onshore**: Light and noise from onshore construction activities could temporarily adversely impact viewers if located near the landing site, onshore cable route, or proposed onshore facilities. It is assumed that construction activities would occur during daylight hours. Fifteen publicly accessible KOPs were identified in the Visual Resource Assessment and Historic Resources Visual Effects Analysis within 3 miles of the OnSS and ICF with the closest at approximately 0.6 mile (Narraganset Bay) (EDR 2021). Impacts to these KOPs are not anticipated due to distance, intervening vegetation, and existing lighting sources. Approximately 500 feet south and west of the OnSS and ICF are residential properties consisting of single-family and multifamily residences. Dense stands of tall trees (40 feet tall on average) provide a natural buffer between the OnSS and ICF and the residences, which is anticipated to reduce any nighttime-related impacts to nearby residences to **negligible** adverse. | **Onshore:** Alternatives C through F would not alter impacts from onshore activities; therefore, impacts would be the same as those described for the Proposed Action: temporary **negligible** to **minor** adverse to potential nighttime viewers and the existing night sky environment based on viewer location and perspective in relation to existing onshore light sources. | | | | **Onshore:** Similar to Alternatives C through F, impacts associated with Alternative G would be the same as the Proposed Action: temporary **negligible** to **minor** adverse to potential nighttime viewers and the existing night sky environment based on viewer location and perspective in relation to existing onshore light sources. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| | **moderate** adverse impacts for the life of the projects. | Onshore lighting related to construction activity for the O&M facility, located within an existing industrial use area with existing lighting, would create short-term **negligible** adverse impacts to potential nighttime viewers and the existing night sky environment due to the nature of the construction lighting, which would be contained to the existing property and be similar in nature to surrounding facilities and light sources.<br>The nighttime lighting impacts of the OnSS, ICF, and O&M facility would cause long-term **negligible** adverse impacts to potential nighttime viewers and the existing night sky environment during Project O&M. Impacts associated with the OnSS and ICF would be reduced by the use of switched vs. motion operational lighting, which would comply with local lighting regulations. Impacts associated with the O&M facility would be associated with localized light sources and operational uses, similar to surrounding infrastructure.<br>Onshore construction and installation would add an O&M facility, OnSS, and ICF to the No Action Alternative. These onshore structures and nighttime lighting sources are anticipated to occur in areas of existing development or where similar infrastructure and development exists. Therefore, when considered cumulatively with past, present, and reasonably foreseeable activities, the Proposed Action would result in long-term **negligible** adverse impacts to nighttime viewers and the existing night sky environment. | | | | | |
| Presence of structures | **Offshore**: Based on the Proposed Action and action alternatives analysis findings (Section 3.20.2.2 and Appendix G), if future offshore wind projects are implemented, the effects of installed WTGs and associated infrastructure on KOPs, character areas, and SDAs, when viewed from both onshore and offshore locations, would result in long-term **negligible** to **major** adverse visual impacts. The impacts experienced at KOPs, character areas, and SDAs would be dependent upon distance and orientation to the project, the degree of visibility considering lighting and | **Offshore**: The addition of Project structures with navigation and aviation lighting over the 8-month construction period, coupled with the temporary increase and concentration in construction related vessel activity, would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs. Sixteen of the 37 KOPs would experience major adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse with approximately 30,208 acres of visibility or 15.5 % of the approximately 208,009 acres of SDAs. Impacts to the OCA as a result of the construction activities noted above would be **major** adverse (approximately 5,882 square miles or 96.2 % of the total OCA within the GAA would have views of the | **Offshore**: The layout and construction activities proposed under Alternatives C through F would include the same activities and construction sequencing as the Proposed Action and would result in similar anticipated impacts. Therefore, the construction and installation of offshore Project structures would have long-term **negligible** to **major** adverse impacts to KOPs, character areas, and SDAs under Alternatives C through F, similar to those of the Proposed Action.<br>Alternatives C1 and C2: Because of the placement of WTGs, Alternative C1 would result in fewer impacts to KOPs than Alternative C2. Alternative C1 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA, with 7 of the 17 selected KOPs having major adverse impacts, five KOPs having moderate adverse impacts, and three KOPs having minor adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 29,968 acres of visibility of Alternative C2 (14.4%) of the approximately 208,009 acres of SDAs as compared to 30,059 acres of Alternative C1. Impacts to the OCA would be **major** adverse, similar to other action alternatives, with Alternatives C1 and C2 visible to approximately 96% of the OCA. Impacts to SCAs and LCAs would range from | | | | **Offshore**: Similar to Alternatives C through F, the layout and construction activities proposed under Alternatives G would include the same activities and construction sequencing as the Proposed Action and would result in similar anticipated impacts. Therefore, the construction and installation of offshore Project structures would have long-term **negligible** to **major** adverse impacts to KOPs, character areas, and SDAs under Alternatives G, similar to those of the Proposed Action<br>Because of the placement of WTGs in relation to KOPs, Alternatives G2 and G3 would have the greatest reduced visual impact as |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action)<br>up to 100 WTGs | Alternative C<br>(Habitat Alternative)<br>64–65 WTGs | Alternative D<br>(Transit Alternative)<br>78–93 WTGs | Alternative E<br>(Viewshed Alternative)<br>64–81 WTGs | Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs | Alternative G<br>(Preferred Alternative)<br>65 WTGs |
|---|---|---|---|---|---|---|---|
| | atmospheric conditions, and the perceivable contrast, dominance, and scale of WTGs and OSSs along the horizontal plane of the ocean. | Proposed Action. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area; overall approximately 35 square miles (2.4 %) of the combined SCAs and LCAs would have visibility of the Project within the GAA. Of the 60 impact determinations associated with KOPs, character areas, and SDAs associated with the Proposed Action, 21 major, 21 moderate, 11 minor and 7 negligible impacts were determined. Further information related to impacts associated with the Proposed Action is located in Appendix G. Further information related to impacts associated with the Proposed Action is located in Appendix G (see Tables G-VIS1a through G-VIS2e).<br>WTGs would be more visually apparent viewed from the northern and easterly shorelines of Rhode Island and Massachusetts. The up to 100 WTGs and two OSSs would become less perceivable as the distance from KOPs and/or character areas increases. Atmospheric and environmental factors such as haze, sun angle, time of day, cloud cover, fog, sea spray, and wave action would also influence visibility and perceivability from KOPs (e.g., NI10 - modified haze/sun, MV12 day vs. night, MV05 day vs. night), which may not be depicted in all visual simulations, or from other non-simulated locations that may have visibility within character areas. It is anticipated therefore that Project O&M would result in long-term **negligible** to **major** adverse impacts.<br>The Proposed Action would add up to 100 WTGs and two OSSs to the No Action Alternative. As a result, approximately 90% of the total potential WTGs and OSSs in the GAA (up to 995) would be associated with other future offshore wind development projects beyond the Proposed Action and at distances from KOPs, character areas, and SDAs where atmospheric conditions and curvature of the Earth influence visibility. When combined with other past, present, and reasonably foreseeable projects, the Proposed Action would result in long-term **negligible** to **major** adverse cumulative impacts to KOPs, character areas, and SDAs. Adverse impacts would be removed at Project decommissioning. | **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area; overall, Alternative C2 would be visible to approximately 34.7 square miles (2.3%) of the combined SCAs and LCAs within the GAA. Because of the similarity in placement of WTGs, Alternatives C1 and C2 would result in similar impacts, and both alternatives would result in fewer impacts than the Proposed Action. Of the 40 impact determinations associated with KOPs, character areas, and SDAs, 10 major, 14 moderate, seven minor, and five negligible adverse impacts were determined for Alternative C1 (see Tables G-VIS3 and G-VIS4c).<br>Alternative D alternatives: Of the seven Alternative D alternatives, Alternative D1+D2+D3 would result in the fewest number of adverse impacts because of the combination of removed turbines within the Lease Area as compared to the maximum-case scenario for the Proposed Action. Alternative D1+D2+D3 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA, with 12 of the 37 selected KOPs having major adverse impacts, 14 KOPs having moderate adverse impacts, and 11 KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 28,840 acres of visibility of Alternative D1+D2+D3 (13.9%) of the approximately 208,009 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to other action alternatives, with the Project visible to approximately 96% of the OCA. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse, similar to the Proposed Action based on the sensitivity and degree of magnitude in relation to the character area. Overall, approximately 31.1 square miles (2.1%) of the combined SCAs and LCAs would have visibility of Alternative D1+D2+D3 within the GAA. Of the 60 impact determinations associated with KOPs, character areas, and SDAs, 15 major, 24 moderate, 12 minor, and nine negligible adverse impacts were determined for Alternative D1+D2+D3 (see Tables G-VIS5a and G-VIS6c).<br>Alternatives E1 and E2: Because of the placement of WTGs, Alternative E1 would result fewer impacts than Alternative E2. Alternative E1 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA, with four of the 21 selected KOPs having major adverse impacts, 12 KOPs having moderate adverse impacts, and five KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 29,085 acres of visibility of Alternative E1 (14.0%) of the approximately 208,009 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to the Proposed Action, with the alternative visible to approximately 96% of the OCA. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area. Overall, Alternative E1 would be visible to approximately 32.7 square miles (2.2%) of the combined SCAs and LCAs within the GAA. Of the 44 impact determinations associated with KOPs, character areas, and SDAs, eight major, 21 moderate, seven minor, and eight negligible adverse impacts were determined for Alternative E1 (see Tables G-VIS7 and G-VIS8c for individual KOP impacts and Section 3.20.2.5 for example impact comparison).<br>Alternative E2 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA; with one of the 16 selected KOPs having major adverse impacts, six KOPs having moderate adverse impacts, and nine KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse with approximately 29,385 acres of visibility of Alternative E2 (14.1.0 %) of the approximately 195,701 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to the Proposed Action, with the alternative visible to approximately 96% of the OCA. Impacts to SCAs and LCAs would range | | | | compared to the Proposed Action. Information related to Alternatives G and G1 is included in Appendix G.<br>Alternative G2 would result in a slightly lesser degree of impacts than Alternative G3. Alternative G2 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA, with one of the 19 selected KOPs having major adverse impacts, 10 KOPs having moderate adverse impacts, and four KOPs having **minor** to **negligible** adverse impacts. Comparatively, Alternative G3 would have 10 of the 22 selected KOPs with major adverse impacts, seven KOPs with moderate adverse impacts, one KOP with minor impacts, and four with negligible adverse impacts.<br>Impacts to SDAs would range from **negligible** to **major** adverse for Alternative G, with Alternative G2 having the greatest reduced visibility with approximately 30,499 acres of visibility (14.6%) of the approximately 208,009 acres of SDAs as compared to 30,477 acres of visibility (14.7%) associated with Alternative G3. Impacts to the OCA would be major adverse, similar to other action alternatives, with Alternative G visible to approximately 96% of the OCA.<br>Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area; overall, Alternative G3 would be the least visible to approximately 33.4 square miles (2.2%) of the combined SCAs and LCAs within the GAA as compared 33.5 square miles (2.3%) associated with Alternative G2.<br>Of the 42 impact determinations associated with KOPs, character areas, and SDAs, six major, 19 moderate, eight minor, and nine negligible adverse impacts were determined for Alternative G2 as compared to 10 major, seven moderate, one minor, and four negligible adverse impacts associated with Alternative G3 (see Tables G-VIS9 to G-VIS10c). |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | | | from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area. Overall, Alternative E2 would be visible to approximately 33.5 square miles (2.3%) of the combined SCAs and LCAs within the GAA. Of the 39 impact determinations associated with KOPs, character areas, and SDAs, five major, 15 moderate, seven minor, and 12 negligible adverse impacts were determined for Alternative E2 (see Tables G-VIS7 and G-VIS8c).<br>Alternative F: Alternative F, when combined with other action alternatives, could reduce the number of WTGs installed in the Lease Area by 7% to 44% as compared to the maximum potential 100 WTGs installed under the Proposed Action. The potential reduction of impacts would depend on viewer distance and would be focused primarily on locations in closest proximity to the area of reduced WTGs. A reduction in WTGs installed would be expected to result in long-term **negligible** to **major** adverse impacts to KOPs, character areas, and SDAs. However, the application of Alternative F cannot be fully evaluated until the specific WTGs to be removed are identified.<br>Further information related to impacts associated with Alternatives C, D, and E is included in Appendix G.<br>Alternatives C through F would add between 66 and 83 structures (WTGs and OSSs) to the estimated up to 893 structures under the No Action Alternative within the GAA. Of the four action alternatives identified as resulting in the greatest reduction of impacts, Alternative D1+D2+D3 would result in the smallest area of visibility (approximately 31 square miles of SCA and LCA). Alternative D1+D2+D3 when combined with other past, present, and reasonably foreseeable projects would result in long-term **negligible** to **major** adverse impacts to KOPs, character areas, and SDAs in comparison to the No Action Alternative. | | | | |
| | **Onshore**: Future onshore components of offshore wind projects could require OnSSs, ICFs, O&M facilities, and port upgrades depending on project needs and could introduce additional or new infrastructure elements into the characteristic landscape over a period of time, although specific locations and design have not been determined. Infrastructure to support other offshore wind projects (e.g., OnSS or O&M facilities) are anticipated to occur in or be co-located in areas of existing development associated with SCAs or LCAs where similar infrastructure and development exist. Therefore, the addition of onshore structures to support other offshore wind projects would be noticeable over time and would have long-term **negligible** to **minor** adverse impacts to identified KOPs, character areas, and SDAs based on their location in relation to other | **Onshore**: The construction and installation of the OnSS and ICF would occur during an approximate 18-month construction period. During this period, there would be an noticeable change over time in the immediate foreground of the OnSS and ICF because of the addition of the facilities. The O&M facility at the Port of Davisville at Quonset Point would be similar to existing industrial infrastructure, consisting of large geometric features. Therefore, the addition of Project structures associated with the OnSS, ICF, and O&M facility would create long-term **negligible** to **minor** adverse impacts to KOPs, character areas, and SDAs until the projects are decommissioned.<br>Where visible within immediate foreground distances, the OnSS and ICF would introduce new industrial-utility structures. However, the OnSS and ICF would be located adjacent to the existing Davisville Substation and would not be out of scale or character with the existing development in the vicinity, which ranges from transit rail and four-lane roadway to residential to heavy industrial within 0.5 mile. For this reason, the OnSS and ICF | **Onshore**: There are no design differences between Alternatives C through F in onshore activities; therefore, impacts resulting from onshore activities would be the same as those described for the Proposed Action: long-term **negligible** to **minor** adverse to viewers based on viewer location and perspective in relation to existing onshore structures and development as well as associated LCAs. | | | | **Onshore**: Similar to Alternatives C through F, impacts resulting from onshore activities associated with Alternative G would be the same as those described for the Proposed Action: long term **negligible** to **minor** adverse to viewers based on viewer location and perspective in relation to existing onshore structures and development as well as associated LCAs. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | infrastructure and facilities until the projects are decommissioned. | would result in long-term **negligible** adverse impacts to KOPs, character areas, and SDAs.<br>Onshore construction and installation would add an, ICF, and OnSS to the No Action Alternative. The O&M facility would use existing structures. The Proposed Action does not include any updates to ports. Any potential future port upgrades required to service the offshore wind industry could result in similar **negligible** adverse visual impacts to KOPs, character areas, and SDAs. The Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** adverse cumulative impacts to KOPs, character areas, and SDAs. | | | | | |

**Table 3.20-2. SLVIA Overall Impacts Per KOP by Alternative as Determined in Appendix G Tables G-VIS1b, G-VIS3, G-VIS5b, G-VIS7, and G-VIS9**

| KOP Number | KOP Name | Overall Impact Level of Proposed Action (Alternative B) | Overall Impact Level of Alternative C | Overall Impact Level of Alternative D | Overall Impact Level of Alternative E | Overall Impact Level of Alternative F* | Overall Impact Level for Alternative G |
|---|---|---|---|---|---|---|---|
| AI01 | Brenton Point State Park | Moderate | N/A | Moderate | Negligible | – | Moderate |
| AI01 | Brenton Point State Park – Night | Major | N/A | Moderate | Moderate | – | Moderate |
| AI03 | Newport Cliff Walk | Moderate | N/A | Moderate | Negligible | – | Moderate |
| AI05 | Sachuest Point National Wildlife Refuge | Major | N/A | Moderate | Negligible | – | Moderate |
| AI06 | Sachuest Beach (Second Beach) | Moderate | N/A | Minor | Negligible | – | Minor |
| AI07 | Hanging Rock (Norman Bird Sanctuary) | Major | N/A | Moderate | Negligible | – | Moderate |
| C01 | Beavertail Lighthouse | Minor | N/A | Minor | N/A | – | Minor |
| CI01 | Chuttyhunk Island | Major | Major | Major | Moderate | – | Moderate |
| MM01 | Gooseberry Island | Minor | Minor | Minor | Negligible | – | Moderate |
| MM04 | Nobska Lighthouse | Minor | N/A | Minor | Negligible | – | Negligible |
| MV02 | Philbin Beach | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| MV03 | Lucy Vincent Beach | Moderate | N/A | Minor | Moderate | – | Moderate |
| MV03 | Lucy Vincent Beach – Sunset | Major | N/A | Moderate | Major | – | Moderate |
| MV05 | Moshup Beach | Moderate | Major | Major | Moderate | – | Major |
| MV05 | Moshup Beach – Sunset | Major | Major | Moderate | Moderate | – | Major |
| MV07 | Aquinnah Overlook | Major | Moderate | Major | Moderate | – | Major |
| MV07 | Aquinnah Overlook – Sunset | Major | Major | Major | Moderate | – | Major |
| MV07 | Aquinnah Overlook – Night | Major | Major | Major | Moderate | – | Major |
| MV09 | Gay Head Lighthouse | Major | Moderate | Major | Moderate | – | Major |
| MV10 | South Beach State Park | Moderate | Major | Moderate | Moderate | – | Moderate |
| MV11 | Wasque Point | Minor | Minor | Minor | Minor | – | Minor |
| MV12 | Peaked Hill Reservation | Major | Major | Major | Moderate | – | Major |
| MV12 | Peaked Hill Reservation – Sunset | Major | Major | Major | Major | – | Major |
| MV13 | Edwin DeVries Vanderhoop Homestead | Major | Moderate | Major | Major | – | Major |
| NL01 | Nomans Land Island NWR *(not occupied)* | Major | Moderate | Major | Moderate | – | Major |
| NL01 | Nomans Land Island NWR – Sunset *(not occupied)* | Major | Major | Major | Major | – | Major |
| NI10 | Madaket Beach | Negligible | Minor | Negligible | Minor | – | Negligible |
| LI04 | Montauk Point State Park | Negligible | N/A | Negligible | N/A | – | Negligible |
| LI04 | Montauk Point State Park – Night | Negligible | N/A | Negligible | N/A | – | Negligible |
| BI04 | Southeast Lighthouse | Moderate | N/A | Moderate | Moderate | – | Moderate |

| KOP Number | KOP Name | Overall Impact Level of Proposed Action (Alternative B) | Overall Impact Level of Alternative C | Overall Impact Level of Alternative D | Overall Impact Level of Alternative E | Overall Impact Level of Alternative F* | Overall Impact Level for Alternative G |
|---|---|---|---|---|---|---|---|
| BI04 | Southeast Lighthouse – Night | Major | N/A | Major | Moderate | – | Moderate |
| BI12 | Clayhead Trail | Moderate | N/A | Moderate | Minor | – | Moderate |
| BI13 | North Light | Moderate | N/A | Moderate | Minor | – | Moderate |
| RI01 | Watch Hill Lighthouse | Minor | N/A | Negligible | N/A | – | Negligible |
| RI06 | Trustom Pond NWR | Minor | N/A | Minor | Negligible | – | Negligible |
| RI08 | Scarborough Beach State Park | Moderate | N/A | Moderate | Moderate | – | Minor |
| RI09 | Narragansett Beach | Moderate | N/A | Moderate | Moderate | – | Moderate |

Notes: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2. Definitions of Potential Adverse Impact Levels, when FAA warning lights are not activated though the use of ADLS.

* Alternative F cannot be fully evaluated using the same method because it does not specify which turbines would be removed.

N/A = KOP is not influenced by WTG removal and is assumed to be the same impact as the Proposed Action.

**Table 3.20-3. SLVIA Overall Impacts Per Landscape Character Area by Alternative as Determined in Appendix G Table G-VIS2a, Table G-VIS2b, Table G-VIS2c, Table G-VIS2d, Table G-VIS4a, Table G-VIS4b, Table G-VIS6a, Table G-VIS6b, Table G-VIS8a, Table G-VIS8b, Table G-VIS10a, and Table G-VIS10b**

| Character Area Name | Landscape Character Association (SCA/LCA/OCA) | SLIA Overall Impact Level for Alternative B | SLIA Overall Impact Level for Alternative C | SLIA Overall Impact Level for Alternative D | SLIA Overall Impact Level for Alternative E | SLIA Overall Impact Level for Alternative F* | SLIA Overall Impact Level for Alternative G |
|---|---|---|---|---|---|---|---|
| Shoreline Beach | SCA | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Coastal Bluff | SCA | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Developed Waterfront | SCA | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Shoreline Residential | SCA | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Coastal Dunes | SCA | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Salt Pond/ Tidal Marsh | SCA/LCA | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Inland Lakes and Ponds | SCA/LCA | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Maintained Recreation Area | SCA/LCA | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Highway Transportation | SCA/LCA | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Coastal Scrub/ Shrub Forest | LCA | Minor | Minor | Minor | Minor | – | Minor |
| Agricultural/ Open Field | LCA | Minor | Minor | Minor | Minor | – | Minor |
| Forest | LCA | Minor | Minor | Minor | Minor | – | Minor |
| Rural Residential | LCA | Minor | Minor | Minor | Minor | – | Minor |
| Suburban Residential | LCA | Minor | Minor | Minor | Minor | – | Minor |
| Village/ Town Center | LCA | Minor | Minor | Minor | Minor | – | Minor |
| Commercial | LCA | Minor | Minor | Minor | Minor | – | Minor |
| Open Ocean | OCA | Major | Major | Major | Major | – | Major |

Notes: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2. Definitions of Potential Adverse Impact Levels, when FAA warning lights are not activated though the use of ADLS.

* Alternative F cannot be fully evaluated using the same method because it does not specify which turbines would be removed.

**Table 3.20-4. SLVIA Overall Impacts Per Specially Designated Area by Alternative as Determined in Appendix G Table G-VIS2e, Table G-VIS4c, Table G-VIS6c, Table G-VIS8c, and Table G-VIS10c**

| Specially Designated Areas | SLIA Overall Impact Level for Alternative B | SLIA Overall Impact Level for Alternative C | SLIA Overall Impact Level for Alternative D | SLIA Overall Impact Level for Alternative E | SLIA Overall Impact Level for Alternative F* | SLIA Overall Impact Level for Alternative G |
|---|---|---|---|---|---|---|
| Historic Sites and National Landmarks | Major | Major | Major | Major | – | Major |
| National Natural Landmarks | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| State Scenic Areas | Major | Major | Major | Major | – | Major |
| National Wildlife Refuges | Minor | Minor | Minor | Minor | – | Minor |
| State/ Non-Profit Wildlife management Areas | Minor | Minor | Minor | Minor | – | Minor |
| National Parks | Negligible | Negligible | Negligible | Negligible | – | Negligible |
| State Parks | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| State Nature and Historic Preserves | Negligible | Negligible | Negligible | Negligible | – | Negligible |
| State Forests | Negligible | Negligible | Negligible | Negligible | – | Negligible |
| State Beaches | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Highways Designated or Eligible as Scenic | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| National Historic Trails | Minor | Minor | Minor | Minor | – | Minor |
| National Recreational Trails | Major | Major | Major | Major | – | Major |
| State Fishing and Boating Access Sites | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Lighthouses | Major | Major | Major | Major | – | Major |
| Public Beaches | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Ferry Routes | Moderate | Moderate | Moderate | Moderate | – | Moderate |
| Seaports | Negligible | Negligible | Negligible | Negligible | – | Negligible |
| Other State Land with Public Access | Negligible | Negligible | Negligible | Negligible | – | Negligible |

Notes: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2. Definitions of Potential Adverse Impact Levels, when FAA warning lights are not activated though the use of ADLS.

* Alternative F cannot be fully evaluated using the same method because it does not specify which turbines would be removed.

#### 3.20.2.2 Alternative A: Impacts of the No Action Alternative on Visual Resources

##### 3.20.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for visual resources (see Section 3.20.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the geographic analysis area. These IPFs are described and analyzed in Appendix E1.

##### 3.20.2.2.2 Cumulative Impacts

This section discloses potential visual resources impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

**Offshore Activities and Facilities**

<u>Light:</u> Development of offshore wind lease areas would increase the amount of offshore light sources associated with construction and installation, O&M, and decommissioning during the life of future projects. Lighting associated with night construction and decommissioning for future projects within BOEM lease areas would be localized and temporary and staggered over time; therefore, the lease areas would not have light sources across the entirety of the GAA at one time. However, light sources, depending on quantity, intensity, and location, could be visible from unobstructed sensitive onshore and offshore viewing locations based on viewer distance.

Field observations associated with visibility of FAA warning lighting (warning lighting) for the BIWF were conducted in May 2019 (HDR 2019). The BIWF consists of five WTGs with a blade tip height of approximately 600 feet. Observations of FAA nighttime lighting visibility under clear sky conditions in open water identified that warning lighting may be visible to the naked eye at a distance of 23.3 nm (26.8 miles) from the viewer (HDR 2019). The approximate 27-mile distance where the BIWF hub height drops below the visible horizon due to the curvature of the Earth and WTG height and viewer position influences the overall distance from which warning lighting may be visible. The BIWF report also concludes that daytime visibility of WTGs from land and water viewing locations is strongly dependent on weather conditions and distance (HDR 2019). Research related to the visibility of onshore WTGs in western landscapes (Sullivan et al. 2012) analyzed the visibility of FAA lighting at various distances and concluded that warning lighting was visible approximately 31.3 nm (36 miles) from viewing positions in broad, uninterrupted onshore landscapes, which would be a similar viewing condition as views across the open ocean setting. Of note, warning lighting may be visible beyond 36 miles, and the aforementioned study (Sullivan et al. 2012) had intervening topography that influenced visibility at the 36-mile distance. Therefore, it is assumed based on the referenced studies that the visibility of warning lighting may be visible anywhere from 23.3 nm (26.8 miles) to 31.3 nm (36 miles) or beyond.

Warning lighting systems would be used for the duration of Project O&M following BOEM guidelines (BOEM 2021a) for each reasonably foreseeable offshore wind project (876 WTGs). The amassing of these WTGs and associated synchronized flashing strobe lights affixed with a minimum of three red flashing lights at the midsection of each tower and two at the top of each WTG nacelle within the lease areas would have long-term **minor** to **major** adverse impacts to onshore and offshore KOPs based on viewer distance and angle of view and assuming no obstructions. Atmospheric and environmental factors such as haze and fog would influence visibility and perceivability of warning lighting from viewing locations. Additionally, long-term impacts associated with OCAs, SCAs, and LCAs would range from long term **minor** to **major** adverse based on the relationship of the character areas, lease areas inherent nighttime visual characteristics, and projects' inconsistences with those nighttime characteristics. Based on warning light viewshed analyses conducted as part of the VIA (EDR 2023:64), for analysis purposes, the following thresholds are considered as part of nighttime visual impacts: minor to negligible impacts are anticipated for distances beyond approximately 26 nm (30 miles); moderate impacts are anticipated for distances between approximately 17 nm (20 miles) and 26 nm (30 miles); and major impacts are anticipated for distances from viewer position out to 17 nm (20 miles). As noted above, overall visibility is based on viewer position, atmospheric conditions, and other environmental and intervening factors.

Implementation of an ADLS is an EPM (see Table F-1in Appendix F) and a component of the Proposed Action and action alternatives. The shorter duration synchronized flashing of the ADLS (activated as needed by nearby aircraft) would have reduced visual impacts at night as compared to the standard continuous, medium-intensity red strobe FAA warning light system. It is assumed that when FAA warning lights are not activated through the use of ADLS, nighttime impacts would be **negligible**. Based on a recent study by Capital Airspace related to ADLS efficacy associated with the RWF, historic air traffic data for flights passing through the warning light activation area indicated that the ADLS would have been activated for a total of 3 hours 35 minutes and 39 seconds over a 1-year period. Considering the local sunrise and sunset times, an ADLS warning light system could result in over a 99% reduction in warning light duration as compared to a traditional continuous warning light system (see COP Appendix S4 for ADLS efficacy analysis).

Lighting impacts would be most pronounced (although for a short duration with the implementation of an ADLS) for locations that can be currently characterized as undeveloped within the seascape both from an onshore and offshore perspective, where lighting from infrastructure and activities is not dominant or perceivable by the casual observer (viewer). Therefore, visual resource impacts would be short term during construction and long term during O&M, with **negligible** to **major** adverse impacts for a short duration of time to viewers based on the observed distances as categorized under the warning lighting impacts above and the anticipated activation time over the period of 1 year. Impacts to character areas would also be short term during construction and long term during O&M, with **negligible** to **major** adverse impacts for a short duration of time based on the relationship of the character areas, the lease areas' inherent nighttime visual characteristics, and projects' inconsistences with those nighttime characteristics. After decommissioning, the adverse impacts associated with O&M would cease.

<u>Presence of structures:</u> Planned future wind facility projects would consist of an estimated 897 WTGs and OSSs (see Table E4-1 in Appendix E4). In general, under clear daytime atmospheric conditions and depending on natural lighting angles, projects built within BOEM lease areas that are within 10.4 nm (12 miles) of character areas and viewing areas would have major adverse visual impacts, viewing areas beyond 10.4 nm (12 miles) up to 20.8 nm (24 miles) would have moderate to major adverse impacts, and viewing areas beyond 20.8 nm (24 miles) up to 26 nm (30 miles) would have minor adverse impacts (BOEM 2021b). Viewing areas that exceed 26 nm (30 miles) from projects would have negligible adverse visual impacts due to distance, the curvature of the Earth, and the influence of atmospheric conditions, which would decrease the ability of the viewer to discern or perceive projects at that distance. The combined visual effects of the planned project structures to KOPs, character areas, and SDAs, when

viewed from both onshore and offshore locations, would create long-term **negligible** to **major** adverse visual impacts. The overall impacts to KOPs, character areas, and SDAs would be dependent on geographic distance, curvature of the Earth, and orientation to the project; the elevation of the viewer; the degree of visibility considering lighting and atmospheric conditions; and the perceivable contrast, dominance, and scale of WTGs and OSSs along the horizontal plane of the ocean.

### Onshore Activities and Facilities

Light: Future onshore planning projects within the GAA may require OnSSs, ICFs, O&M facilities, and port upgrades depending on project needs and may introduce additional or new infrastructure elements into SCAs and/or LCAs, although specific locations and project designs have not been determined. Infrastructure and associated nighttime lighting to support other offshore wind projects (e.g., OnSS O&M facilities) are anticipated to occur in areas of existing development or where similar infrastructure and development exist to aid in co-location of similar resources. Therefore, additional nighttime lighting sources associated with infrastructure to support other offshore wind projects would be a noticeable change over time and would have long-term **negligible** to **moderate** adverse impacts depending on the final location of infrastructure and additional lighting needs in relation to existing nighttime light sources.

Presence of Structures: Future onshore planning projects could require OnSSs, ICFs, O&M facilities, and port upgrades depending on project needs and could introduce additional or new infrastructure elements into the characteristic landscape over a period of time, although specific locations and design have not been determined. Infrastructure to support other offshore wind projects (e.g., OnSS O&M facilities) are anticipated to occur in or be co-located in areas of existing development associated with SCAs or LCAs where similar infrastructure and development exists based on trends in siting of these facilities associated with recent offshore wind projects. Therefore, the addition of structures to support other offshore wind projects would be noticeable over time and would have long-term **negligible** to **moderate** adverse impacts to identified KOPs, character areas, and SDAs depending on the final location of structures in relation to other built features in the characteristic landscape.

### 3.20.2.2.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on the viewer’s visual experience and character areas associated with the Project would not occur. However, ongoing and future offshore wind activities would have continued temporary to long-term adverse impacts, primarily through construction and O&M of WTGs and associated lighting.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities would be **negligible** to **major** adverse for KOPs, character areas, and SDAs. BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind (as described in Appendix E) are anticipated to be **negligible** to **moderate** adverse as those ongoing activities and reasonably foreseeable activities would have less prominence and dominance as compared to offshore wind projects.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts because the overall effect would be substantial, but the resource would be expected to recover completely after decommissioning.

### 3.20.2.3 Alternative B: Impacts of the Proposed Action on Visual Resources

#### 3.20.2.3.1 Construction and Installation

##### Offshore Activities and Facilities

Light: The Proposed Action would require nighttime lighting for construction vessels traveling and working within the Lease Area as well as the addition of warning lighting systems at each WTG and OSS during an 8-month construction period. This lighting could be visible and impact the viewer’s nighttime visual experience and inherent nighttime seascape character. During construction, visual impacts to potential nighttime viewers and the existing night sky environment would be temporary when associated with vessel traffic and construction lighting. Impacts would be long term, of short duration, and intermittent when associated with WTGs and OSSs warning lighting implementing ADLS. These impacts would be **negligible** to **major** adverse based on the observed viewer distance, as described in Section 3.20.1.1. Aquinnah Overlook (MV07), the closest occupied KOP to the Proposed Action, is located approximately 11.10 nm (13.7 miles) from the Proposed Action and the farthest KOP, Madeaket Beach (NI10), is located approximately 30.0 nm (34.6 miles) from the Proposed Action; these KOPs are representative of the minimum and maximum KOP distances in relation to perceivability of warning lighting. KOP distances in relation to the nearest WTG are further described in Appendix G.

Presence of structures: Up to 102 Project structures (WTGs and OSSs) are proposed for installation within the GAA. As noted under the No Action Alternative, these offshore structures would impact both viewers and character areas throughout construction until build-out completion. During construction, offshore and onshore viewers would see the upper portions of tall equipment such as mobile cranes and vessels. This equipment would move from each WTG and OSS location as construction progresses and thus would be temporary fixtures. Subsequently, the construction and installation of Project structures would occur during an approximate 8-month construction period, when there would be an appreciable change over time in seascape character and the viewer’s visual experience resulting from the addition of up to two OSSs and 100 WTG structures. This appreciable change during the 8-month construction period as a result of the addition of Project structures to full build-out based on the WTG installation sequence; the temporary increase and concentration in vessel activity associated with construction, installation, and transport activities; and the addition of navigational marking and lighting would create short-term to long-term **negligible** to **major** adverse impacts to KOPs, with 16 of the 37 KOPs having major impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 30,208 acres of visibility of the Proposed Action, or 14.5%, of the approximately 208,009 acres of SDAs. Impacts to the OCA as a result of the construction activities noted above would be **major** adverse (approximately 5,882 square miles, or 96.2%, of the total OCA within the GAA would have views of the Proposed Action). Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area; overall, the Project would be visible to approximately 35 square miles (2.4%) of the combined SCAs and LCAs within the GAA. Of the 60 impact determinations associated with KOPs, character areas, and SDAs, 21 major, 21 moderate, 11 minor, and seven negligible adverse impacts were determined for the Proposed Action. Further information related to impacts associated with the Proposed Action is located in Appendix G (see Tables G-VIS1a thru G-VIS2e).

### Onshore Activities and Facilities

Light: Light from onshore construction activities could temporarily adversely impact viewers if located near the landing site, onshore cable route, and proposed onshore facilities. It is assumed that construction activities would occur during daylight hours. Fifteen publicly accessible KOPs were identified in the Visual Resource Assessment and Historic Resources Visual Effects Analysis within 3 miles of the OnSS and ICF, with the closest at approximately 0.6 mile distant (Narraganset Bay) (EDR 2021). Based on aerial imagery, approximately 500 feet south and west of the OnSS and ICF, there are residential properties consisting of single-family and multifamily residences. However, dense stands of tall trees, approximately 40-feet tall or greater, provide a natural buffer (approximately 300–350 feet thick) between the OnSS and ICF and the residences, which is anticipated to reduce any potential nighttime-related impacts to nearby residences to **negligible** adverse.

Nighttime lighting associated with the O&M facility at the Port of Davisville at Quonset Point would be localized (consisting of temporary nighttime safety and security lighting) because construction activities would occur during daylight hours. Based on viewer location and perspective in relation to existing onshore light sources, onshore lighting related to construction activity for the O&M facility would create short-term **negligible** adverse impacts to potential nighttime viewers and the existing night sky environment. Impacts associated with O&M facility would be associated with localized light sources associated with the facility and operational uses, similar to surrounding infrastructure.

Presence of structures: A new OnSS and ICF would be constructed to support interconnection of the Project to the existing electrical grid. Vegetation clearing associated with the access road and taller equipment (e.g., crane tip) may be visible from Camp Avenue or from surrounding residences during construction of these onshore structures. The construction and installation of the OnSS and ICF would occur during an approximate 18-month construction period. During this period, there would be a noticeable change over time in the immediate foreground of the OnSS and ICF because of the addition of the facilities. However, viewers would generally be screened and have obstructed views of construction activities because of the presence of existing development combined with densely forested areas that surround the facilities (EDR 2021).

The O&M facility at the Port of Davisville at Quonset Point would consist of two structures to house office space (approximately 1,000 square feet) and storage space (approximately 11,000 square feet) and located on the existing Air National Guard base. The structures, which are to be refurbished existing facilities, would be similar to existing industrial infrastructure, consisting of large geometric features. Therefore, the noticeable change during the 18-month construction period as a result of construction and installation activities and the addition of Project structures associated with the OnSS, ICF, and O&M facility would create long-term **negligible** adverse impacts to KOPs, character areas, and SDAs based on viewer location and perspective in relation to existing onshore structures and development.

#### 3.20.2.3.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

Light: During O&M, the Proposed Action would contribute to nighttime lighting due to required warning lighting of up to 100 WTGs and two OSSs. During times when the warning lighting is activated, this lighting would add a developed-industrial visual element to views that were previously characterized by dark, open ocean. The addition of the ADLS would result in shorter duration night sky impacts to KOPs, character areas, and SDAs. Because of the limited duration and frequency of anticipated aviation warning activations and visibility of warning lighting, the Proposed Action would result in long-term, short duration, intermittent **negligible** to **major** adverse impacts to KOPs, character areas, and SDAs within distances described above. Impacts during decommissioning would be similar to the impacts during construction and installation: long term, short duration, and intermittent **negligible** to **major** adverse.

Presence of structures: The offshore components of the Project would be visible from coastal locations in New York, Connecticut, Rhode Island, and Massachusetts. Based on visual simulations as part of the VIA, the WTGs and/or OSSs would be all or partially visible on the horizon from shore where there are generally unobstructed views within the analysis area from 28 of the 37 KOPs evaluated (EDR 2023). The WTGs and OSSs would be painted RAL 9010 Pure White or RAL 7035 Light Grey in accordance with BOEM guidelines. The effects of sun lighting, shade, and shadows would cause backlit contrasts and higher impacts for onshore and offshore views from the northeast, north, and northwest in relation to sun angle. The color contrast varies due to sun angles and atmospheric clarity shifting from white WTGs against a blue or gray backdrop to a dark gray WTG against a light gray backdrop. Distance between the viewer and the WTGs along with the curvature of the Earth affect how much of the WTG is visible from viewer locations and influence its visible scale and dominance.

The up to 100 WTGs and two OSSs, as shown in the visual simulations in COP Appendix U3 (EDR 2023), would be viewed from variable distances along the ocean horizon depending on their distance from the 37 KOPs (7.6 nm [8.7 miles] minimum [it should be noted that this minimum distance was measured from Nomans Land Island which is an uninhabited island and National Wildlife Refuge] to 30 nm [34.6 miles] maximum) and result in variable degrees of impacts. Additionally, the curvature of the Earth, which influences the percentage of the turbine structure visible along the horizon is also a factor in the overall impacts. The WTGs would be more visually apparent when viewed from the northern and easterly shorelines due to the relationship of the Lease Area to KOPs (e.g., KOP MV02), which are approximately 11.8 nm (13.6 miles) distant. The scale of the 100 WTGs and two OSSs would become less perceivable as the distance from KOPs and/or character areas increases. Atmospheric and environmental factors such as haze, sun angle, time of day, cloud cover, fog, sea spray, and wave action would also influence visibility and perceivability from KOPs (e.g., NI10 - modified haze/sun, MV12 day vs. night, MV05 day vs. night), which may not be depicted in all visual simulations, or from other non-simulated locations that may have visibility within character areas. As a result, O&M would cause long-term **negligible** to **major** adverse impacts for the life of the Project. Impacts from decommissioning the 100 WTGs and two OSSs would be similar to construction impacts, **negligible** to **major** adverse.

### Onshore Activities and Facilities

Light: Impacts would be reduced by the developer-committed EPM of switched vs. motion operational lighting, which would comply with local lighting regulations. Facility lighting would be mounted with the lamp horizontal to the ground (light facing straight down) or with a lamp tilt no more than 25 degrees from the horizon, which would direct light sources downward and localize any light disturbance (VHB 2023). Because of the similarity of the existing lighting of the adjacent Davisville Substation with the OnSS and ICF (lighting masts assumed to be approximately 20 feet in height), screening by mature vegetation throughout the area as noted in Section 3.20.2.2.1, and developer-committed EPMs, the nighttime lighting impacts of the OnSS and ICF would cause long-term **negligible** adverse impacts to potential nighttime viewers. Impacts during decommissioning would be similar to the impacts during construction and installation, short-term **negligible** to **minor** adverse.

Presence of structures: Based on the results of the viewshed analysis (EDR 2023), the OnSS and ICF infrastructure (buildings, lighting protection, and transmission structures) could be visible from approximately 15% (approximately 2,928 acres) of the 3-mile visual study area not accounting for the influence of vegetative screening defined in the onshore VIA. The presence of existing intervening landscape vegetation along roadways and other viewing locations could further reduce the extent of visibility. For views beyond 0.5 miles, for example Wickford Historic District, Wickford Harbor/Wickford Village State Scenic Area, and Narragansett Bay, visibility, considering distance, vegetation screening, viewer perspective, etc., is anticipated to be the top 10-feet of the overhead transmission line structures which are the tallest structure at approximately 80-feet (EDR 2021). Further discussion regarding potential impacts to viewsheds associated with historic or cultural viewsheds can be found in Section 3.10. Nevertheless, the OnSS and ICF would not be out of scale or character with the existing development present in the vicinity, which ranges from transit rail and four-lane roadway to residential to heavy industrial within 0.5 mile of the OnSS and ICF location. For this reason, the OnSS and ICF would result in long-term **negligible** adverse impacts to the viewer's and associated LCA. Impacts during decommissioning would be similar to the impacts during construction and installation.

#### 3.20.2.3.3 Cumulative Impacts

#### Offshore Activities and Facilities

Light: Construction-related activities would add lighting used by offshore vessels and construction areas to the No Action Alternative. Construction of up to 100 WTGs and two OSSs would also add warning lighting to the No Action Alternative, which would be visible from several KOPs, character areas, and SDAs. New lighting from the Proposed Action would increase in-water structures with lighting impacts from past, present, and reasonably foreseeable future projects (assumed to be 893 structures) for a combined total of 995 lighted structures within the GAA, a 11% increase in lighting compared to the No Action Alternative (see Table E4-1). Nighttime vessel and construction area lighting during construction of the Proposed Action would be limited in duration and cease when construction is complete. Atmospheric and environmental conditions would influence visibility and perceivability from KOPs, character areas, and SDAs. Cumulatively, when combined with other past, present, and reasonably foreseeable future projects, the Proposed Action would result in long-term **negligible** to **major** adverse impacts to nighttime viewers and the existing night sky environment.

Presence of structures: Construction activities would add up to 100 additional WTGs and two OSSs to the No Action Alternative. As a result, approximately 90% of the total potential WTGs and OSSs in the GAA (995) would be associated with other future offshore wind development projects beyond the Proposed Action and at distances from KOPs, character areas, and SDAs where atmospheric conditions and the curvature of the Earth influence visibility. The position of the Proposed Action within the Lease Area, in relation to the other offshore wind development projects, shields or obscures visibility of those projects from KOPs in the northwestern to northeastern portions of the GAA (e.g., RI01, AIO5, and CI01). KOPs in these locations would have views of the Proposed Action as it is the closest project in relation to other projects. KOPs located along the western and eastern portions of the GAA (e.g., BI09, MV03, and NI10) would have increased visibility and therefore increased impacts related to future offshore wind projects in addition to the Proposed Action (see Table G-VIS9). When combined with other past, present, and reasonably foreseeable projects, the Proposed Action would result in long-term **negligible** (e.g., KOP MM 04) to **major** adverse cumulative impacts to KOPs, character areas, and SDAs. Adverse impacts would be removed at Project decommissioning.

### Onshore Activities and Facilities

<u>Light:</u> Onshore construction and O&M would add an O&M facility, OnSS, and ICF with nighttime security lighting to the No Action Alternative. These onshore structures and nighttime lighting sources would occur in areas of existing development or where similar infrastructure and development exists; would use or replace existing structures (O&M facility); and when considered cumulatively with past, present, and reasonably foreseeable activities would result in long-term **negligible** adverse impacts to the viewer's nighttime visual experience and inherent nighttime landscape character.

<u>Presence of structures:</u> Onshore construction and installation would add an ICF, and OnSS to the No Action Alternative. The O&M facility would use existing structures. The Proposed Action does not include any updates to ports. Any potential future port upgrades required to service the offshore wind industry would potentially result in similar **negligible** adverse visual impacts to KOPs, character areas, and SDAs. The Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** adverse cumulative impacts to KOPs, character areas, and SDAs.

### 3.20.2.3.4 Conclusions

Project construction and installation, O&M, and decommissioning would introduce visible vessels, structures, and warning lighting to the GAA. BOEM anticipates the impacts resulting from the Proposed Action alone would range from short term to long term **negligible** to **major** adverse. Of the 60 impact determinations associated with KOPs, character areas, and SDAs, 21 major, 21 moderate, 11 minor, and seven negligible adverse impacts were determined for the Proposed Action (see Appendix G); therefore, BOEM anticipates the overall impact on KOPs, character areas, and SDAs from the Proposed Action to be **long term moderate to major adverse because** the overall effect would be substantial to dominant based on the largest number of impact determinations for the for the life of the Project, but the resource would be expected to recover completely after decommissioning. BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** to **major** adverse to KOPs, character areas, and SDAs. Decommissioning after a project's life of up to 35 years would remove the cumulative visual impacts of the Project.

## 3.20.2.4 Alternatives C, D, E, and F

Table 3.20-1 provides a summary of IPF findings for these alternatives.

#### 3.20.2.4.1 Conclusions

Project construction and installation, O&M, and decommissioning would introduce visible vessels, structures, and warning lighting to the GAA. Analysis findings that identify an action alternative associated with Alternatives C, D, E, and F that has the greatest potential for reduced visual impacts (least impactful) as a result of the removal of turbines in relation to KOPs or character areas, have been carried forward in Table 3.20-1 rather than describe impacts for all action alternatives where differences are negligible. Of the 12 action alternatives (C, D, E, and F); four alternatives (C1, D1+D2+D3, E1, and F) were determined to have a lesser degree of visual impacts to KOPs and SCAs than the remaining eight action alternatives and are described below.

Alternatives C1 and C2: Because of WTG placement, Alternative C2 would result in slightly lesser degree of impacts than Alternative C1. Alternative C2 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs, with 10 of the 17 selected KOPs having major adverse impacts, four KOPs having moderate adverse impacts, and three KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 29,967 acres of visibility of Alternative C2 (14.4%) of the approximately 195,701 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to other action alternatives, with approximately 96% of the OCA having visibility of Alternative C2. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area; overall, Alternative C2 would be visible to approximately 34.7 square miles (2.3%) of the combined SCAs and LCAs within the GAA. Due to the similarity in placement of WTGs, Alternatives C1 and C2 would result in similar impacts, and both alternatives would result in fewer impacts than the Proposed Action. Of the 40 impact determinations associated with KOPs, character areas, and SDAs, 14 major, 13 moderate, eight minor, and five negligible adverse impacts were determined for Alternative C2 (Tables G-VIS3 and G-VIS4c).

Alternative D alternatives: Of the seven Alternative D alternatives, Alternative D1+D2+D3 would result in the least number of adverse impacts because of the combination of removed turbines as compared to the maximum-case scenario for the Proposed Action. Alternative D1+D2+D3 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA, with 12 of the 37 selected KOPs having major adverse impacts, 14 KOPs having moderate adverse impacts, and 11 KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 28,840 acres of visibility of Alternative D1+D2+D3 (13.9%) of the approximately 208,009 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to other action alternatives, with approximately 96% of the OCA having visibility of the Project. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse, similar to the Proposed Action, based on the sensitivity and degree of magnitude in relation to the character area. Overall, approximately 31.1 square miles (2.1%) of the combined SCAs and LCAs would have visibility of Alternative D1+D2+D3 within the GAA. Of the 60 impact determinations associated with KOPs, character areas, and SDAs, 15 major, 24 moderate, 12 minor and 9 negligible impacts were determined for Alternative D1+D2+D3 (Tables G-VIS5a and G-VIS6c).

Alternative E1 and E2: Because of the placement of WTGs, Alternative E1 would result in slightly fewer impacts than Alternative E2. Alternative E1 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA, with four of the 21 selected KOPs having major adverse impacts, 12 KOPs having moderate adverse impacts, and five KOPs having minor to negligible adverse impacts. The removal of WTGs from the central and northern portions of the Lease Area would increase the distance between KOPs and WTGs in those portions of the Lease Area. Views of WTGs from KOP MV07 (Aquinnah Overlook), for example, would be similar to the Proposed Action at the far-left field of view and to the right of Nomans Land Island where WTGs have not been removed and are the nearest WTGs to KOP MV07 (approximately 13 nm as indicated in Appendix G Table G-VIS7 as the worst case scenario). Within the field of view continuing to pan from left to right where WTGs have been removed, WTGs would increase in distance from the KOP and range from approximately 14 nm (center left) to approximately 18 nm (far right) (Figure 3.20-2).

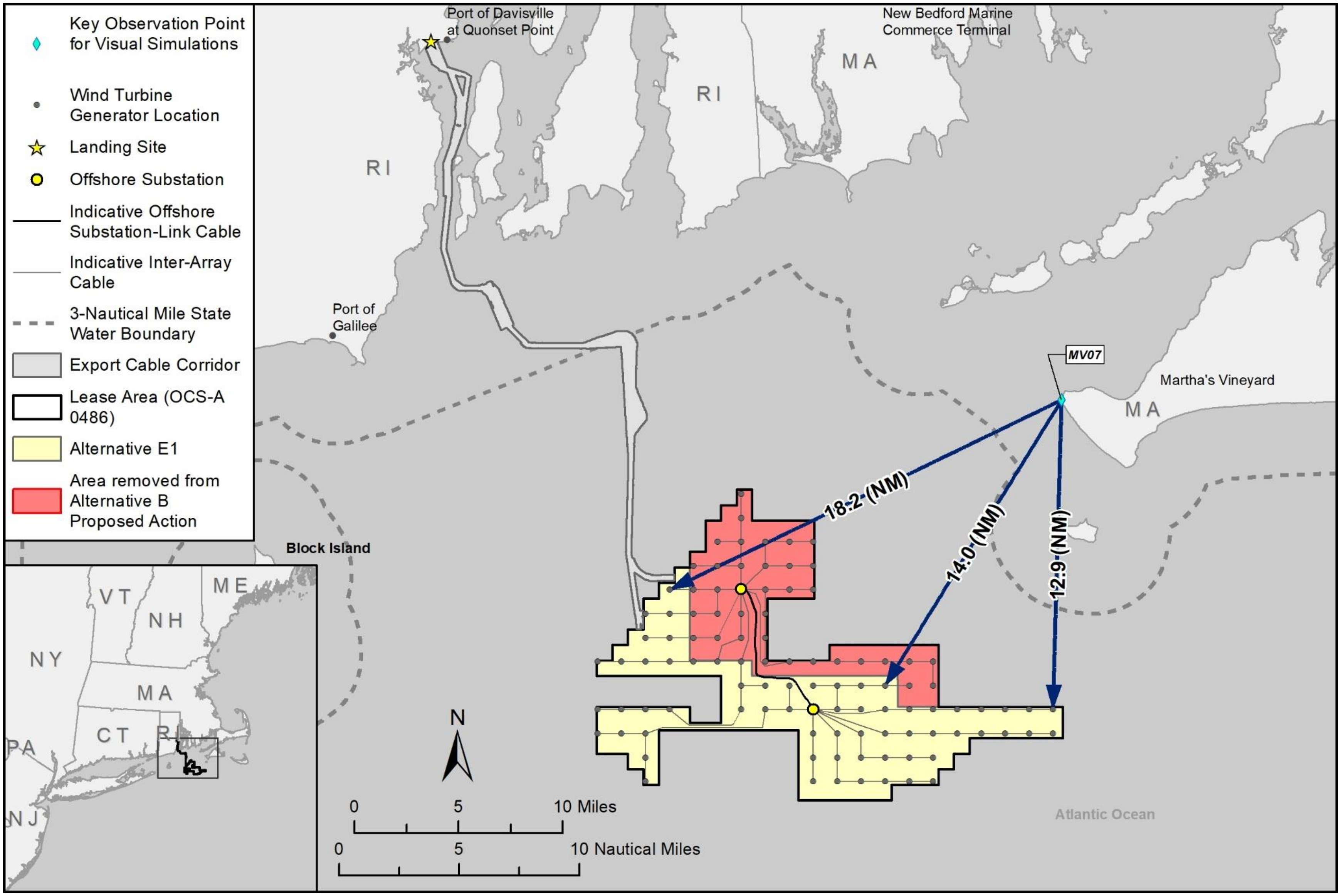


**Figure 3.20-2. Alternative E1 - nearest wind turbine generator to KOP MV07.**

Impacts to SDAs would range from **negligible** to **major** adverse. with approximately 29,085 acres of visibility of Alternative E1 (14.0%) of the approximately 208,009 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to the Proposed Action, with approximately 96% of the OCA having visibility of the alternative. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area. Overall, approximately 32.7 square miles (2.2%) of the combined SCAs and LCAs would have visibility of Alternative E1 within the GAA. Of the 44 impact determinations associated with KOPs, character areas, and SDAs, eight major, 21 moderate, seven minor, and eight negligible adverse impacts were determined for Alternative E1 (see Tables G-VIS7 and G-VIS8c).

Alternative E2 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA; with one of the 16 selected KOPs having major adverse impacts, six KOPs having moderate adverse impacts, and nine KOPs having minor to negligible adverse impacts. The removal of WTGs from the northern and northwest portions of the Lease Area associated with Alternative E2 would increase the distance between the Rhode Island and Block Island KOPs and the viewer’s field of view. The size and scale of impact to views of WTGs as seen from KOP MV07 (Aquinnah Overlook) would be similar to the Proposed Action; however, the removal of WTGs at the far-right proximity of the Lease Area (approximately 11.9 nm) would reduce the western encroachment into the sunset view; therefore, the overall field of view of WTGs would be reduced as compared to the Proposed Action (Figure 3.20-3).

Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 29,385 acres of visibility of Alternative E2 (14.1%) of the approximately 208,009 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to the Proposed Action, with approximately 96% of the OCA having visibility of the alternative. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area. Overall, approximately 33.5 square miles (2.3%) of the combined SCAs and LCAs would have visibility of Alternative E2 within the GAA. Of the 39 impact determinations associated with KOPs, character areas, and SDAs, five major, 15 moderate, seven minor, and 12 negligible adverse impacts were determined for Alternative E2 (see Tables G-VIS7 and G-VIS8c).

Alternatives E1 and E2 would not have as great of a reduced visual impact within the GAA. Because of the specific nature and development of Alternatives E1 and E2 related to reducing visual impacts to specific KOPs along the northeastern portion of the Lease Area associated with Martha’s Vineyard (e.g., MV08, Aquinnah Overlook and MV12, Peaked Hill), KOPs in this geographic area would have greater reduced visual impacts as compared to other action alternatives. Additionally, some KOPs that are at a greater distance (e.g., AI05 [Sachuest Point National Wildlife Refuge]) would also have reduced visual impacts based on orientation to the Lease Area.

Further information related to impacts to individual KOPs, character areas, and SDAs associated with Alternatives C, D, and E is included in Appendix G.

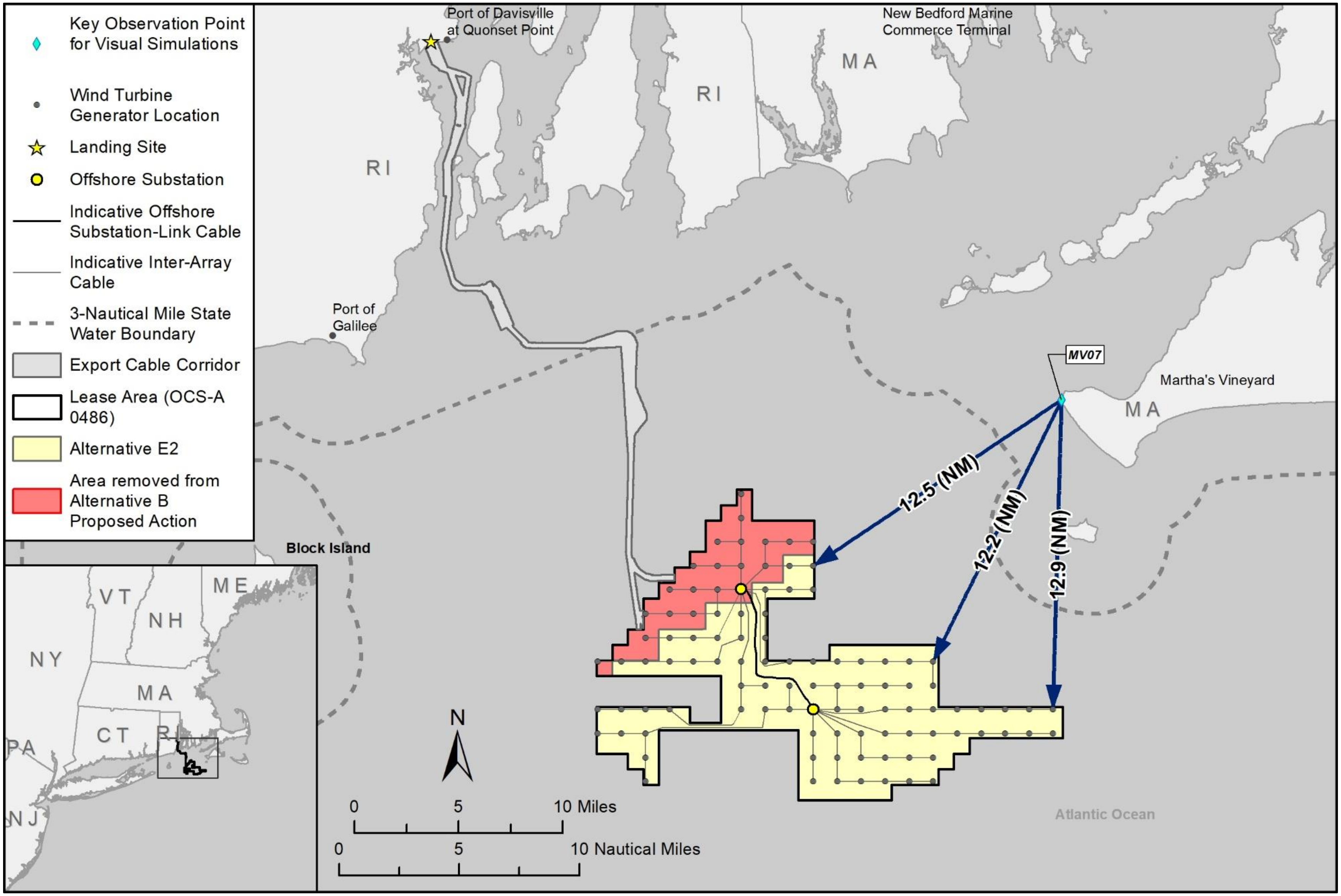


**Figure 3.20-3. Alternative E2 - nearest wind turbine generator to KOP MV07.**

Alternative F would reduce the number of WTGs installed in the Lease Area as compared to the maximum-case scenario for the Proposed Action or any action alternative that it is combined with. The potential reduction of impacts would depend on viewer distance and be focused primarily on locations in closest proximity to the area of reduced WTGs. A reduction in WTGs installed would be expected to result in long-term **negligible** to **major** adverse impacts to KOPs, character areas, and SDAs. However, the application of Alternative F cannot be fully evaluated until the specific WTGs to be removed are identified.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM anticipates that the overall impacts associated with Alternatives C2, D1+D2+D3, E1, and F or any other alternative option when combined with past, present, and reasonably foreseeable activities would be **negligible** to **major** adverse. This impact determination is due to the proximity of the Project within the Lease Area and in relation to KOPs, character areas, and SDAs. Additionally, impacts would be variable based on the final alternative selected and range from 1,011 to 1,048 structures (WTGs and OSSs). Decommissioning would remove the cumulative visual impacts of the Project.

### 3.20.2.5 Alternative G: Impacts of the Preferred Alternative on Visual Resources

Table 3.20-1 provides a summary of IPF findings for this alternative.

#### 3.20.2.5.1 Conclusions

Because of the placement of WTGs in relation to KOPs, Alternatives G2 and G3 would have the greatest reduced visual impact as compared to the Proposed Action. Information related to overall impact determinations for Alternatives G and G1 is included in Appendix G. Alternative G2 would result in fewer impacts than Alternative G3. Alternative G2 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA, with one of the 19 selected KOPs having major adverse impacts, 10 KOPs having moderate adverse impacts, and four KOPs having minor to negligible adverse impacts. Comparatively, Alternative G3 would have 10 of the 22 selected KOPs with major adverse impacts, seven KOPs with moderate adverse impacts, one KOP with minor impacts, and four KOPs with negligible adverse impacts.

Impacts to SDAs would range from negligible to major adverse under Alternative G, with Alternative G2 having the greatest reduced visibility with approximately 30,499 acres of visibility (14.6%) of the approximately 208,009 acres of SDAs as compared to 30,477 acres of visibility (14.7%) associated with Alternative G3. Impacts to the OCA would be major adverse, similar to other action alternatives, with Alternative G visible to approximately 96% of the OCA.

Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area; overall, Alternative G3 would be the least visible to approximately 33.4 square miles (2.2%) of the combined SCAs and LCAs within the GAA as compared 33.5 square miles (2.3%) associated with Alternative G2. Of the 42 impact determinations associated with KOPs, character areas, and SDAs, six **major**, 19 **moderate**, eight **minor**, and nine **negligible** adverse impacts were determined for Alternative G2 as compared to 10 **major**, seven **moderate**, one **minor**, and four **negligible** adverse impacts associated with Alternative G3 (see Tables G-VIS9 to G-VIS10c).

Further information related to impacts to individual KOPs, character areas, and SDAs associated with Alternative G is included in Appendix G.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM anticipates that the overall impacts associated with Alternatives G when combined with past, present, and reasonably foreseeable activities would be negligible to major adverse. This impact determination is due to the proximity of the Project within the Lease Area and in relation to KOPs, character areas, and SDAs. Additionally, impacts would be variable based on the final alternative selected and range from 964 to 978 structures (WTGs and OSSs). Decommissioning would remove the cumulative visual impacts of the Project.

#### 3.20.2.6 Mitigation

No mitigation measures resulting from agency consultations for visual resources are identified in Appendix F, Table F-2. Additional mitigation measures identified by BOEM and cooperating agencies are listed in Appendix F, Table F-3, and addressed in Table 3.20-5.

**Table 3.20-5. Additional Mitigation and Monitoring Measures for Visual Resources (Appendix F, Table F-3)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
| --- | --- | --- |
| Visual impacts monitoring plan | Monitoring visual effects during construction and operations in the daytime and nighttime | This measure would not modify the impact determination for visual resources but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein. |

##### 3.20.2.6.1 Measures Incorporated into the Preferred Alternative

Mitigation measures resulting from consultations, authorizations, and permits listed in Table 3.20-5 and in Appendix F, Table F-2, are incorporated into Alternative G (Preferred Alternative). The visual impacts monitoring plan, if adopted, would further define how the effectiveness and enforcement of EPMs would be ensured. This mitigation measure would improve accountability for compliance with EPMs by requiring the submittal of plans for approval by the enforcing agency(ies) and by defining reporting requirements. Because this measure ensures the effectiveness of and compliance with EPMs, as part of a formalized monitoring plan, that is already analyzed as part of the Proposed Action, implementation of this measure would not further reduce the impact level of the Proposed Action from what is described in Section 3.20.2.3.

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## 3.21 Water Quality

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to water quality from implementation of the Proposed Action and other considered alternatives.

## 3.22 Wetlands and Non-tidal Waters

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of current conditions and potential impacts to wetlands and non-tidal waters from implementation of the Proposed Action and other considered alternatives.

# APPENDIX A

## Required Environmental Permits and Consultations

# Contents



# Tables

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# Introduction

This appendix discusses required permitting and public, agency, and tribal involvement in the preparation of the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (the Project) environmental impact statement (EIS). This involvement included formal consultations, cooperating agency exchanges, and a public scoping comment period.

Authorizations and permits are listed in Table A-1, and cooperating or participating federal agencies are described below. The Bureau of Ocean Energy Management (BOEM) has completed the following interagency milestones to date for the Project:

- Finalize purpose and need: April 19, 2021
- Concurrence on permitting timetable: April 19, 2021
- Issuance of notice of intent (NOI) to prepare an EIS: April 30, 2021
- Issuance of notice of correction: June 4, 2021
- Complete public scoping period: June 11, 2021
- Finalize Draft EIS alternatives: April 19, 2022

# Other Federal and State Review

In addition to the BOEM-led National Environmental Policy Act (NEPA) process at the federal level, the Project is also being reviewed through a robust state permitting process, including the Rhode Island Department of Environmental Management; the Rhode Island Coastal Resources Management Council (RI CRMC); the Massachusetts Office of Coastal Zone Management (MA CZM); and various state historic preservation offices (SHPOs), including the Rhode Island Historic Preservation & Heritage Commission, the Massachusetts Historical Commission, the Connecticut State Historic Preservation Office, the New York State Division of Historic Preservation, and the Massachusetts Board of Underwater Archaeological Resources through Section 106 of the National Historic Preservation Act (NHPA). BOEM is also coordinating with federally and non-federally recognized tribal nations, local governments, and non-governmental organizations.

Table A-1 provides a discussion of other federal and state reviews required, including legal authority, jurisdiction of the agency, and the regulatory process involved.

**Table A-1. Cooperating Federal and State Agencies, Required Environmental Permits, and Consultations for the Project**

| Agency/Regulatory Authority | Cooperating Agency Status | Permit/Approval/Consultations | Status |
|---|---|---|---|
| **Federal** | | | |
| Advisory Council on Historic Preservation | Participating agency | None | Not applicable |
| BOEM | Lead federal agency | Construction and operations plan (COP) approval | Original COP filed with BOEM on October 30, 2020; COP updates provided on April 29, 2021; December 15, 2021; July 21, 2022; and March 1, 2023 |
| Bureau of Safety and Environmental Enforcement | Cooperating agency | Facility design report/Fabrication and installation report, oil spill response plan, safety management system, and decommissioning for project | Planned |
| National Park Service | Participating agency | None | Not applicable |
| U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service | Cooperating agency | Letter of authorization (LOA) for incidental take regulations (ITRs) Essential fish habitat consultation<br>Endangered Species Act (ESA) consultation | Planned |
| U.S. Department of Defense, U.S. Army Corps of Engineers | Cooperating agency | Clean Water Act Section 404/Rivers and Harbors Act of 1899 Section 10<br>Individual Permit | Planned |
| U.S. Department of Defense | Participating agency | None | Not applicable |
| U.S. Department of Transportation, Federal Aviation Administration | Participating agency | Obstruction evaluation/airport airspace analysis | Planned |
| U.S. Department of Homeland Security, U.S. Coast Guard | Cooperating agency | Private Aids to Navigation Permit | Planned |

| Agency/Regulatory Authority | Cooperating Agency Status | Permit/Approval/Consultations | Status |
|---|---|---|---|
| U.S. Department of the Navy | Participating agency | None | Not applicable |
| U.S. Environmental Protection Agency | Cooperating agency | Outer Continental Shelf Air Permit | Planned |
| U.S. Fish and Wildlife Service | Participating agency | ESA consultation | Planned |
| **State (portions of the Project within state jurisdiction)*** | | | |
| State of Rhode Island Coastal Resources Management Council | Cooperating agency | Coastal Zone Management Act (CZMA) Consistency Certification<br>Category B Assent/Submerged lands license<br>Permit to Alter Freshwater Wetlands in the Vicinity of the Coast<br>Application for Marine Dredging and Associated Activities | Filed on June 7, 2021; concurrence issued on May 12, 2023<br>Filed on July 1, 2021; completed Q1 2023<br>Filed on July 1, 2021<br>Filed on July 1, 2021 |
| State of Rhode Island Department of Environmental Management | Cooperating agency | Section 401 and State Water Quality Certification/Rhode Island Pollutant Discharge Elimination System Construction General Permit (filed concurrently)<br>Application for Marine Dredging and Associated Activities (see above) | Filed on August 3, 2021 |
| MA CZM | Cooperating agency | CZMA Consistency Certification | Filed on June 7, 2021; concurrence issued on May 10, 2023 |
| Connecticut State Historic Preservation Office, Connecticut Department of Economic and Community Development | Not applicable | NHPA Section 106 consultation | Not applicable |
| Rhode Island Historical Preservation & Heritage Commission | Not applicable | NHPA Section 106 consultation | Not applicable |

| Agency/Regulatory Authority | Cooperating Agency Status | Permit/Approval/Consultations | Status |
|---|---|---|---|
| New York State Division for Historic Preservation | Not applicable | NHPA Section 106 consultation | Not applicable |
| Massachusetts Historical Commission | Not applicable | NHPA Section 106 consultation | Not applicable |

* State agencies may be cooperating agencies under NEPA.

## Cooperating Agencies

As part of the NEPA process, BOEM invited other federal agencies and state, tribal, and local governments to consider becoming cooperating agencies in the preparation of the EIS. According to Council on Environmental Quality (CEQ) guidelines, qualified agencies and governments are those with "jurisdiction by law" or "special expertise" (40 Code of Federal Regulations [CFR] 1501.8). BOEM asked potential cooperating agencies to consider their authority and capacity to assume the responsibilities of a cooperating agency and to be aware that an agency's role in the environmental analysis neither enlarges nor diminishes the final decision-making authority of any other agency involved in the NEPA process. BOEM also provided potential cooperating agencies participating in the FAST-41 process with a written summary of expectations for cooperating agencies, including time schedules and critical action dates, milestones, responsibilities, scope, detail of cooperating agencies' contributions, and availability of pre-decisional information.

Cooperating agency status is provided in Table A-1. More specific details regarding federal agency roles and expertise are described below.

### National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect marine resources under its jurisdiction by law and special expertise. As applicable, permits and authorizations are issued pursuant to the Marine Mammal Protection Act, as amended (MMPA) (16 United States Code [USC] 1361 et seq.); the regulations governing the taking and importing of marine mammals (50 CFR 216); the Endangered Species Act (ESA) (16 USC 1531 et seq.); and the regulations governing the taking, importing, and exporting of threatened and endangered species (50 CFR 222–226). In accordance with 50 CFR 402, NMFS also serves as the consulting agency under Section 7 of the ESA for federal agencies proposing actions that may affect marine resources listed as threatened or endangered and critical habitat. NMFS has additional responsibilities to conserve and manage fishery resources of the United States, which include the authority to engage in consultations with other federal agencies pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and 50 CFR 600 when proposed actions may adversely affect essential fish habitat (EFH). The MMPA is the only authorization for NMFS that requires NEPA compliance. NMFS intends to adopt BOEM's Final EIS if, after independent review and analysis, NMFS determines the Final EIS to be sufficient to support the authorization.

NMFS has multiple roles in the NEPA process and EIS for this major federal action. First, NMFS has a responsibility to serve as a cooperating agency based on its technical expertise and legal jurisdiction over multiple trust resources. NMFS's role is to provide expert advice regarding the action's impact with respect to EFHs, as defined in the MSA, listed threatened and endangered species and designated critical habitat listed under the ESA, marine mammals protected by the MMPA, and commercial and recreational fisheries managed under the MSA.

Second, NMFS intends to adopt the EIS in support of its MMPA authorization decision after reviewing it and determining it to be sufficient. NMFS is required to review applications for incidental take under the MMPA, as amended (16 USC 1361 et seq.) and issue an Incidental Take Authorization (ITA) in the form of a Letter of Authorization (LOA) for Incidental Take Regulations (ITRs) if appropriate. Revolution

Wind, LLC (Revolution Wind) has submitted an application to NMFS for an ITR in conjunction with the construction and operations plan (COP) for *take*, as defined by the MMPA, of marine mammals incidental to Project construction and associated activities. The decision to issue an ITR under the MMPA is considered a major federal action requiring NEPA review. Therefore, NMFS has an independent responsibility to comply with NEPA. Consistent with the regulations published by the CEQ (40 CFR 1501.7(g)), NMFS intends to rely on the information and analyses in BOEM's EIS to fulfill its NEPA obligations for ITA issuance, if applicable. NMFS intends to adopt the final EIS for this purpose.

The following list provides a timeline for NMFS-related Project documentation (BOEM 2023a, 2023b, 2023c, 2023d).

- Draft ESA biological assessment (BA) and EFH submitted to NMFS on April 25, 2022.
- NMFS provided comments on June 22, 2022.
- Revised ESA BA and EFH submitted on August 29, 2022.
- NMFS provided comments and requested changes on EFH on September 22, 2022.
- Revised ESA BA was submitted on November 1, 2022.
- NMFS deemed insufficient on November 11, 2022.
- BOEM submitted revised BA addendum on January 31, 2023.
- NMFS requested additional 60 calendar days to complete ESA and EFH consultations.
- BOEM submitted revised EFH consultation on February 7, 2023.
- NMFS determined EFH assessment complete on March 23, 2023.
- NMFS determined ESA consultation package complete on March 31, 2023.
- EFH consultation concludes on June 16, 2023.
- ESA consultation concludes on July 21, 2023.

NMFS published proposed ITA under MMPA on December 16, 2022.

NMFS proposed ITA under MMPA public comment period extended to February 7, 2023.

### Bureau of Safety and Environmental Enforcement

The Bureau of Safety and Environmental Enforcement (BSEE) is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect marine resources under its jurisdiction by law and special expertise. BSEE's roles and responsibilities are outlined in 30 CFR 285.633 (BSEE and BOEM 2023).

### U.S. Coast Guard

The U.S. Coast Guard (USCG) is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect navigation and safety issues that fall under its jurisdiction by law and special expertise. Upon lessee application, the USCG will issue a Private Aids to Navigation (PATON) permit for the marking and lighting of the wind turbine generators (WTGs), offshore substations (OSSs), and measurement buoys to alert mariners to potential hazards to navigation. A request for a Local Notice to Mariners (LNMs) publication will also be submitted to the USCG prior to vessel mobilization for construction activities to enable the USCG to issue the LNM.

### U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect resources under its jurisdiction by law and special expertise. The EPA is responsible for issuing an Outer Continental Shelf (OCS) permit for the Project under the Clean Air Act.

### U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect resources under its jurisdiction by law and special expertise. As applicable, permits and authorizations are issued pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act.

Section 10 of the Rivers and Harbors Act, approved on March 3, 1899 (33 USC 403), prohibits the unauthorized obstruction or alteration of any navigable water of the United States. The construction of any structure in or over any navigable water of the United States; the excavating from or depositing of material in such waters; or the accomplishment of any other work affecting the course, location, condition, or capacity of such waters is unlawful unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army. The instrument of authorization is designated a permit. The authority of the Secretary of the Army to prevent obstructions to navigation in navigable waters of the United States was extended to artificial islands, installations, and other devices located on the seafloor, to the seaward limit of the OCS, by Section 4(f) of the Outer Continental Shelf Lands Act of 1953, as amended (43 USC 1333(e)).

Section 404 of the Clean Water Act (33 USC 1344) authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits, after notice and opportunity for public hearing, for the discharge of dredged or fill material into the waters of the United States at specified disposal sites (see 33 CFR 323.) The selection and use of disposal sites will be in accordance with guidelines developed by the Administrator of the EPA in conjunction with the Secretary of the Army and published in 40 CFR 230.

The Section 10 activities associated with the Project may consist of the installation of WTGs, the installation of inter-array cables, the installation of export cables, and scour protection associated with the structures. Section 10 activities are regulated by the USACE between the mean high water-mark and the limits of the OCS. The Section 404 fill activities associated with the Project may consist of the placement of scour protection on the export cables, the redeposition of dredged material into the horizontal directional drilling (HDD) pits near the landfall site, the installation of temporary cofferdams, and any other temporary discharges of dredged or fill material associated with the installation of the export cable. Section 404 activities are regulated by the USACE between the high tide line and the 3-nautical-mile mark.

Issuance of Section 10 or Section 404 permits requires NEPA compliance, which will be met via adoption of BOEM’s EIS and issuance of a record of decision (ROD).

### U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) is serving as a participating agency for the Project. The USFWS also serves as the consulting agency under Section 7 of the ESA for federal agencies proposing actions that may affect terrestrial resources listed as threatened or endangered, including species of concern. See the ESA section below for a summary of the ESA consultation to date with the USFWS. The USFWS deemed the ESA consultation package complete, and consultation was initiated on November 17, 2022. BOEM submitted additional information to USFWS via an addendum in January 2023 and via a revised addendum in April 2023. Consultation was completed on May 30, 2023.

### National Park Service

The National Park Service (NPS) is serving as a participating agency because there are multiple important NPS resources within the Project vicinity, including the Block Island Southeast Light, Marble House, Ocean Drive Historic District, Bellevue Avenue Historic District, and The Breakers National Historic Landmarks (NHLs). There may also be Land and Water Conservation Fund State and Local Assistance Program sites impacted if more export cable locations are set. However, at this point in time the proposed cable landing at Quonset Business Park in North Kingstown, Rhode Island, is not expected to interact with any NPS units or program lands. Should any potential impacts to NPS units or program lands be identified and an NPS permit is required, the NPS will request a change to cooperating agency status under "jurisdiction by law" pursuant to 40 CFR 1501.8.

## Consultations and Authorizations

The following section provides a summary and status of BOEM consultations and authorizations as part of the Project (ongoing, complete, and the opinion or finding of each consultation). Section 1.4 of the COP provides a discussion of other federal and state consultation processes being led by Revolution Wind (VHB 2023).

### Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) requires that federal actions within and outside the coastal zone that have reasonably foreseeable effects on any coastal use or natural resource of the coastal zone be consistent with the enforceable policies of a state's federally approved coastal management program (CMP). On June 7, 2021, Revolution Wind submitted a federal consistency certification with the MA CZM and the RI CRMC per 15 CFR 930.76. The CZMA federal consistency regulations at 15 CFR 930.60(b) allow for a stay of the required review period, if mutually agreed upon by both the applicant and the state agency.

On July 2, 2021, MA CZM requested additional information deemed necessary to determine consistency with the enforceable policies of its approved CMP and entered into a mutual agreement with Revolution Wind to stay the review for 8 months, beginning on July 7, 2021, with MA CZM's review restarting on March 7, 2022. On March 7, 2022, both parties agreed to a second stay ending May 7, 2022. On August 8, 2022, both parties agreed to a third stay ending on October 12, 2022. On November 21, 2022, both parties agreed to a fourth stay ending February 12, 2023. On February 17, 2023, both parties agreed to a fifth stay ending March 23, 2023. On March 27, 2023, both parties agreed to a sixth stay ending on April 25, 2023.

On May 1, 2023, both parties agreed to a seventh stay ending on May 9, 2023. On May 10, 2023, MA CZM issued a federal consistency determination of concurrence for the RWF Project.

On October 21, 2021, RI CRMC also requested additional information deemed necessary to make a consistency determination. On October 29, 2021, RI CRMC and Revolution Wind entered into an agreement to stay the CRMC's CZMA review until September 17, 2022. On November 17, 2022, RI CRMC and Revolution Wind entered into a second agreement to stay the CRMC's CZMA review until January 20, 2023. On February 8, 2023, RI CRMC and Revolution Wind entered into a third agreement to stay the CRMC's CZMA review until March 14, 2023. On March 3, 2023, RI CRMC and Revolution Wind entered into a fourth agreement to stay the CRMC's CZMA review until April 11, 2023. On March 31, 2023, RI CRMC and Revolution Wind entered into a fifth agreement to stay the CRMC's CZMA review until April 25, 2023. On May 12, 2023, RI CRMC issued a federal consistency determination of concurrence for the RWF Project. The COP provides the necessary data and information under 15 CFR 930.58 (VHB 2023). The states' concurrence is required before BOEM could approve, or approve with conditions, the COP per 30 CFR 585.628(f) and 15 CFR 930.130(1).

### Endangered Species Act

Section 7(a)(2) of the ESA of 1973, as amended (16 USC 1531 et seq.), requires that each federal agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of those species. When the action of a federal agency could affect a protected species or its critical habitat, that agency is required to consult with either NMFS or the USFWS, depending upon the jurisdiction of the agencies. Pursuant to 50 CFR 402.07, BOEM has accepted designation as the lead federal agency for the purposes of fulfilling interagency consultation under Section 7 of the ESA for listed species under the jurisdiction of NMFS and the USFWS. BOEM is consulting on the proposed activities considered in this EIS with both NMFS and the USFWS for listed species under their respective jurisdictions. Draft biological assessments have been prepared for submission to USFWS and NMFS. USFWS ESA consultations are expected to be completed by March 31, 2023. NMFS ESA consultation is expected to be completed by July 21, 2023.

### Government-to-Government Consultation with Federally Recognized Indian Tribes

Executive Order (EO) 13175 commits federal agencies to engage in government-to-government consultation with tribal nations. A June 29, 2018, memorandum outlines BOEM's current tribal consultation guidance (BOEM 2018). This memorandum states that "consultation is a deliberative process that aims to create effective collaboration and informed Federal decision-making" and is in keeping with the spirit and intent of EO 13175 (BOEM 2018). BOEM implements tribal consultation policies through formal government-to-government consultation, informal dialogue, collaboration, and engagement.

Summaries of BOEM's consultation meetings with tribes are provided in this section and indicate which tribes were in attendance. BOEM invites multiple tribes, unless a one-to-one or follow-up meeting was requested by the tribe.

BOEM conducted government-to-government consultations with the Narragansett Indian Tribe, the Mashantucket (Western) Pequot Tribal Nation, and the Mohegan Tribe of Indians of Connecticut in an overview of planned offshore wind development projects off southern New England in August 2018.

Between January 15 and 17, 2020, BOEM met again with the Mohegan Tribe of Indians of Connecticut, the Mashantucket (Western) Pequot Tribal Nation, and the Narragansett Indian Tribe to discuss multiple BOEM actions in the Rhode Island/Massachusetts Wind Energy Area. Tribal representatives expressed concerns about possible effects on marine mammals, other marine life, and the Nantucket Sound Traditional Cultural Place (TCP). One concern emphasized the importance of open sea views to the east during sunrise, as well as the night sky, whereas others emphasized the long historical association of the tribes with the sea and islands off southern New England and the critical role of fishing and shellfish gathering for tribes. All of the tribes emphasized the importance of understanding the interconnected nature of the human world, the sea, and the living things in both worlds.

In July 2020, BOEM and the BSEE conducted meetings with the Mashantucket (Western) Pequot Tribal Nation, and the Mashpee Wampanoag Tribe. These meetings generally focused on developing mitigation measures for offshore wind project impacts, funding, and best practices. Concerns expressed by representatives from the tribes present included project effects and layout, a desire to redefine the Nantucket Sound TCP boundaries, recommendations for mitigation measures, aboriginal rights and titles, communication with developers, and cumulative effects of the present and future offshore wind projects in the area.

On August 20, 2020, BOEM consulted with the Delaware Tribe of Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, and Wampanoag Tribe of Gay Head (Aquinnah) to discuss the impacts of offshore wind developments on marine mammals. This included an overview of the consultation process and environmental review, the BOEM Environmental Studies Program and process, existing and upcoming studies related to North Atlantic right whales, and the marine mammal analysis and findings noted in the Vineyard Wind 1 supplemental EIS. The meeting concluded with some action items for BOEM, including to provide the above-referenced consulting tribes with additional reports and to research funding options to provide tuition assistance for tribal members interested in participating in the Protected Species Observer training certificate program.

On April 9, 2021, BOEM held a government-to-government consultation meeting with representatives from the Delaware Tribe of Indians, Mashpee Wampanoag Tribe, and Wampanoag Tribe of Gay Head (Aquinnah). Most of the meeting focused on topics and issues applicable to offshore wind development. During the meeting, representatives from the tribes voiced concerns about potential impacts of area offshore wind projects to water quality; marine mammals; culturally and economically significant fisheries and shellfish populations; chemical pollutants; the financial and time burden on tribes of participating in multiple, simultaneous offshore wind project reviews; and preserving natural and cultural resources for future generations, particularly the current and future ability of tribal youth to perform sacred ceremonies and have safe havens for traditional cultural practices in the future. In addition to discussing these concerns, tribal representatives also recommended that BOEM consider creating shared offshore export cable corridors and requested that BOEM consult with federally recognized tribes on all proposed offshore wind projects as one large federal action rather than on a project-by project basis.

In April 2021, BOEM invited by individual letter and email the Mashpee Wampanoag Tribe, Shinnecock Indian Nation, Mashantucket (Western) Pequot Tribal Nation, Wampanoag Tribe of Gay Head (Aquinnah), Mohegan Tribe of Indians of Connecticut, Narragansett Indian Tribe, Delaware Tribe of Indians, and Delaware Nation to join the EIS process as cooperating agencies, to participate in scoping, to meet government-to-government on the Project, and to consult under NHPA Section 106. The invitations and the NOI for the Project notified tribes that BOEM would be using the NEPA substitution process for completing the steps of NHPA Section 106 pursuant to 36 CFR 800.8 (see National Historic Preservation Act section below). BOEM had earlier, in December 2020, notified the consulting tribes of its intent to apply this NEPA substitution process on its future offshore wind development reviews and held a workshop on this process open to tribes in January 2021.

On August 2, 2021, BOEM held a government-to-government meeting with the Wampanoag Tribe of Gay Head (Aquinnah) to discuss visual effects from the South Fork Wind Farm (SFWF) and RWF. The Wampanoag Tribe of Gay Head (Aquinnah) provided comments, and BOEM responses on the agency's tribal consultation practices to date on offshore wind development and the tribe's expressed concerns with the proximity of the SFWF and RWF lease areas and the consideration of alternatives.

On August 13, 2021, BOEM held a government-to-government meeting on RWF and Vineyard Wind South with the Mashpee Wampanoag Tribe, Mashantucket (Western) Pequot Tribal Nation, Wampanoag Tribe of Gay Head (Aquinnah), Delaware Tribe of Indians, and Delaware Nation. The meeting discussed BOEM's decision to use the NEPA substitution process for NHPA Section 106 compliance; cooperating agency status for tribes during NEPA EIS development; tribal land considerations on the OCS; power purchase agreements; BOEM's use of project design envelopes for project reviews; export cables; vessel traffic corridors; HDD at landfall sites; terrestrial archaeology; cumulative visual impacts; traditional cultural practices; potential impact to marine mammals; and project schedules and FAST-41.

On February 3, 2022, BOEM held a government-to-government meeting on RWF with the Mashpee Wampanoag Tribe, Mashantucket (Western) Pequot Tribal Nation, and Wampanoag Tribe of Gay Head (Aquinnah). The meeting discussed tribal land considerations on the OCS, export cables, terrestrial archaeology, marine archaeology, alternatives, cumulative visual impacts, Project schedule, and FAST-41.

On May 2, 2022, BOEM held a government-to-government meeting specifically with the chairwoman, tribal historic preservation office, and council members of the Wampanoag Tribe of Gay Head (Aquinnah). In the meeting, BOEM introduced and discussed the overall renewable energy program and process and summarized details and status of projects off the coast of New England. Topics identified for future discussion included cumulative visual simulations and resource impacts, the transmission process that is part of a lease, decommissioning process and oversight, proposed mitigation plans and agreements, and the tribal capacity building initiatives.

On June 1, 2022, BOEM held a government-to-government meeting with the chairwoman and council members of the Wampanoag Tribe of Gay Head (Aquinnah). This meeting was a follow-up to the May 2 meeting to continue the conversation on various topics and tribal concerns related to the Project as well as to offshore wind development off the New England coast collectively.

On June 2, 2022, the BOEM director met in-person with the Mashpee Wampanoag Tribe to provide the tribal council with an overview of the current state of wind farm permitting off the coast of New England, including Gulf of Maine; to discuss and receive feedback on the Project and regional biological and economic concerns and potential mitigation strategies; to discuss and receive feedback on cumulative visual impacts and simulations; and to discuss and receive feedback on other programmatic topics, including transmission as part of a lease and capacity building initiatives.

On January 24, 2023, and February 3, 2023, BOEM had virtual government-to-government meetings with members of the Mashpee Wampanoag Tribe, Wampanoag Tribe of Gay Head (Aquinnah), and Mashantucket (Western) Pequot Tribal Nation to give an update on the Project, and answer questions.

As part of COP development, Revolution Wind also engaged with tribes, State Historic Preservation Officers, and other stakeholders identified as having potential to inform the design process (see COP Appendix A [BOEM 2023e]).

### Marine Mammal Protection Act

The MMPA was enacted to protect and conserve marine mammals and established a general moratorium on the taking and importation of marine mammals, with certain enumerated exceptions. Unless an exception applies, the act prohibits persons or vessels subject to the jurisdiction of the United States from taking any marine mammal in waters or on lands under the jurisdiction of the United States or on the high seas (16 USC 1372(a)(1), (a)(2)). Section 101(a) of the act provides the prohibitions for the incidental taking of marine mammals. The incidental take of a marine mammal falls under three categories: mortality, serious injury, or harassment (i.e., injury and/or disruption of behavioral patterns). Sections 101(a)(5)(A) and (D) of the act provide the exceptions to the prohibition on take, which give NMFS the authority to authorize the incidental but not intentional take of small numbers of marine mammals, provided certain determinations are made and statutory and regulatory procedures are met. Entities seeking to obtain authorization for the incidental take of marine mammals under NMFS jurisdiction must submit such a request (in the form of an application). ITAs may be issued as either 1) regulations and associated letters of authorization or 2) incidental harassment authorizations when a proposed action will not result in a potential for serious injury and/or mortality or where any such potential can be negated through required mitigation measures. NMFS also promulgated regulations to implement the provisions of the MMPA governing the taking and importing of marine mammals (50 CFR 216) and produced Office of Management and Budget (OMB)–approved application instructions (OMB Number 0648-0151) that prescribe the procedures necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the MMPA. Once NMFS determines an application is adequate and complete, NMFS has a corresponding duty to determine whether and how to authorize take of marine mammals incidental to the activities described in the application. To authorize the incidental take of marine mammals, NMFS evaluates the best available scientific information to determine whether the take would have a negligible impact on the affected marine mammal species or stocks and an unmitigable impact on their availability for taking for subsistence uses. NMFS must also prescribe the “means of effecting the least practicable adverse impact” on the affected species or stocks and their habitat, and on the availability of those species or stocks for subsistence uses, as well as monitoring and reporting requirements.

NMFS received an application for an ITR from Revolution Wind, which was deemed complete on February 28, 2022, and published in the *Federal Register* on March 21, 2022 (National Oceanic and Atmospheric Administration [NOAA] 2022a). Subsequently, the proposed rule for the taking of marine mammals incidental to implementation of the Revolution Wind Offshore Wind Energy Project was published in the *Federal Register* on December 23, 2022 (NOAA 2022b). As outlined above, NMFS reviews applications to determine whether to issue an authorization for the activities described in the application.

### National Historic Preservation Act

The NHPA (54 USC 306108 et seq.) requires federal agencies to consider the effects of their undertakings on historic properties, to the maximum extent possible plan and act to minimize harm to NHLs, and afford the Advisory Council on Historic Preservation an opportunity to comment. BOEM has determined that approving a COP constitutes an undertaking subject to Section 106 of the NHPA and is implementing the Section 106 process (36 CFR 800). Effects to historic properties from the Project could be direct, indirect, and cumulative. The construction of WTGs, installation of electrical support cables, and development of staging areas are ground- or seafloor-disturbing activities that could directly affect archaeological resources. The presence of WTGs could also introduce visual elements out of character with the historic setting of historic structures or landscapes; in cases where historic setting is a contributing element of historic properties' eligibility for the NRHP, the Project could affect those historic properties, including NHLs. NHLs that may be affected by the undertaking will be addressed according to Section 110(f) of the NHPA pursuant to 36 CFR 800.10. Visual impacts to historic properties, in particular, could be cumulative when the Project adds to the visual impacts of other reasonably foreseeable offshore wind energy developments.

The regulations at 36 CFR 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR 800.3–800.6. This process is known as "NEPA substitution for Section 106," and BOEM is using this process and documentation prepared under NEPA to also comply with Section 106. Under NEPA substitution for Section 106 (NEPA Substitution), BOEM is using the public involvement requirements under NEPA to also seek public involvement in its Section 106 review, pursuant to 36 CFR 800.2(d)(3). EIS Appendix J includes BOEM's draft finding of adverse effect, which includes a description and summary of BOEM's consultation to date. BOEM will continue consulting with the Connecticut, Rhode Island, Massachusetts, and New York SHPOs; Advisory Council on Historic Preservation (ACHP); federally recognized tribal nations, and other consulting parties regarding the finding of adverse effect and the resolution of adverse effects. BOEM has and will be conducting Section 106 consultation meeting(s) on the finding of adverse effect and the resolution of adverse effects, and the agency will be requesting the consulting parties to review and comment on the finding of adverse effect and proposed resolution measures. Through NEPA Substitution, resolution of adverse effects will be documented in a memorandum of agreement (MOA) with the consulting parties, concluded prior to the issuance of the ROD.

Under the NEPA process, federally recognized tribes were invited to be cooperating agencies for the Project by BOEM, and officials with the Mashpee Wampanoag Tribe, Mashantucket (Western) Pequot Tribal Nation, and Wampanoag Tribe of Gay Head (Aquinnah) have attended select cooperating agency meetings to date. BOEM received comments from several tribes during June 2021 cooperating agency meetings in the scoping of alternatives and weighed these in the identification of alternatives to consider in detailed EIS analyses. The Mashantucket (Western) Pequot Tribal Nation and the Wampanoag Tribe of Gay Head (Aquinnah) also provided written comments for scoping. Comments received variously from tribes on alternatives included a co-located export cable corridor to be shared with other offshore projects and RWF setbacks and different configurations of WTG layouts to protect the environment (water, wildlife, and other natural and heritage resources) as well as to set back WTGs from land to address visual and cultural impact concerns. A setback option that would restrict/maximize the distance of WTGs from Massachusetts islands was formulated by BOEM in consultation with the Wampanoag Tribe of Gay Head (Aquinnah) and carried forward by BOEM to detailed analyses (i.e., Alternative E). A marine habitat alternative (Alternative C) was also carried forward to detailed analysis based on the comments of many consulting parties, including participating tribes. A draft scoping report was provided for cooperating agency review in June 2021, including to participating tribes.

BOEM fulfilled public involvement requirements for Section 106 of the NHPA through the NEPA public scoping and public meetings process, pursuant to 36 CFR 800.2(d)(3). The scoping summary report (SWCA Environmental Consultants [SWCA] 2022), available on BOEM's Project-specific website, summarizes comments on historic preservation issues. BOEM initiated review under NEPA Substitution on April 2, 2021, with letters sent to identify consulting parties for this undertaking between April 2 and 20, 2021. Letters were then sent between May 11 and 12, 2021, to initiate consultation with those parties previously identified for the undertaking. BOEM posted an additional notification for the public and historic properties owners, and sent letters to local administrators, with an invitation to consult following publication of BOEM's finding of adverse effect under NHPA Section 106 (see EIS Appendix J). BOEM will add additional consulting parties throughout the review process as they are identified. Lists of the consulting parties to date for the Project are provided in BOEM's finding of adverse effect and MOA documents in EIS Appendix J. BOEM held the following consultation meetings with consulting parties:

- An initial consultation meeting with consulting parties on December 17, 2021, to discuss the area of potential effects (APE) and the identification of historic properties within the APE
- A second consultation meeting with consulting parties on April 8, 2022, to discuss the identification of historic properties and potential effects on historic properties
- A third consultation meeting on September 27, 2022, to further discuss adverse effects and their resolution
- A consultation meeting with the Town of Aquinnah on December 5, 2022, focusing on mitigation of adverse effects to historic properties in that town
- A consultation meeting on December 14, 2022, with parties involved with NHLs to review and discuss Project visual effects to NHLs and treatment of adverse effects that would result in harm to NHLs
- A fourth consultation meeting on April 7, 2023, to discuss the identification of the Preferred Alternative, updates to technical reports, and the measures proposed by consulting parties in review of the MOA

Subsequent consultation meetings are anticipated in Q2 2023 and as needed prior to the issuance of the ROD for the purpose of finalizing and executing the MOA.

BOEM's final EIS includes treatment measures for resolving adverse effects to historic properties. The MOA details the final resolution measures to resolve adverse effects, including avoidance, minimization, and mitigation measures.

BOEM has consulted with the ACHP and coordinated with the NPS about a plan on how to handle sensitive information potentially subject to NHPA Section 304. From the beginning of the Section 106 consultation for the Project, BOEM has planned to distribute documents that contain sensitive information to the consulting parties and to post publicly available summaries or redacted versions of Section 106–related documents to BOEM's website. The documents could contain sensitive information on the location and character-defining elements of historic properties that could be subject to NHPA

Section 304—in particular, archaeological sites and sites of religious and cultural significance to tribes. Summaries were posted to BOEM's website for the Project shortly after the Draft EIS was made publicly available. EIS Appendix J contains BOEM's finding of adverse effect and the draft MOA documents, with certain sensitive information redacted. The NEPA scoping, hearings, and review have specifically included presentation of the non-confidential NHPA Section 106 process and information. BOEM notifications to the public on public hearings were posted in local media and newspapers. With respect to the timing of the Draft EIS public review period and the differing dates for technical document review by consulting parties under NHPA Section 106, BOEM believes that it was appropriate to give the consulting parties additional time to review the documents that it distributed to them on August 1, 2022, because supplemental information on NHLs was provided during the review period for the Section 106–related documents and reports on October 1, 2022. With this additional time, the consulting parties had a 90–calendar day review period for the Section 106–related documents from August 1 to October 31, 2022. BOEM elected not to extend the 45-day public comment period on the Draft EIS. Nothing under the NEPA and NHPA Section 106 coordination process under 36 CFR 800.8(c) precludes BOEM from providing consulting parties additional time to review documents specifically related to Section 106 consultation. BOEM has publicly posted the supplemental information on NHLs to the Project website and included the final versions of the finding of effect and MOA documents in the publicly available Final EIS.

In addition to the directives of NEPA and the NHPA, EO 13007 (Indian Sacred Sites) directs federal land management agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites. BOEM management actions within the OCS may not directly affect Indian sacred sites; however, BOEM recognizes its undertakings could affect the physical integrity or ceremonial use of Indian sacred sites located on submerged federal lands on the OCS. As stated previously in the Government-to-Government Consultation with Federally Recognized Indian Tribes section, BOEM is also consulting with Indian tribes on these matters in accordance with EO 13175.

### Magnuson-Stevens Fishery Conservation and Management Act

Pursuant to Section 305(b) of the MSA, federal agencies are required to consult with NMFS on any action that may result in adverse effects on EFH. NMFS regulations implementing the EFH provisions of the act can be found at 50 CFR 600. As provided for in 50 CFR 600.920(b), BOEM has accepted designation as the lead agency for the purposes of fulfilling EFH consultation obligations under Section 305(b) of the act. Certain OCS activities authorized by BOEM may result in adverse effects on EFH and therefore require consultation with NMFS. BOEM is developing an EFH assessment concurrent with this EIS. As outlined in the Cooperating Agencies section above, NMFS deemed the EFH assessment from BOEM complete on March 31, 2023. The EFH consultation is expected to conclude on June 21, 2023 (BOEM 2023c, 2023d).

## Public Involvement in Development of the Environmental Impact Statement

This section provides an overview of the development of the EIS, including public scoping, cooperating agency involvement, and distribution of the EIS for public review and comment.

## Scoping

On April 30, 2021, BOEM issued an NOI to prepare an EIS consistent with the regulations implementing NEPA (42 USC 4321 et seq.) to assess the potential impacts of the Proposed Action and alternatives (BOEM 2021a). The NOI initiated a public scoping period from April 30 through June 1, 2021. During this time, input from federal agencies, tribes, state and local governments, and the general public was gathered regarding the potential of significant resources and issues, impact-producing factors, reasonable alternatives (e.g., size, geographic, seasonal, or other restrictions on construction and siting of facilities and activities), and potential mitigation measures to be analyzed in the EIS as well as provide additional information.

A correction to the NOI was issued by BOEM on June 4, 2021, which reopened the public scoping period (BOEM 2021b), allowing for comments to be received by June 11, 2021. The correction addressed and clarified two statements in the NOI regarding the energy capacity of the proposed wind farm and its distance from shore.[1]

BOEM accepted comment submissions on the NOI via the following mechanisms:

- Electronic submissions received via www.regulations.gov on docket number BOEM-2021-0029
- Hard copy comment letters submitted to BOEM via traditional mail
- Emails submitted to BOEM
- Hard copy comment cards and/or letters received during each of the public scoping meetings
- Comments submitted verbally during the listening sessions of each of the three virtual public scoping meetings

BOEM held three virtual public scoping meetings on May 13, May 18, and May 20, 2021. Each virtual public scoping meeting included a presentation, listening session, and a question and answer session, all available on BOEM’s website at https://www.boem.gov/Revolution-Wind-Scoping-Virtual-Meetings.

## Summary of Scoping Comments

BOEM reviewed and considered, as appropriate, all scoping comments in the development of the Draft EIS and used the comments to identify alternatives for analysis. The scoping summary report (SWCA Environmental Consultants 2022) summarizing the 42 submissions received and the methods for analyzing them is available on BOEM’s website at https://www.boem.gov/Revolution-Wind. In addition, all public scoping submissions received can be viewed online at http://www.regulations.gov by typing “BOEM-2021-0029” in the search field. As detailed in the scoping summary report, the resource areas or NEPA topics most referenced in the scoping comments include birds, marine mammals, effects analysis,

[1] Replaced the sentence “The project will deliver 704 MW of power to the New England energy grid.” with “The project would have the capacity to deliver up to 880 MW of power to the New England energy grid, satisfying the current PPA total of 704 MW.” Also replaced the sentence “The wind turbine generators, offshore substations, array cables, and substation interconnector cables would be located on the [Outer Continental Shelf] approximately 17.4 nautical miles (20 statute miles) south of the coast of Rhode Island.” with “The wind turbine generators, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf (OCS) approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines.”

socioeconomics, commercial fishing, mitigation, wildlife (general), bats, essential fish habitat and finfish, cumulative impacts, and sea turtles.

### Distribution of the Draft Environmental Impact Statement for Review and Comment

On September 2, 2022, BOEM published a notice of availability (NOA) for the Draft EIS. The Draft EIS was made available in electronic format for public viewing at https://www.boem.gov/renewable-energy/state-activities/revolution-wind. Notification was provided, as indicated in Appendix K of the Draft EIS. Hard copies and digital copies of the Draft EIS were delivered to entities as requested. The NOA commenced the 45-day public review and comment period of the Draft EIS through October 17, 2022. BOEM held two virtual public hearings on September 29 and October 11 and three in-person public hearings on October 4–6 and 11, 2022, to solicit feedback and identify issues for consideration in preparing the Final EIS. Throughout the public review and comment period, government agencies, members of the public, and interested stakeholders had the opportunity to provide comments on the Draft EIS in various ways, including the following:

- In hard copy form, delivered by mail, and enclosed in an envelope addressed to Program Manager, Office of Renewable Energy Programs, Bureau of Ocean Energy Management, 45600 Woodland Road, Sterling, Virginia 20166
- Through the regulations.gov online portal by navigating to https://www.regulations.gov/, searching for docket number "BOEM-2022-0045," and submitting a comment
- By attending one of the public hearings on the dates listed in the NOA and providing written or verbal comments

BOEM reviewed and considered all comment submissions in the development of the Final EIS, except those from anonymous sources. BOEM's evaluation of public submissions focused on those comments within the submissions that were identified as substantive. EIS Appendix L describes the public comment processing methodology and includes comment responses. All public comment submissions received on the Draft EIS can be viewed online at https://www.regulations.gov/ by typing "BOEM-2022-0045" in the search field. BOEM received 123 individual comment letters via https://www.regulations.gov/ and 916 individual comments that are summarized and responded to in Appendix L.

### Distribution of the Final Environmental Impact Statement

The EIS is available in electronic form for public viewing at https://www.boem.gov/renewable-energy/state-activities/revolution-wind. Hard copies and digital copies of the Final EIS can be requested by contacting Program Manager, Office of Renewable Energy Programs, Bureau of Ocean Energy Management, 45600 Woodland Road, Sterling, Virginia 20166. Publication of the Final EIS initiates a minimum 30-day mandatory waiting period, during which BOEM is required to pause before issuing a ROD. The ROD will state clearly whether BOEM intends to approve, approve with conditions, or disapprove the COP for construction, O&M, and eventual decommissioning of the Project. Distribution will be provided as indicated in Appendix H of the Final EIS.

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# APPENDIX B

## List of Preparers and Reviewers, References Cited, and Glossary

# Contents



# Tables

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# LIST OF PREPARERS AND REVIEWERS

**Table B-1. Bureau of Ocean Energy Management Contributors**

| Name | Role/Resource Area |
|---|---|
| **National Environmental Policy Act (NEPA) Coordinator** | |
| Olivier, Trevis | NEPA coordinator |
| Segarra, Katherine | NEPA coordinator |
| Wolfson, Laura Lee | NEPA coordinator |
| **Resource Scientists and Contributors** | |
| Baker, Arianna | Navigation and vessel traffic; military uses |
| Bedard, Justin | Cultural resources; government-to-government consultation |
| Bhandari, Doleswar | Socioeconomics |
| Bigger, David | Birds; bats; coastal habitats; terrestrial and coastal fauna; wetlands; USFWS Endangered Species Act (ESA) consultation |
| Caporaso, Alicia | Benthic resources |
| Carrier, Brandi | Project coordinator |
| Chaiken, Emma | Commercial fisheries, economics, and for-hire recreational fishing |
| Chaky, Sindey | Land use and coastal resources |
| Charpentier, Nicole | Coastal Zone management Act coordinator |
| Conrad, Alexander | Marine acoustics and sound exposure |
| Cornelison, Meghan | Environmental justice |
| Damour, Melanie | Navigation and vessel traffic; visual resources |
| de Zeeuw, Maureen | Birds; bats; coastal habitats |
| Glenn, Tre | Marine mammals; sea turtles; birds; bats; National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) ESA consultation |
| Hauer, Whitney | Project coordinator |
| Heinze, Martin | Demographics, employment, and economics |
| Hesse, Jeffrey T. | Military uses |
| Houghton, Bonnie | Military uses |
| Howson, Ursula | NOAA NMFS essential fish habitat (EFH) consultation |
| Jensen, Mark | Demographics, employment, economics, recreation and tourism |
| Johnson, Stacey | NEPA compliance |
| Jones, Douglas | Cultural resources; government-to government consultations |
| Lilley, Meredith | Project coordinator |
| Luton, Harry | Environmental justice; land use; recreation and tourism |

| Name | Role/Resource Area |
|---|---|
| McCarty, John | Recreation and tourism; visual resources |
| Merritt, Stacie | Air quality |
| Miller, Jennifer | Alternatives, geophysical, cable burial and routing |
| Morin, Michelle | Chief, Environment Branch for Renewable Energy; NEPA compliance |
| Moshier, Marissa | Cultural resources, Section 106 consultations |
| Nord, Beth | Marine mammals; sea turtles |
| Oliver, Liz | Tribal liaison |
| Ren, Cholena | Air quality |
| Reuther, Dustin | Environmental justice, land use, recreation and tourism |
| Schiff, John | Water quality |
| Slayton, Ian | Cumulative impacts; air quality |
| Sorset, Scott | Cultural resources |
| Stokely, Sarah | Cultural resources; Section 106 consultations |
| Steen, Mariana | Benthic resources; invertebrates; finfish and essential fish habitat; NOAA NMFS EFH consultation |
| Stromberg, Jessica | Project coordinator and chief, Environment Branch for Renewable Energy; NEPA compliance |
| Sullivan, Kimberly | Environmental justice |
| Vaughn, Sarah | Water quality |
| White, Timothy | Birds; bats |
| Wisman, Jeri | Birds; bats; terrestrial and coastal fauna; wetlands; USFWS ESA consultation |
| Wolf, Jacob | Air quality |

**Table B-2. Reviewers**

| Name | Title | Agency |
|---|---|---|
| Brown, William | Chief Environmental Officer | U.S. Bureau of Ocean Energy Management (BOEM) |
| Segarra, Katherine | NEPA Coordinator | BOEM |
| Olivier, Trevis | NEPA Coordinator | BOEM |
| Wolfson, Laura Lee | NEPA Coordinator | BOEM |
| Giordano, Juliette | Lead Environmental Protection Specialist | Bureau of Safety and Environmental Enforcement |
| Baker, Arianna | Renewable Energy Policy Specialist | BOEM |

| Name | Title | Agency |
|---|---|---|
| Hildreth, Emily | Renewable Energy Policy Specialist | BOEM |
| Melendez-Arreaga, Pedro | Solicitor | U.S. Department of the Interior, Office of the Solicitor |
| Sarver, Kathryn | Solicitor | U.S. Department of the Interior, Office of the Solicitor |
| Vorkoper, Stephen | Solicitor | U.S. Department of the Interior, Office of the Solicitor |
| Timmerman, Timothy | Director | U.S. Environmental Protection Agency Region 1, Office of Environmental Review |
| Engler, Lisa | Director | Massachusetts Office of Coastal Zone Management |
| Hooker, Brian | Endangered Species Subject Matter Expert | BOEM |
| Crocker, Julie | Endangered Fish Branch Chief, GARFO Protected Resources Division | National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) |
| Tuxbury, Susan | Fishery Biologist/Wind Program Coordinator, GARFO Habitat and Ecosystems Services Division | NOAA NMFS |
| Gray, Terry | Acting Director | Rhode Island Department of Environmental Management (RIDEM) |
| Amerault, Suzanne | Assistant to the Acting Director | RIDEM |
| Willis, Jeffrey | Acting Executive Director | Rhode Island Coastal Resource Management Council |
| Handell, Naomi | Project Manager, USACE, New York District Regulatory Branch-Eastern Section | U.S. Army Corps of Engineers (USACE) |
| Jacek, Christine | Project Manager, USACE New England District | USACE |
| Brien, Ruthann | Project Manager, USACE New England District | USACE |
| Detweiler, George | Team Leader, Office of Navigation Standards | U.S. Coast Guard (USCG) |
| Desautels, Michele | District 1 Agency Point of Contact | USCG |

**Table B-3. Consultants**

| Name | Role/Resource Area |
|---|---|
| **Project Management/Coordinators** | |

| Name | Role/Resource Area |
|---|---|
| Fluder, Joseph; SWCA | Corporate sponsor |
| Kloepfer, Robert; SWCA | Project sponsor |
| Hartmann, Christine; SWCA | Project manager; all sections |
| Wilmot, Susan; SWCA | Deputy project manager; all sections |
| Smith, Earl; SWCA | Geographic information systems |
| Diais, Madeline; SWCA | Administrative record, executive summary, appendices |
| **Subject Matter Experts** | |
| Berger, Chris; Confluence Environmental Company, Inc. (Confluence) | Sea turtles |
| Bockey, Chris; SWCA | Visual resources |
| Bush, Diane; SWCA | Editor |
| Clapsaddle, Madison; SWCA | Appendices |
| Cziesla, Chris; Confluence | Marine mammals, sea turtles |
| Doyle, Eric; Confluence | Benthic resources; invertebrates; EFH/finfish; marine mammals; sea turtles; other marine uses; land use and coastal infrastructure |
| Douglas, Calvin; Confluence | EFH/finfish |
| Faulkner, Geneva; Confluence | Land use and coastal infrastructure; other marine uses |
| Fisher, Michael; Northern Economics, Inc. (NEI) | Navigation and vessel traffic |
| Giblin, Kara; SWCA | Wetlands and non-tidal waters |
| Gilmer, Anna; SWCA | Cultural resources |
| Guest, Joanna; SWCA | Air quality |
| Hartley, Marcus; NEI | Commercial fisheries and for-hire recreational fishing; Demographics, employment, and economics |
| Himmelstein, Ashley; R. Christopher Goodwin & Associates (RCGA) | Cultural resources—marine archaeology |
| Hogel, Adrian; SWCA | Bats; birds; coastal habitats and fauna; wetlands and non-tidal waters |
| Huyhn, Alexis; Confluence | EFH/finfish, GIS support |
| Klewicki, Laura; SWCA | Water quality |
| Linehan, Kerri; SWCA | Editor |
| Maymon, Jeffrey; RCGA | Cultural resources—marine archaeology |
| McDonald, Kelly; Confluence | Marine mammals; GIS support |
| Medeiros, Melanie; SWCA | Cultural resources |

| Name | Role/Resource Area |
|---|---|
| Nixley, Todd; Confluence | Land use and coastal infrastructure; GIS support; other marine uses |
| Novak, Grant; Confluence | Benthic resources; invertebrates; EFH/finfish; marine mammals; sea turtles; other (marine) uses; land use and coastal infrastructure |
| Phillips, Scott; SWCA | Cultural resources—terrestrial resources, terrestrial archaeology, historic architecture, viewshed resources; tribal consultation |
| Sato, Irene; Confluence | Marine mammals |
| Schug, Donald; NEI | Commercial fisheries and for-hire recreational fishing; environmental justice |
| Smith, Debbi; SWCA | Formatter and 508 specialist |
| Sohm, Brad; SWCA | Air quality |
| Soncarty, Chris; Confluence | Marine mammals; sea turtles; biological assessments; EFH/finfish |
| Tucker Burfitt, Linda; SWCA | Editor |
| Wheeler, Letitia; Confluence | Land use and coastal infrastructure; other marine uses |
| Wilmot, Sue; SWCA | Recreation and tourism; water quality |
| Witzens, Kelcie; SWCA | Formatter and 508 specialist |

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## Land Use and Coastal Infrastructure

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## Wetlands and Non-Tidal Waters

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# GLOSSARY

| Term | Definition |
|---|---|
| affected environment | Environment as it exists today that could be impacted by the proposed Project |
| ancient submerged landform feature | A landform as it was in ancient times |
| algal blooms | Rapid growth of the population of algae, also known as algae bloom |
| allision | A moving ship running into a stationary ship |
| anthropogenic | Generated by human activity |
| applicant | Revolution Wind, LLC |
| archaeological resource | Historical place, site, building, shipwreck, or other archaeological site on the American landscape |
| automatic identification system | Automatic tracking system used on vessels to monitor ship movements and avoid collision |
| baleen whale | A cetacean with baleens (whalebones) instead of teeth |
| below grade | Below ground level |
| benthic | Related to the bottom of a body of water |
| benthic resources | The seafloor surface, the substrate itself, and the communities of bottom-dwelling organisms that live within these habitats |
| Cetacea | Order of aquatic mammals made up of whales, dolphins, porpoises, and related lifeforms |
| coastal habitat | Coastal areas where flora and fauna live, including salt marshes and aquatic habitats |
| coastal waters | Waters in nearshore areas where bottom depth is less than 98.4 feet |
| coastal zone | The lands and waters starting at 3 nautical miles from the land and ending at the first major land transportation route |
| cofferdam | A watertight enclosure pumped dry to permit construction work below the waterline |
| commercial fisheries | Areas or entities raising and/or catching fish for commercial profit |
| commercial-scale wind energy facility | Wind energy facility usually greater than 1 megawatt that sells the produced electricity |
| criteria pollutant | One of six common air pollutants for which the U.S. Environmental Protection Agency sets National Ambient Air Quality Standards: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, or sulfur dioxide |
| critical habitat | Geographic area containing features essential to the conservation of threated or endangered species. This is a specific term and designation within the U.S. Endangered Species Act. |
| cultural resource | Historical districts, objects, places, sites, buildings, shipwrecks, and archeological sites on the American landscape, as well as sites of traditional, religious, or cultural significance to cultural groups, including Native American tribes |

| Term | Definition |
|---|---|
| cumulative impacts | Impacts that could result from the incremental impact of a specific action, such as the proposed Project, when combined with other past, present, or reasonably foreseeable future actions or other projects; can occur from individually minor, but collectively significant actions that take place over time |
| demersal | Living close to the ocean floor |
| design envelope | The range of proposed Project characteristics defined by the applicant and used by the Bureau of Ocean Energy Management (BOEM) for purposes of environmental review and permitting |
| dredging | Removal of sediments and debris from the bottom of lakes, rivers, harbors, and other water bodies |
| duct bank | Underground structure that houses the onshore export cables, which consists of polyvinyl chloride (PVC) pipes encased in concrete |
| ecosystem | Community of interacting living organisms and nonliving components (such as air, water, soil) |
| environmental protection measure (EPM) | Measure proposed in a COP to avoid or minimize potential impacts |
| electromagnetic field | A field of force produced by electrically charged objects and containing both electric and magnetic components |
| endangered species | A species that is in danger of extinction in all or a significant portion of its range |
| Endangered Species Act–listed species | Species listed under the Endangered Species Act |
| ensonified | The process of filling with sound |
| environmental consequences | The potential impacts that the construction, operations, maintenance, and decommissioning of the proposed Project would have on the environment |
| environmental justice communities | Minority and low-income populations affected by the proposed Project |
| essential fish habitat | “Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (50 Code of Federal Regulations 600) |
| export cables | Cables connecting the wind facility to the onshore electrical grid power |
| finfish | Vertebrate and cartilaginous fishery species, not including crustaceans, cephalopods, or other mollusks |
| for-hire commercial fishing | Commercial fishing on a for-hire vessel, i.e. a vessel on which the passengers make a contribution to a person having an interest in the vessel in exchange for carriage |
| for-hire recreational fishing | Fishing from a vessel carrying a passenger for hire who is engaged in recreational fishing |

| Term | Definition |
|---|---|
| foundation | The bases to which the wind turbine generators and offshore substation are installed on the seabed. Five alternative foundation designs were considered and reviewed for the Project (Section 2.2.2.2 of the COP): monopile; piled three-, four-, or six-legged jacket; suction caisson jackets; monopod suction caisson; or gravity-based structure. Monopile is the selected foundation type for the Project. |
| hard-bottom habitat | Benthic habitats comprised of hard-bottom (e.g., cobble, rock, and ledge) substrates |
| historic property | Prehistoric or historic district, site, building, structure, or object that is eligible for or already listed in the National Register of Historic Places. Also includes any artifacts, records, and remains (surface or subsurface) related to and located within such a resource |
| horizontal directional drilling | Trenchless technique for installing underground cables, pipes, and conduits using a surface-launched drilling rig |
| hull | Watertight frame or body of a ship |
| inter-array cables | Cables connecting the wind turbine generators to the offshore substations |
| interconnection facility | Substation connecting the proposed Project to the existing bulk power grid system |
| invertebrate | Animal with no backbone |
| jack-up vessel | Mobile and self-elevating platform with buoyant hull |
| jet plow | Method of submarine cable installation equipment that primarily uses water jets to fluidize soil, temporarily opening a channel to enable the cable to be lowered under its own weight or be pushed to the bottom of the trench via a cable depressor. |
| knot | Unit of speed equaling 1 nautical mile per hour |
| landing site | The shoreline landing site at which the offshore cable transitions to onshore |
| Lease Area | The entire area that Revolution Wind, LLC purchased from BOEM. The RWF must be within the Lease Area. |
| marine mammal | Aquatic vertebrate distinguished by the presence of mammary glands, hair, three middle ear bones, and a neocortex (a region of the brain) |
| marine waters | Waters in offshore areas where bottom depth is more than 98.4 feet |
| mechanical cutter | Method of submarine cable installation equipment that involves a cutting wheel or excavation chain to cut a narrow trench into the seabed allowing the cable to sink under its own weight or be pushed to the bottom of the trench via a cable depressor. |
| mechanical plow | Method of submarine cable installation equipment that involves pulling a plow along the cable route to lay and bury the cable. The plow’s share cuts into the soil, opening a temporary trench which is held open by the side walls of the share, while the cable is lowered to the base of the trench via a depressor. Some plows may use additional jets to fluidize the soil in front of the share. |
| monopile or monopile foundation | A long steel tube driven into the seabed that supports a tower |

| Term | Definition |
|---|---|
| National Ambient Air Quality Standards | Limits on atmospheric concentration of six criteria pollutants that are common in outdoor air and considered harmful to public health and the environment as established by the U.S. Environmental Protection Agency under authority of the Clean Air Act. |
| nautical mile | A unit used to measure sea distances and equivalent to approximately 1.15 miles |
| offshore Revolution Wind Export Cable | Export cables located in state or federal waters |
| offshore substation | The interconnection point between the wind turbine generators and the export cable; the necessary electrical equipment needed to connect the inter-array cables to the offshore export cables |
| onshore transmission cable | Export cables located on land |
| operations and maintenance facilities | Would include offices, control rooms, warehouses, shop space, and pier space |
| outer continental shelf | All submerged land, subsoil, and seabed belonging to the United States but outside of states' jurisdiction |
| pile | A type of foundation akin to a pole |
| pile driving | Installing foundation piles by driving them into the seafloor |
| pinnipeds | Carnivorous, semiaquatic, fin-footed marine mammals, also known as seals |
| plume | Column of fluid moving through another fluid |
| private aids to navigation | Visual references operated and maintained by the U.S. Coast Guard, including radar transponders, lights, sound signals, buoys, and lighthouses, that support safe maritime navigation |
| Project | The siting and development of the Revolution Wind Farm and the Revolution Wind Export Cable |
| protected species | Endangered or threatened species that receive federal protection under the Endangered Species Act of 1973 (as amended) |
| right-of-way | Registered easement on private or government land that allows access by another entity. For purposes of renewable energy development of the Outer Continental Shelf (OCS), BOEM defines a right-of-way grant as an authorization issued by BOEM under 30 CFR 585 Subpart B to use a portion of the OCS for the construction and use of a cable or pipeline for the purpose of gathering, transmitting, distributing, or otherwise transporting electricity or other energy product generated or produced from renewable energy but does not constitute a project easement under Subpart B. The term also means the area covered by the authorization. |
| ruderal | Growing on waste ground or among refuse |
| scour protection | Protection consisting of rock and stone that would be placed around all foundations to stabilize the seabed near the foundations as well as the foundations themselves |
| sessile | Attached directly by the base |

| Term | Definition |
|---|---|
| soft-bottom habitat | Benthic habitats include soft-bottom (i.e., unconsolidated sediments) and hard-bottom (e.g., cobble, rock, and ledge) substrates, as well as biogenic habitat (e.g., eelgrass, mussel beds, and worm tubes) created by structure-forming species |
| Revolution Wind Farm (RWF) | The work area containing all proposed wind turbine generators, offshore substations, and inter-array cables |
| substrate | Earthy material at the bottom of a marine habitat; the natural environment that an organism lives in |
| suspended sediments | Very fine soil particles that remain in suspension in water for a considerable period of time without contact with the bottom. Such material remains in suspension due to the upward components of turbulence and currents, and/or by suspension. |
| threatened species | A species that is likely to become endangered within the foreseeable future |
| tidal energy project | Project related to the conversion of the energy of tides into usable energy, usually electricity |
| transition vault | Underground concrete transition vault that to be constructed at the landing site and inside of which offshore and shore South Fork Export Cable would be spliced together. |
| trawl | A large fishing net dragged by a vessel at the bottom or in the middle of sea or lake water |
| turbidity | A measure of water clarity |
| vibracore | Technology/technique for collecting core samples of underwater sediments and wetland soils |
| viewshed | Area visible from a specific location |
| visual resource | The visible physical features on a landscape, including natural elements such as topography, landforms, water, vegetation, and manmade structures |
| wetland | Land saturated with water; marshes; swamps |
| wind energy | Electricity from naturally occurring wind |
| wind energy area | Areas with significant wind energy potential and defined by BOEM |
| wind turbine generator | Component that puts out electricity in a structure that converts kinetic energy from wind into electricity |

# APPENDIX C

## Incomplete or Unavailable Information

# Contents

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# Introduction

In accordance with Section 1502.21[1] of the Council on Environmental Quality regulations implementing the National Environmental Policy Act (NEPA), when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement (EIS) and there is incomplete or unavailable information, the agency shall make clear that such information is lacking.

Given the substantial geographic and temporal scale of the cumulative impacts analysis for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (Project), some information regarding ongoing activities is unavailable or only available in qualitative or summary form—in particular, for many offshore resources. Concerning reasonably foreseeable construction and operations plans (COPs), specific information is available only for COPs that have been submitted for Bureau of Ocean Energy Management (BOEM) review and are publicly available (see Appendix E of the EIS). Given that information is lacking for other offshore wind activities considered reasonably foreseeable, and several of the COPs submitted are currently under review to determine whether they contain complete and sufficient information for environmental review, a series of assumptions were necessary to conduct the cumulative impacts analysis as outlined in Appendix E3, Table E3-1. Although these assumptions were necessary to allow the analysis to proceed with a reasonable degree of certainty, it is not known whether or to what extent future offshore wind activities will proceed according to these assumptions.

In addition to the uncertainty regarding future activities contemplated in the cumulative analysis, there is also incomplete or unavailable information regarding the likely consequences of various activities on the resources analyzed. When incomplete or unavailable information was identified, BOEM considered whether the information was relevant to the assessment of impacts and essential to a reasoned choice among alternatives. If essential to a reasoned choice among the alternatives, BOEM considered whether it was possible to obtain the information and if the cost of obtaining it was unreasonable. If information could not be obtained within the time frame needed for this analysis or because of exorbitant costs, BOEM applied acceptable scientific methodologies to inform the analysis in light of this incomplete or unavailable information. For example, conclusive information on many impacts of the offshore wind industry may not be available for years and would therefore not be available within the contemplated time frame of this NEPA process. In its place, subject matter experts have used the scientifically credible information available and accepted scientific methodologies for proxy indicators or data to evaluate impacts on the resources while this information is unavailable.

# Incomplete or Unavailable Information Analysis for Resource Areas

## Air Quality

Any action alternative for the Project would lead to air quality impacts that range from **negligible** to **moderate** and **minor** beneficial. Although a quantitative emissions inventory analysis of the region over the next 35 years has not been completed, the EIS does disclose annual emissions that could have been

[1] 40 Code of Federal Regulations 1502.22 in Council on Environmental Quality regulations implementing NEPA prior to September 14, 2020.

avoided by using non–fossil fuel energy sources within the air quality geographic analysis area, as well as the health impacts from those avoided emissions. In addition, the differences among action alternatives with respect to direct emissions due to construction and installation, operations and maintenance (O&M), and decommissioning of the Project would likely be small. For this reason, the analysis provided in the EIS is sufficient to support sound scientific judgements and informed decision making related to the use of onshore and offshore portions of the air quality geographic analysis area. In summary, BOEM did not identify incomplete or unavailable information on air quality that is essential to a reasoned choice among alternatives.

## Bats

Habitat use and distribution vary between season and species, and as a result, there will always be some level of incomplete information on the distribution and habitat use of migratory bats in the offshore portions of the bat geographic analysis area. In addition, because U.S. offshore wind is in its infancy, with three offshore wind projects (Block Island Wind Farm, Virginia Commercial Offshore Wind, and Vineyard Wind Farm) having been or currently being constructed at the time of this analysis, there is some level of uncertainty regarding the potential collision risk to individual bats that may be present within the offshore portions of the geographic analysis area. However, empirical data, including regional bat acoustic studies conducted from coastal, island, vessel, or offshore structure locations and regional telemetry data from recent studies focusing on listed species, were used to assess the likelihood of offshore occurrence, seasonal patterns, and bat species composition.

Information on collision risk to migratory bats is also available from observations collected at land-based U.S. wind facilities, and based on a number of assumptions regarding the applicability to offshore environments, this information was used to analyze and evaluate the potential for collisions associated with the wind turbine generators (WTGs) analyzed in the EIS. In addition, and as described in Section 3.5.1 of the EIS, the likelihood of an individual migratory bat encountering the rotor swept zone of one or more operating WTGs is negligible. For this reason, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the distribution and use of the offshore portions of the geographic analysis area, as well as to the potential for collision risk of migratory bats. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM did not identify incomplete or unavailable scientifically based information on bat resources that is essential to a reasoned choice among alternatives.

## Benthic Habitat and Invertebrates

Although there is some uncertainty regarding the temporal distribution of benthic resources and periods during which they might be especially vulnerable to disturbance, site-specific benthic habitat mapping by Inspire Environmental (2021) and other broadscale studies (e.g., Fugro 2019, 2021; Guida et al. 2017; Stantec 2020) provided a suitable basis for predicting the species, community composition, and distributions of benthic resources in the geographic analysis area. Some uncertainty also exists about the effects of some impact-producing factors (IPFs) on benthic resources. For example, the available information on invertebrate sensitivity to electromagnetic fields (EMFs) is equivocal (Hutchinson et al. 2020), and sensitivity to sound pressure and particle motion effects is not well understood for all species (e.g., squid sensitivity to vibration effects transmitted through sediments). However, information from monitoring studies of European wind facilities and, more recently, the Block Island Wind Farm in the United States provides no indication of biologically significant adverse effects. There is broader uncertainty about the long-term effects of changes in biological productivity resulting from the creation of new habitat types on the mid-Atlantic Outer Continental Shelf (OCS) in the form of a distributed network of artificial reefs. The widespread development of offshore renewable energy facilities would, however, create a distributed network of artificial reefs on the mid-Atlantic OCS. These reefs form biological hotspots that could support species range shifts and expansions, nonnative species, and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). The nature and significance of secondary synergistic effects, such as changes in diet and predator-prey interactions resulting from habitat modification in combination with other IPFs, are not fully known. Lastly, the nature, extent, and significance of potential spillover effects on broader ecosystem functions, such as larval dispersal, are not fully understood (van Berkel et al. 2020).

As stated, ongoing monitoring studies at European wind facilities and the Block Island Wind Farm in the United States provide a useful basis for evaluating the combined effects of these IPFs on the biological community as a whole, even if effects on individual species cannot be predicted with specificity. On balance, the current scientific information is sufficient to support sound scientific judgements and informed decision making because relevant studies monitoring changes at wind farms have not observed significant changes to finfish over years of study. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM did not identify incomplete or unavailable information that is essential to a reasoned choice among alternatives. There is uncertainty regarding the spatial and temporal occurrence of invertebrates throughout the entire benthic habitat and invertebrates geographic analysis area. However, broadscale information is available from sources such as federal fisheries management plans (FMPs) and surveys completed to support COP submission. There is also uncertainty regarding behavioral effects from each IPF individually and cumulatively. Again, BOEM is able to draw on existing scientific findings, as presented in Section 3.6 of the EIS and references therein. The available information is suitable for characterizing the likely effects of each IPF and has been used to analyze potential impacts resulting from the proposed Project and past, present, and reasonably foreseeable actions. Therefore, BOEM concludes that the available information about potential impacts on benthic habitats supports a reasoned choice among alternatives.

## Birds

Habitat use and distribution of birds vary between seasons, species, and years, and as a result, there will always be some level of incomplete information on the distribution and habitat use of birds in the offshore portions of the birds geographic analysis area. However, survey findings for the Project (see COP Appendix K [*Onshore Natural Resources and Biological Assessment*] [VHB 2023]) were used to inform the predictive models and analyze the potential adverse impacts on bird resources in the EIS. In addition, because U.S. offshore wind is in its infancy, as described above for bats, there will always be some level of uncertainty regarding the potential for collision risk and avoidance behaviors for some of the bird species that may be present within the offshore portions of the geographic analysis area.

Bird mortality data are available for onshore wind facilities, and based on a number of assumptions (described in Section 3.7 of the EIS) regarding their applicability to offshore environments, these data were used to inform the analysis of bird mortality associated with the offshore WTGs analyzed in the EIS. However, uncertainties exist regarding the use of the onshore bird mortality rate to estimate offshore bird mortality rate because of differences in species groups present, the life history and behavior of species, and the differences in the offshore marine environment compared to onshore habitats. Similarly, the U.S. Fish and Wildlife Service biological assessment (BA) (BOEM 2022, 2023a) also provides an estimate of potential mortality using the Band (2012) collision risk model for Endangered Species Act species. Modeling is commonly used to predict the potential mortality rates for marine bird species in Europe and the United States (BOEM 2015, 2022). Because of inherent data limitations, these models often represent only a subset of species potentially present. However, the datasets used by both Revolution Wind, LLC (Revolution Wind), and BOEM to assess the potential for exposure of birds to offshore wind activities represent the best available data and provide context at both local and regional scales. Further, sufficient information on collision risk and avoidance behaviors observed in related species at European offshore wind projects is available and was used to analyze and corroborate the potential for these impacts as a result of the Project (e.g., Petersen et al. 2006; Skov et al. 2018). For this reason, the analysis provided in the EIS is sufficient to support sound scientific judgements and informed decision making related to distribution and use of the offshore portions of the analysis area, as well as to the potential for collision risk and avoidance behaviors in bird resources. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM did not identify incomplete or unavailable information on bird resources that is essential to a reasoned choice among alternatives.

## Coastal Habitats and Fauna

Although the preferred areas of coastal habitats and associated fauna are generally known, exact abundances and distributions of various fauna are likely to remain unknown for the foreseeable future. However, the species inventories and other information from nearby areas provide an adequate basis for evaluating the fauna likely to inhabit the coastal habitat and fauna geographic analysis area. Additionally, the onshore activities proposed involve only common, industry-standard activities for which impacts are generally understood. For this reason, BOEM identified no incomplete or unavailable information required to conduct the impact assessment or to make a reasoned choice among alternatives.

## Commercial Fisheries and For-Hire Recreational Fishing

Fisheries are managed in the context of an incomplete understanding of fish stock dynamics and effects of environmental factors on fish populations. The fisheries information used in this assessment has limitations. For example, vessel trip report data are only an approximation because they are self-reported, and available historical data lack consistency, making comparisons challenging. However, these data do represent the best available data, and sufficient information exists to support the findings presented herein.

A second limitation is that aggregated geographic information system (GIS)–based data is necessary to fully update the revenue intensity figures. EIS Figures G-CF1 through G-CF13 in Appendix G provide low-resolution images of revenue intensity by FMP and provide graphic representations of the distribution of fishing efforts near the Lease Area for the years shown. However, similar revenue intensity figures are not available for ports or gear. Although the analysis in EIS Section 3.9 refers to these figures, annual vessel trip report data for 2008 to 2019 from the Greater Atlantic Regional Fisheries Office (GARFO) (2021) were the primary sources of data used in the tables throughout the assessment. These tables in EIS Section 3.9 summarize harvests and revenues by FMP, by ports, and by gears within the RWF and Revolution Wind Export Cable. Although additional revenue intensity figures would augment information provided in the analysis, BOEM determined this information is not essential to a reasoned choice among alternatives.

## Cultural Resources

BOEM is applying NEPA Substitution for the steps in the National Historic Preservation Act Section 106 process under 36 Code of Federal Regulations 800.8, facilitating BOEM's good faith effort to identify historic properties and assess effects prior to construction. The record of decision (ROD) will apply to the alternative(s) selected by BOEM. BOEM will execute a memorandum of agreement before issuing the ROD and would require that the memorandum of agreement specify that measures for avoiding, minimizing, and mitigation adverse effects to historic properties be implemented for the selected alternative following ROD issuance. Therefore, BOEM has not identified incomplete or unavailable information on cultural resources that is essential to a reasoned choice among alternatives.

## Demographics, Employment, and Economics

Estimates of local employment and income resulting from development and construction of the Project may be underestimated because the broadly used model to project the employment impacts of offshore wind energy development—the Jobs and Economic Development Impact Offshore Wind Model (JEDI-OWM) developed by the National Renewable Energy Laboratory (NREL)—has not been updated to include recent developments within the U.S. offshore wind component manufacturing and fabrication industry, despite NREL's recent updates to capital cost estimation portions of the JEDI-OWM.[2]

The COP and COP appendices do provide estimates of a capital and operating cost of a single configuration of RWF (with 89 8-megawatt [MW] WTGs and a nameplate capacity of 712 MW) along with an estimate of economic impacts to the United States and local economies of Rhode Island and Connecticut based on the 2017 version of the JEDI-OWM. It is presumed that Revolution Wind provided specific guidance to their economic analysts with respect to technical and cost parameters, as well as United States and local spending coefficients for this assessment. However, most of the specific technical details of the assessment were not provided to BOEM or to the authors of the EIS. Therefore, estimates of economic impacts of the development and construction of RWF under the range of EIS alternatives rely heavily on the economic impacts developed in the COP relative to estimates of capital and operating costs of the single configuration provided.

Because Revolution Wind provided the baseline estimates of economic impacts of the Project, and because other information from NREL's updated JEDI-OWM model[2] provides current estimates of

[2] An updated version of JEDI-OWM was made available in 2021. The portions of the JEDI-OWM used to estimate capital operational costs have been updated and include cost estimates of large WTGs (12 MW and 15 MW) that are likely to be employed in future offshore windfarms. However, the 2021 version of the model does not provide local purchase coefficients that are needed to estimate economic impacts. In addition, NREL has not yet published a user manual or a methodological report for the 2021 version. The economic impact estimates used in the demographic, employment, and economics section of the EIS are augmented by improved capital cost estimates in the new release, but continue to employ U.S. and local spending patterns included in the 2017 version of the JEDI-OWM.

capital costs of offshore wind farms with WTGs ranging up to 15 MW, BOEM determined that the lack of directly provided information with respect to other configurations is not essential to a reasoned choice among alternatives.

There is also uncertainty regarding the distribution of economic impacts among geographic areas, income brackets, and other sub-components of the economy. These effects will depend on how the Project supply chain evolves, the contracts that are ultimately entered into, and provisions with the Project's power purchase agreements and state laws. Much of this uncertainty is inherent at this stage of the Project. In addition, BOEM has used appropriate methods to estimate economic impacts given the available information. Therefore, additional information regarding the distribution of impacts among sub-components of the economy is not essential to a reasoned choice among alternatives.

## Environmental Justice

Evaluations of impacts on environmental justice communities rely on the assessment of impacts on other resources. As a result, incomplete or unavailable information related to other resources, as described in this document, also affect the completeness of the analysis of impacts on environmental justice communities. However, BOEM has determined that the incomplete and unavailable resource information summarized in this appendix was either not relevant to a reasoned choice among alternatives or the alternative data or methods used to predict potential impacts provided the best available information. Therefore, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the proposed uses of the onshore and offshore portions of the environmental justice analysis area.

## Finfish and Essential Fish Habitat

Monitoring studies of European and American offshore wind energy facilities to date (Hutchison et al. 2020; Raoux et al. 2017; Reubens et al. 2013, 2014) provide no indication of biologically significant adverse effects on finfish and their habitats. However, broader uncertainty remains about the long-term effects of changes in biological productivity resulting from the creation of new habitat types along the Atlantic OCS in the form of a distributed network of artificial reefs (Degraer et al. 2020). The nature and significance of potential ecological responses, such as changes in diet and predator-prey interactions resulting from changes in habitat productivity, are not fully known. Lastly, the nature, extent, and significance of potential spillover effects on broader ecosystem functions, such as seasonal stratification of the Cold Pool and larval dispersal patterns, are not fully understood (Johnson et al. 2021; van Berkel et al. 2020). Targeted modeling studies suggest that the effects of offshore wind development in the RI/MA and MA WEAs on water column stratification and larval dispersal patterns are unlikely to be ecologically significant (Johnson et al. 2021). However, this study considered only two out of several WEAs in the geographic analysis area, meaning that the potential effects resulting from full build-out of all WEAs within the geographic analysis area remain to be studied.

As stated, ongoing monitoring studies at European wind facilities and the Block Island Wind Farm in the United States provide a useful basis for evaluating the combined effects of these IPFs on the biological community as a whole, even if effects on individual species cannot be predicted with specificity. On balance, the current scientific information is sufficient to support sound scientific judgements and informed decision making because relevant studies monitoring changes at wind farms have not observed significant changes in finfish abundance and distribution at regional scales over years of study. For example, while wind farm installation can displace soft-bottomed habitat in favor of hard substrates, the affected areas usually represent a small fraction of available habitat. Moreover, offshore wind structures provide habitat complexity that generally results in an increase in biological productivity, which in turn can attract fish species that associate with complex habitat types (Degraer et al. 2020). Therefore, while some uncertainty remains, the available information does not suggest that long-term negative effects are likely. The similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives.

There is uncertainty regarding the spatial and temporal occurrence of finfish and essential fish habitat (EFH) throughout the entire finfish and EFH geographic analysis area. This is especially true for Atlantic cod (*Gadus morhua*) use of the Coxes Ledge area, which is part of an ongoing study funded by BOEM examining the movements of commercial fish species in southern New England (National Oceanic and Atmospheric Administration [NOAA] 2020a). However, broadscale information is available from sources such as federal FMPs and from surveys completed to support COP submission. There is also uncertainty regarding behavioral effects from each IPF individually and cumulatively (e.g., operational noise effects on Atlantic cod communication during spawning). Again, BOEM is able to draw on existing scientific findings, as presented in Section 3.13 of the EIS and references therein, in the RWF EFH assessment (BOEM 2023b, 2023c), and in the National Marine Fisheries Service (NMFS) BA (BOEM 2023d, 2023e). The available information is suitable for characterizing the likely effects of each IPF and has been used to analyze potential impacts resulting from the Project and past, present, and reasonably foreseeable actions. For this reason, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the proposed uses of the offshore portions of the geographic analysis area. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM concluded that the available information about potential impacts on finfish and EFH supports a reasoned choice among alternatives.

## Land Use and Coastal Infrastructure

There is no incomplete or unavailable information related to the analysis of impacts on land use and coastal infrastructure.

## Marine Mammals

Although there is some uncertainty regarding the temporal distribution of marine mammals and periods during which they might be especially vulnerable to Project disturbance, the NMFS BA (BOEM 2023d, 2023e) provides detailed species descriptions and life history information. NOAA has summarized the most current information about marine mammal population status, occurrence, and use of the region in their 2019 and 2020 stock status reports for the Atlantic OCS and Gulf of Mexico (Hayes et al. 2020, 2021). These studies provide a suitable basis for predicting the species, abundances, and distributions of marine mammals in the geographic analysis area.

Uncertainty also exists with regard to the effects of some IPFs on marine mammals. For example, there is still some uncertainty regarding the impacts on marine mammals from EMF produced by submarine cables. This uncertainty is due in part to difficulties in evaluating population-scale impacts around regional deployments (Taormina et al. 2018), to the large size and high mobility of marine mammals, and to other logistical constraints, which make experimental studies infeasible. As a result, no scientific studies have been conducted to examine the effects of altered EMF on marine mammals. Although scientific studies summarized by Normandeau Associates, Inc., et al. (2011) demonstrate that marine mammals are sensitive to and can detect small changes in magnetic fields, as described in Section 3.15 of the EIS, those potentially detectable impacts would only occur within a few feet of select cable segments. There is no basis to conclude that the potential detection of EMFs would lead to any measurable change in behavior. For this reason, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the proposed uses of the offshore portions of the geographic analysis area.

Some uncertainty also exists regarding the cumulative acoustic impacts associated with pile-driving activities. The available information relative to impacts on marine mammals from pile driving associated with offshore wind development is primarily limited to information on harbor porpoise (*Phocoena phocoena*) and harbor seal (*Phoca vitulina*) because most of this research has occurred at European offshore wind projects, where large whales are uncommon. At this time, it is unclear if marine mammals would cease feeding and when individuals would resume normal feeding, migrating, breeding, etc., behaviors once daily pile-driving activities cease, or if secondary indirect impacts would persist. Certain species, notably North Atlantic right whale (*Eubalaena glacialis*), rely on specialized feeding strategies that appear to be sensitive to disruption (van der Hoop et al. 2019). These findings suggest that short-term behavioral disturbance could contribute to energy deficits that ultimately lead to reduced fitness (Fortune et al. 2013; van der Hoop et al. 2019). Under the cumulative impact scenario, individual whales may be exposed to acoustic impacts from multiple projects in 1 day or to acoustic impacts from one or more projects over multiple days. The consequences of these exposure scenarios have been analyzed with the best available information, but a lack of real-world observations on species' responses to pile-driving results is uncertain. Additionally, it is currently unclear how sequential years of construction of multiple projects would impact marine mammals. Future projects will undergo a project-specific analysis under NEPA, the Endangered Species Act, and the Marine Mammal Protection Act that may reach different impact conclusions from this analysis if warranted based on new scientific and potentially observable information, or if impacts are defined differently from the EIS.

There is also uncertainty about certain potential impacts on marine mammals resulting from the long-term presence of offshore wind structures in the environment. For example, operational WTGs would generate low-frequency underwater noise that may exceed the established minimum threshold for potential behavioral and auditory masking impacts within a short distance (e.g., approximately 120 feet) from each foundation, although detectable noise above ambient levels could extend up to 560 feet or more. These structures would contribute to and potentially increase ambient noise within each WEA, albeit at levels generally not associated with adverse effects on marine mammals. However, the 120 root mean square decibels ($dB_{RMS}$) threshold may not adequately represent the potential for adverse effects of chronic noise exposure (e.g., Cholewiak et al. 2018; Hatch et al. 2012; Jensen et al. 2009; Putland et al. 2017). The implications of long-term operational noise impacts and structure presence on marine mammal behavior, particularly the behavior of large whale species, are unclear. These potential impacts are topics of ongoing research.

There is broader uncertainty about how large whales will respond to the presence of extensive networks of novel offshore wind structures on the Atlantic OCS. Under the cumulative impact scenario, up to 3,110 new structures (i.e., WTGs and OSSs) could be constructed across the geographic analysis area. Although the planned spacing of structures would not obstruct whale movement between structures, the potential synergistic effects of structure presence and low-level operational noise are uncertain. There is also some uncertainty around reef effect and hydrodynamic impacts on prey and forage availability and predator-prey interactions. Additionally, these impacts could combine and interact with ongoing changes in marine species distribution and community composition driven by climate change. Displacement effects that result in increased interactions between vulnerable populations of marine mammals and commercial shipping and/or fishing activity could have significant long-term cumulative effects. The potential consequences of these impacts on the Atlantic OCS are unknown. Monitoring studies could be able to track these changes and observe how they may influence whale behavior. At present, BOEM has no basis to conclude that these IPFs would result in significant adverse impacts on any marine mammal species.

At present, currently available information suggests that hydrodynamic effects of foundation structures are likely to be localized and not additive when spaced at 1 nm in environments with strong seasonal stratification (van Berkel et al. 2020). Recent modeling of hydrodynamic effects suggests that surface currents could be affected by the presence of multiple wind farms potentially impacting the distribution of larvae (Johnson et al. 2021). There is insufficient information to determine if this conclusion is valid for broader scale development at the levels planned within the geographic analysis area.

BOEM determined that the overall costs of obtaining the missing information for or addressing uncertainty of the above topics for marine mammals are exorbitant or that the means to obtain it are not known. Therefore, BOEM extrapolated or drew assumptions from known information for similar species and/or situations, as presented in Section 3.15 of the EIS and in the BA submitted to NMFS (BOEM 2023d, 2023e). As a result, the information and methods used to predict potential impacts on marine mammals represent the best available information, and the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the proposed uses of the offshore portions of the geographic analysis area. Notwithstanding the foregoing, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM has not identified incomplete or unavailable scientific information on marine mammal resources that is essential to a reasoned choice among alternatives.

## Navigation and Vessel Traffic

The navigation and vessel traffic impact analysis in the EIS is based on automatic identification system (AIS) data for calendar year 2019. Vessel monitoring system (VMS) data for fishing vessels provided by the NMFS were the basis for polar histograms and other analytical outputs used in evaluating commercial and for-hire recreational fishing trips (see EIS Section 3.9). Some smaller recreational and fishing vessels carry an AIS; however, the AIS analysis likely excludes most vessels less than 65 feet (19.8 meters) long that traverse the WEA. In addition, as discussed under Commercial Fisheries and For-Hire Recreational Fishing, above, the VMS data provided by NMFS indicate the number of vessels in each fishery and their direction of travel while actively fishing, which speaks to alignment of the WTG grid. Nonetheless, the combination of AIS and VMS data described above represent the best available vessel traffic data and are sufficient to enable BOEM to make a reasoned choice among alternatives.

The U.S. Coast Guard's (USCG's) final report for the Areas Offshore of Massachusetts and Rhode Island Port Access Route Study (MARIPARS), evaluating the need for establishing vessel routing measures, was published in the *Federal Register* on May 27, 2020 (USCG 2020). The MARIPARS report recommends a standard and uniform grid pattern turbine layout throughout the Rhode Island and Massachusetts Lease Areas as the best way to facilitate predictable safe navigation throughout the contiguous leases. The five Rhode Island and Massachusetts offshore wind leaseholders, including Revolution Wind, have proposed a collaborative regional layout for wind turbines (1 × 1 nm apart in fixed east–west rows and north–south columns, with 0.7-nm theoretical transit lanes oriented northwest–southeast) across their respective BOEM leases (Geijerstam et al. 2019), which meets the layout rules set forth in the MARIPARS report recommendations. Although the USCG attached to the MARIPARS *Federal Register* docket the Responsible Offshore Development Alliance proposal (Hawkins 2020), which recommends additional transit corridors through the Lease Areas, the MARIPARS report concludes that if the layout in the recommendations was implemented, the USCG would likely not pursue additional formal or informal routing measures. As a cooperating agency with BOEM, the USCG would continue to consult over the course of the NEPA process for the Project as it relates to navigational safety and other aspects, including the impacts associated with alternatives assessed. Therefore, BOEM has not identified incomplete or unavailable information on navigation and vessel traffic that is essential to a reasoned choice among alternatives.

## Other Marine Uses

In the context of this EIS, other marine uses include aviation and air traffic, land-based radar, marine mineral resources and dredged material disposal, military and national security, offshore energy (aside from the proposed Project), scientific research and surveys, and undersea cables. There is no incomplete or unavailable information related to the analysis of marine mineral resources and dredged material disposal, military and national security, aviation and air traffic, offshore energy (aside from the aspects described in this appendix for the proposed Project, and the reasonably foreseeable offshore wind projects for which BOEM has not received COPs), undersea cables, and land-based radar uses.

As discussed in Section 3.17 of the EIS for scientific research and surveys, analysis in the EIS discloses both Project-specific and cumulative impacts to NMFS's ability to continue conducting scientific research and surveys for the purpose of fisheries management and protected species management. Despite the foregoing, BOEM has concluded that the information provided by NOAA in Section 3.17 regarding scientific research and surveys is sufficient to support the impact findings presented in the EIS. Therefore, BOEM has not identified incomplete or unavailable information on scientific research and surveys that is essential to a reasoned choice among alternatives.

## Recreation and Tourism

There is a lack of quantitative data related to recreational not-for-hire fishing in the recreation and tourism geographic analysis area; therefore, quantitative analysis for this resource is not possible at this time. BOEM is considering how best to approach this issue for future similar projects. *Fisheries Economics of the United States 2018* (NMFS 2021) is a comprehensive summary document and the data presented discuss the overall economic level for not-for-hire recreational anglers in the offshore New England region (Maine, New Hampshire, Rhode Island, Connecticut, and Massachusetts). However, the document does not relate to how projects such as the RWF are likely to affect not-for-hire recreational fishing and is not detailed enough in geographic extent to discuss specific recreational angling locations.

However, BOEM has determined that incomplete and unavailable resource information was either not relevant to a reasoned choice among alternatives or alternative data or methods used to predict potential impacts provided the best available information. Therefore, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the proposed uses of the onshore and offshore portions of the geographic analysis area.

## Sea Turtles

Sea turtles are difficult to observe in the open ocean, and there is some uncertainty about the distribution of some turtle species (e.g., the green sea turtle [*Chelonia mydas*]) in relation to the Lease Area. The NMFS BA (BOEM 2023d, 2023e) provides a thorough overview of the available information about potential species occurrence and exposure to Project-related IPFs. The studies summarized therein provide a suitable basis for predicting potential species occurrence, relative abundance, and probable distribution of sea turtles in the geographic analysis area.

Some uncertainty exists about the effects of certain IPFs on sea turtles and their habitats. For example, sea turtle sensitivity to potential EMF effects from the Project is not fully understood. Sea turtles are known to use the earth's magnetic field to orient in space and navigate between habitats (Irwin and Lohmann 2005; Courtillot et al. 1997). However, the available research has not examined how sea turtles respond to lower strength EMF levels on the order of those likely to result from the Project. Although there are no direct data on impacts on sea turtles from EMFs generated by underwater cables, the preponderance of evidence summarized in the BOEM-sponsored report by Normandeau et al. (2011) indicates that sea turtles are unlikely to detect most of the EMF impacts resulting from the Project. Potentially detectable EMF effects would be limited to within 5 feet of the short segments of cable laid on the seafloor that are not buried. Section 3.19 of the EIS and the NMFS BA (BOEM 2023d, 2023e) allowed BOEM's subject matter experts to estimate the potential risk to other species of sea turtles based on the assumption of similar anatomical, behavioral, and life history similarities, related to EMFs. Although the thresholds for EMF disturbance to the behavior of all potential species of sea turtles are not known, no adverse effects on sea turtles from the numerous submarine power cables around the world have been documented, and modeling of the anticipated EMFs generated by Project components suggests the majority of induced field strengths would likely be below detection levels. Similar to marine mammals, data are also not available to evaluate potential changes to normal movements of juvenile and adult sea turtles due to short-term elevated suspended sediments. Although some exposure may occur, total suspended sediment impacts would be limited in magnitude and duration and within the range of natural exposures periodically experienced by these species. On this basis, any resulting impact on behavior would likely be too small to be biologically meaningful, and no adverse impacts would be expected (NOAA 2020b).

There is also uncertainty relative to sea turtle responses to construction activities on the Atlantic OCS. Some potential for displacement from areas exposed to noise and disturbance exists. However, should displacement of individuals occur, it is unclear if this would result in adverse impacts (e.g., because of lost foraging opportunities or increased exposure to potentially fatal vessel interactions). Additionally, it is unclear whether concurrent construction of multiple projects, increasing the extent and intensity of impacts over a shorter duration or spreading out project construction, and associated impacts over multiple years would result in the least potential harm to sea turtles. There is also uncertainty regarding the cumulative acoustic impacts associated with pile driving. At this time, it is unclear if sea turtles that have ceased feeding during multiple construction activities would resume normal feeding, migrating, breeding, etc., behaviors once daily pile driving ceases or if secondary indirect impacts would continue. Under the cumulative impact scenario, individual sea turtles may be exposed to acoustic impacts from multiple projects in 1 day or to acoustic impacts from one or more projects over multiple days. The consequences of these exposure scenarios have been analyzed with the best available scientific information in EIS Section 3.19, although some level of uncertainty remains due to the lack of observational data on species responses to pile driving. In addition, modeled predictions of operational sound for large turbines (10 MW) indicate that sound levels could be greater than observed for existing wind turbines; actual sound levels are still predicted to be well below levels that could cause harm.

Some uncertainty exists in regard to the potential for sea turtle responses to Federal Aviation Administration hazard lights and navigation lighting associated with offshore wind development. Given the placement of the new structures far from nesting beaches and within the OCS, no impacts to nesting female or hatchling sea turtles would be expected. Revolution Wind has incorporated BOEM’s guidance (BOEM 2021; Orr et al. 2013) for avoiding and minimizing artificial lighting impacts on aquatic life into the Project design. This environmental protection measure would limit WTG and electrical service platform lighting to minimum levels required by regulation for worker safety, navigation, and aviation. Sea turtle sensitivity to these minimal light levels is unknown. However, given that sea turtles do not appear to be adversely affected by oil and gas platform operations, which produce far more artificial light than offshore wind structures (BOEM 2023d, 2023e), this IPF is not expected to have any measurable impacts (adverse or beneficial) on sea turtles in the offshore environment.

More broadly, considerable uncertainty remains about how sea turtles would interact with long-term changes in biological productivity and community structure resulting from the development of an extensive network of artificial reefs across the geographic analysis area. Artificial reef and hydrodynamic impacts could influence predator-prey interactions and foraging opportunities in ways that influence sea turtle behavior and distribution. These IPFs are expected to interact with the ongoing influence of climate change on species distribution and behavior over broad spatial scales, but the nature and significance of these interactions are unclear. BOEM anticipates that ongoing monitoring of offshore energy structures will provide some useful insights into these synergistic effects. BOEM considered the level of effort required to address the uncertainties described above for sea turtles and determined that the methods necessary to do so are lacking and/or the associated costs would be exorbitant. Where appropriate, BOEM inferred conclusions about the likelihood of potential biologically significant impacts from available information for similar species and/or situations. These methods are described in detail in EIS Section 3.19 EIS and in the NMFS BA (BOEM 2023d, 2023e). The approaches and methods used are based on the best available scientific information, and the analysis provided in the EIS is sufficient to support sound scientific judgements and informed decision making related to the proposed uses of the offshore portions of the analysis area. Notwithstanding the foregoing, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM does not believe that there is incomplete or unavailable information on sea turtle resources that is essential to a reasoned choice among alternatives.

## Visual Resources

There is no incomplete or unavailable information related to the analysis of impacts on visual resources.

## Water Quality

There is no incomplete or unavailable information related to the analysis of impacts on water quality.

## Wetlands and Non-tidal Waters

There is no incomplete or unavailable information related to the analysis of impacts on wetlands and non-tidal waters.

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# APPENDIX D

## Project Design Envelope and Maximum-Case Scenario

# Contents



# Figures



# Tables

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# Introduction

This environmental impact statement (EIS) assesses the impacts of the reasonable range of Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (the Project) designs that are described in the Revolution Wind construction and operations plan (COP) (VHB 2023) by using the maximum-case scenario process. The maximum-case scenario analyzes the aspects of each design parameter that would result in the greatest impact for each physical, biological, and socioeconomic resource. This EIS considers the interrelationship among aspects of the project design envelope (PDE) rather than simply viewing each design parameter independently. Additional information and guidance related to the PDE concept can be found in Chapter 1 of the EIS and on BOEM's website available at https://www.boem.gov/Draft-Design-Envelope-Guidance/. Table D-1 details the full range of maximum-case design parameters for the proposed Project and which parameters are relevant to the analysis for each EIS resource section (denoted with an *X*) in Chapter 3 of the EIS. Table D-2 and Figure D-1 detail the wind turbine generator (WTG) identification numbers and locations for the maximum-case scenario.

**Table D-1. Maximum-Case Scenario List of Parameter Specifications**

| Design Parameter | Minimum Design Size | Maximum Design Size | 3.4 Air Quality | 3.5 Bats | 3.6 Benthic Habitat and Invertebrates | 3.7 Birds | 3.8 Coastal Habitats and Fauna | 3.9 Commercial Fisheries and For-Hire Recreational Fishing | 3.10 Cultural Resources | 3.11 Demographics, Employment, and Economics | 3.12 Environmental Justice | 3.13 Finfish and Essential Fish Habitat | 3.14 Land Use and Coastal Infrastructure | 3.15 Marine Mammals | 3.16 Navigation and Vessel Traffic | 3.17 Other Marine Uses | 3.18 Recreation and Tourism | 3.19 Sea Turtles | 3.20 Visual Resources | 3.21 Water Quality | 3.22 Wetlands and Non-tidal Waters |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WIND FARM** | | | | | | | | | | | | | | | | | | | | | |
| Wind farm capacity | 704 megawatt (MW) | 880 MW | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| **WTG AND MONOPILE FOUNDATION** | | | | | | | | | | | | | | | | | | | | | |
| Turbine size | 8 MW | 12 MW | X | X | X | X | | X | X | | | X | | X | X | X | X | X | X | X | |
| Number of WTG positions | 59 | 100 | X | X | X | X | | X | X | | | X | | X | X | X | X | X | X | X | |
| Distance between positions | 1 nautical mile (nm) between WTGs on an east–west, north–south grid | 1 nm between WTGs along north–south rows, and 0.7 mile between WTGs within east–west rows | X | X | X | X | | X | X | | | X | | X | X | X | X | X | X | X | |
| Total tip height | 647.6 feet (197.4 meters [m]) | 872.7 feet (266 m) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Hub height | 377 feet (115 m) | 512 feet (156 m) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Turbine height | 646 feet (197 m) | 873 feet (266 m) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Rotor diameter | 538 feet (164 m) | 722 feet (220 m) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Base height (foundation height–top of transition piece) | 19.7 feet (6 m) | 26 feet (8 m) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Base (tower) width (at the top) | 13 feet (4 m) | 21 feet (6.4 m) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Nacelle dimensions (length × width × height) | 46 × 23 × 20 feet (14 × 7 × 6 m) | 72 × 33 × 39 feet (22 × 10 × 12 m) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Rotor swept zone area | 5.2 acres (21,100 square meters [$m^2$])* | 9.7 acres (39,400 $m^2$)* | | X | | X | | X | X | | | | | | X | X | X | | X | | |

| Design Parameter | Minimum Design Size | Maximum Design Size | 3.4 Air Quality | 3.5 Bats | 3.6 Benthic Habitat and Invertebrates | 3.7 Birds | 3.8 Coastal Habitats and Fauna | 3.9 Commercial Fisheries and For-Hire Recreational Fishing | 3.10 Cultural Resources | 3.11 Demographics, Employment, and Economics | 3.12 Environmental Justice | 3.13 Finfish and Essential Fish Habitat | 3.14 Land Use and Coastal Infrastructure | 3.15 Marine Mammals | 3.16 Navigation and Vessel Traffic | 3.17 Other Marine Uses | 3.18 Recreation and Tourism | 3.19 Sea Turtles | 3.20 Visual Resources | 3.21 Water Quality | 3.22 Wetlands and Non-tidal Waters |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Blade length | 259 feet (79 m) | 351 feet (107 m) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Blade width | 16 feet (5 m) | 26 feet (8 m) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Base height (foundation height–top of transition piece) | 82 feet (25 m) | 128 feet (39 m) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Air gap (mean sea level to bottom of blade tip) | 93.5 feet (28.5 m) | 151 feet (46 m) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Foundation construction method | Pile driving | Pile driving | X | X | X | X | | X | X | | | X | | X | X | X | X | X | X | X | |
| Foundation and WTG vessel type | Jack-up vessel or derrick barge, vessel on dynamic positioning with feeder barges | Jack-up vessel or derrick barge, vessel on dynamic positioning with feeder barges | X | X | X | X | | X | X | | | X | | X | X | X | X | X | X | X | |
| Jack-up vessel seafloor penetration of spudcans (WTG and OSS) | 52 feet | 52 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Jack-up radius around foundations (WTG and OSS) | 656 feet | 656 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Jack-up seafloor preparation (WTG and OSS) | 18.36 acres<br>(assume all foundations need one jack up; 0.18 acre per jack up x 102 foundations = 18.36 acres) | 21.14 acres<br>(assume 15% of all foundations will need one additional jack up; 18.36 acres + 0.18*(0.15 x 102) = 21.14 acres) | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| WTG coloring | RAL 9010 Pure White | RAL 7035 Light Grey | | | | X | | | X | | | | | | X | X | X | | X | | |
| Bureau of Ocean Energy Management (BOEM) aviation and navigation safety recommendations (BOEM 2021) | Two synchronized L-864 aviation medium-intensity red flashing obstruction lights mounted on the WTG nacelle at a height of approximately 530 feet (161.5 m); up to three L-810 low-intensity red flashing obstruction lights mounted on the WTG tower midsection at a height of approximately 312 feet (95 m); all lights would synchronize with 30 flashes per minute for air navigation lighting | Two synchronized L-864 aviation medium-intensity red flashing obstruction lights mounted on the WTG nacelle at a height of approximately 530 feet (161.5 m); up to three L-810 low-intensity red flashing obstruction lights mounted on the WTG tower midsection at a height of approximately 312 feet (95 m); all lights would synchronize with 30 flashes per minute for air navigation lighting | | X | | X | | X | X | | | | | | X | X | X | | X | | |

| Design Parameter | Minimum Design Size | Maximum Design Size | 3.4 Air Quality | 3.5 Bats | 3.6 Benthic Habitat and Invertebrates | 3.7 Birds | 3.8 Coastal Habitats and Fauna | 3.9 Commercial Fisheries and For-Hire Recreational Fishing | 3.10 Cultural Resources | 3.11 Demographics, Employment, and Economics | 3.12 Environmental Justice | 3.13 Finfish and Essential Fish Habitat | 3.14 Land Use and Coastal Infrastructure | 3.15 Marine Mammals | 3.16 Navigation and Vessel Traffic | 3.17 Other Marine Uses | 3.18 Recreation and Tourism | 3.19 Sea Turtles | 3.20 Visual Resources | 3.21 Water Quality | 3.22 Wetlands and Non-tidal Waters |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BOEM aviation and navigation safety recommendations (BOEM 2021);<br>U.S. Coast Guard (USCG) District 1 offshore structure marking guidance (USCG 2020a) | Two white flashing obstruction lights (color to be determined depending on structure classification) on each turbine approximately 20 to 23 meters above mean lower low water on opposite corners along the same horizontal plane, each visible from all approach directions to 3 nm | Two white flashing obstruction lights (color to be determined depending on structure classification) on each turbine approximately 20 to 23 meters above mean lower low water on opposite corners along the same horizontal plane, each visible from all approach directions to 3 nm | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| BOEM aviation and navigation safety recommendations;<br>USCG District 1 offshore structure Private Aids to Navigation (PATON) marking guidance (USCG 2020b) | Flashing white light visible to 1 nm for Class C structure (to be determined by USCG) | Flashing white light visible to 5 nm for Class A structure (to be determined by USCG) | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| WTG foundation coloring | RAL 1023 Yellow from water line to height of at least approximately 50 feet | RAL 1023 Yellow from water line to height of at least approximately 50 feet | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Nautical hazard prevention device | Foghorns audible to 2 nm and emit 134 decibels at 3 feet (1 m) and a tone at a frequency of 660 hertz (Hz) | Foghorns audible to 2 nm and emit 134 decibels at 3 feet (1 m) and a tone at a frequency of 660 Hz | | X | X | X | | X | | | | X | | X | X | X | X | | | | |
| Number of monopile foundations | 61 | 102 | X | X | X | X | | X | X | | | X | | X | X | X | X | X | X | X | |
| Monopile diameter | 20–39 feet (tapered) | 20–39 feet (tapered) | X | X | X | X | | X | X | | | X | | X | X | X | X | X | X | X | |
| Number of piles per foundation | 1 | 1 | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Seafloor disturbance—no scour protection—per monopile foundation | 0.027 acre | 0.027 acre | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Monopole and scour protection area per foundation | 0.7 acre | 0.7 acre | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Scour protection depth | 2.2–4.6 feet above seafloor | 2.2–4.6 feet above seafloor | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Seafloor preparation per foundation | 31.1 acres | 31.1 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Vessel anchoring/mooring per foundation | Not provided | Not provided | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Hammer size for monopile foundation | 4,000 kilojoules (kJ) | 4,000 kJ | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Maximum penetration depth into seafloor | 98 feet (monopile) | 164 feet (monopile) | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |

| Design Parameter | Minimum Design Size | Maximum Design Size | 3.4 Air Quality | 3.5 Bats | 3.6 Benthic Habitat and Invertebrates | 3.7 Birds | 3.8 Coastal Habitats and Fauna | 3.9 Commercial Fisheries and For-Hire Recreational Fishing | 3.10 Cultural Resources | 3.11 Demographics, Employment, and Economics | 3.12 Environmental Justice | 3.13 Finfish and Essential Fish Habitat | 3.14 Land Use and Coastal Infrastructure | 3.15 Marine Mammals | 3.16 Navigation and Vessel Traffic | 3.17 Other Marine Uses | 3.18 Recreation and Tourism | 3.19 Sea Turtles | 3.20 Visual Resources | 3.21 Water Quality | 3.22 Wetlands and Non-tidal Waters |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Duration of pile driving (hours/pile) | 1–4 hours | 6–12 hours | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Duration of installation (per WTG) | 36 hours | 36 hours | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Duration of installation (foundations/day) | 3 | 3 | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Period of all WTG foundation pile driving | 5 months | 5 months | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| **OFFSHORE SUBSTATION (OSS)** | | | | | | | | | | | | | | | | | | | | | |
| Number of OSSs | 1 | 2 | X | X | X | X | | X | X | | | X | | X | X | X | X | X | X | X | |
| Period of installation and commissioning | 8 months | 8 months | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| OSS height, excluding lightning protection | 82 + 108 feet = 190 feet | 190 feet | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| OSS height, including lightning protection | 82 + 180 feet = 262 feet | 262 feet | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| Topside length and width | 321.5 × 216.5 feet | 321.5 × 216.5 feet | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| USCG lighting | See monopile turbine requirements | See monopile turbine requirements | | X | | X | | X | X | | | | | | X | X | X | | X | | |
| OSS number of piles per foundation | 1 | 1 | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Scour protection area (per monopile) | 0.7 acre | 0.7 acre | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Seafloor preparation per foundation | 31.1 acres | 31.1 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| OSS foundation construction method | Pile driving | Pile driving | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Diameter (minimum top to maximum bottom) | 20–49 feet (tapered) | 20–49 feet (tapered) | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| Maximum hydraulic hammer energy | 4,000 kJ | 4,000 kJ | X | | X | | | X | X | | | X | | X | X | X | X | X | X | X | |
| **INTER-ARRAY CABLE (IAC)** | | | | | | | | | | | | | | | | | | | | | |
| IAC capacity | 72 kilovolts (kV) | 72 kV | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| IAC diameter | 8 inches | 8 inches | | | | | | | | | | | | | | | | | | | |
| IAC length | 155 miles | 155 miles | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |

| Design Parameter | Minimum Design Size | Maximum Design Size | 3.4 Air Quality | 3.5 Bats | 3.6 Benthic Habitat and Invertebrates | 3.7 Birds | 3.8 Coastal Habitats and Fauna | 3.9 Commercial Fisheries and For-Hire Recreational Fishing | 3.10 Cultural Resources | 3.11 Demographics, Employment, and Economics | 3.12 Environmental Justice | 3.13 Finfish and Essential Fish Habitat | 3.14 Land Use and Coastal Infrastructure | 3.15 Marine Mammals | 3.16 Navigation and Vessel Traffic | 3.17 Other Marine Uses | 3.18 Recreation and Tourism | 3.19 Sea Turtles | 3.20 Visual Resources | 3.21 Water Quality | 3.22 Wetlands and Non-tidal Waters |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum disturbance depth | 10 feet | 10 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Target burial depth | 4 feet | 6 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Disturbance corridor-cable only (width) | 131 feet | 131 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Period of installation of the complete IAC system | 5 months | 5 months | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| IAC installation rate | 400 m/hour | 400 m/hour | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| IAC general disturbance corridor | 2,471 acres | 2,471 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| IAC seafloor disturbance due to boulder clearance (80% of total length) | 1,976.8 acres | 1,976.8 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| IAC secondary cable protection (10% of total length) | 74.1 acres | 74.1 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| **OFFSHORE SUBSTATION-LINK CABLE (OSS-LINK CABLE)** | | | | | | | | | | | | | | | | | | | | | |
| OSS-link cable capacity | 275 kV | 275 kV | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| OSS-link cable length | 9 miles | 9 miles | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Number of OSS-link cables | 1 | 1 | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Cable diameter | 11.8 inches | 11.8 inches | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Target burial depth | 4 feet | 6 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Disturbance corridor (width) | 131 feet | 131 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Maximum disturbance depth | 10 feet | 10 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| OSS-link cable installation rate | 400 m/hour | 400 m/hour | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| OSS-link cable general disturbance corridor | 148.0 acres | 148.0 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| OSS-link cable seafloor disturbance due to boulder clearance (60% of total length) | 89 acres | 89 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |

| Design Parameter | Minimum Design Size | Maximum Design Size | 3.4 Air Quality | 3.5 Bats | 3.6 Benthic Habitat and Invertebrates | 3.7 Birds | 3.8 Coastal Habitats and Fauna | 3.9 Commercial Fisheries and For-Hire Recreational Fishing | 3.10 Cultural Resources | 3.11 Demographics, Employment, and Economics | 3.12 Environmental Justice | 3.13 Finfish and Essential Fish Habitat | 3.14 Land Use and Coastal Infrastructure | 3.15 Marine Mammals | 3.16 Navigation and Vessel Traffic | 3.17 Other Marine Uses | 3.18 Recreation and Tourism | 3.19 Sea Turtles | 3.20 Visual Resources | 3.21 Water Quality | 3.22 Wetlands and Non-tidal Waters |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OSS-link cable protection (10% of total length) | 4.4 acres | 4.4 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| **SUMMARY OF RWEC SEGMENT LENGTHS OFFSHORE** | | | | | | | | | | | | | | | | | | | | | |
| RWEC: OCS | Up to 19 miles (per cable) | N/A | X | X | | X | | | X | X | | | X | | X | X | X | X | X | | X |
| RWEC: Rhode Island | 23 miles (per cable) | N/A | X | X | | X | | | X | X | | | X | | X | X | X | X | X | | X |
| Total RWEC segment lengths offshore | Approximately 42 miles (per cable) | N/A | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | X |
| **RWEC OFFSHORE** | | | | | | | | | | | | | | | | | | | | | |
| RWEC capacity | 275 kV | 275 kV | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Number of RWECs | 1 | 2 | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| RWEC diameter | 11.8 inches | 11.8 inches | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Disturbance corridor (width) | 131 feet, up to 673 feet at joint locations | 131 feet, up to 673 feet at joint locations | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Operational right-of-way (ROW) | 1,640 feet | 1,640 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Target burial depth (offshore) | 4 feet | 6 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| RWEC installation rate | 400 m/hour | 400 m/hour | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Period of installation | 8 months | 8 months | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| RWEC: trench width | up to 43 feet | up to 43 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| RWEC: Outer Continental Shelf (OCS) submarine cable general disturbance corridor | 593.1 acres | 593.1 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| RWEC: OCS boulder clearance (40% of route, included in general disturbance corridor amount) | 237.2 acres | 237.2 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| RWEC: OCS cable protection (10% of route for each cable) | 17.8 acres | 17.8 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |

| Design Parameter | Minimum Design Size | Maximum Design Size | 3.4 Air Quality | 3.5 Bats | 3.6 Benthic Habitat and Invertebrates | 3.7 Birds | 3.8 Coastal Habitats and Fauna | 3.9 Commercial Fisheries and For-Hire Recreational Fishing | 3.10 Cultural Resources | 3.11 Demographics, Employment, and Economics | 3.12 Environmental Justice | 3.13 Finfish and Essential Fish Habitat | 3.14 Land Use and Coastal Infrastructure | 3.15 Marine Mammals | 3.16 Navigation and Vessel Traffic | 3.17 Other Marine Uses | 3.18 Recreation and Tourism | 3.19 Sea Turtles | 3.20 Visual Resources | 3.21 Water Quality | 3.22 Wetlands and Non-tidal Waters |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RWEC: OCS cable omega joints (two total) | 20.4 acre | 20.4 acre | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| RWEC: Rhode Island (RI) submarine cable general disturbance corridor | 731.4 acres | 731.4 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| RWEC: RI boulder clearance (70% of route, included in general disturbance corridor amount) | 512 acres | 512 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| RWEC: RI cable protection (5% of route for each cable) | 11.0 acres | 11.0 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| RWEC: RI cable protection per crossing (7 existing submarine assets, all located within RI state waters) | 21.9 acres | 21.9 acres | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| Vessel anchoring corridor | 1,640 feet | 1,640 feet | X | | X | | | X | X | | | X | | X | X | X | X | X | | X | |
| **RWEC AT LANDFALL** | | | | | | | | | | | | | | | | | | | | | |
| Landfall work area | 3.1 acres | 3.1 acres | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Transition joint bays (located within the landfall work area) | 1,340 square feet | 1,340 square feet | X | | | | X | | X | | | | X | | | | X | | | X | X |
| Temporary cofferdam exit pits (2X) for horizontal directional drilling (HDD) construction (located within landfall work area) | 0.24 acre | 0.94 acre | X | | | | X | | X | | | | X | | | | X | | | X | X |
| **ONSHORE TRANSMISSION CABLE AND PROJECT COMPONENTS** | | | | | | | | | | | | | | | | | | | | | |
| Landfall sites | Multiple landfall sites are currently being evaluated within the approximate 20-acre landfall envelope, located at Quonset Point in North Kingstown, Rhode Island. | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Landfall work area | 3.1 acres within the landfall envelope, located at Quonset Point in North Kingstown, Rhode Island | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Landfall transition method | HDD with possible cofferdam | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |

| Design Parameter | Minimum Design Size | Maximum Design Size | 3.4 Air Quality | 3.5 Bats | 3.6 Benthic Habitat and Invertebrates | 3.7 Birds | 3.8 Coastal Habitats and Fauna | 3.9 Commercial Fisheries and For-Hire Recreational Fishing | 3.10 Cultural Resources | 3.11 Demographics, Employment, and Economics | 3.12 Environmental Justice | 3.13 Finfish and Essential Fish Habitat | 3.14 Land Use and Coastal Infrastructure | 3.15 Marine Mammals | 3.16 Navigation and Vessel Traffic | 3.17 Other Marine Uses | 3.18 Recreation and Tourism | 3.19 Sea Turtles | 3.20 Visual Resources | 3.21 Water Quality | 3.22 Wetlands and Non-tidal Waters |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temporary anchor wall driven depth | 20 feet | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| HDD cable duct diameter | 3 feet | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| HDD cable duct length | 0.6 mile | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Landfall transition | Underground concrete transition vault | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Onshore construction location | Single thermal concrete duct bank and splice vaults | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Onshore construction method | Open trench (8-foot-wide trench within 25-foot-wide temporary disturbance corridor that expands to 30 × 75 feet at splice vaults) with HDD or other trenchless technology as needed | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Onshore cable route | Landfall work area to The Narragansett Electric Company d/b/a National Grid (TNEC) Davisville Substation | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Splice vaults | 30 × 10 × 8 feet | 30 × 70 × 16 feet | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Onshore transmission cable corridor length | Approximately 1 mile | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Onshore interconnection facility location | Immediately adjacent to the existing Davisville Substation in North Kingstown, Rhode Island | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Length of underground ROW connecting the onshore substation (OnSS) to the interconnection facility | 527 feet | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Length of overhead ROW connecting the interconnection facility to the Davisville Substation | 474 feet | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| Onshore interconnection facility limit of work size | Property size = 6 acres<br>Limit of work = up to 4 acres<br>Operational footprint = approximately 1.6 acres | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |
| OnSS (property size) | Property size = 15.7 acres<br>Limit of work = up to 7 acres<br>Operational footprint = approximately 4 acres | | X | X | X | | X | X | | X | X | X | | X | | | | X | | X | X |

| Design Parameter | Minimum Design Size | Maximum Design Size | 3.4 Air Quality | 3.5 Bats | 3.6 Benthic Habitat and Invertebrates | 3.7 Birds | 3.8 Coastal Habitats and Fauna | 3.9 Commercial Fisheries and For-Hire Recreational Fishing | 3.10 Cultural Resources | 3.11 Demographics, Employment, and Economics | 3.12 Environmental Justice | 3.13 Finfish and Essential Fish Habitat | 3.14 Land Use and Coastal Infrastructure | 3.15 Marine Mammals | 3.16 Navigation and Vessel Traffic | 3.17 Other Marine Uses | 3.18 Recreation and Tourism | 3.19 Sea Turtles | 3.20 Visual Resources | 3.21 Water Quality | 3.22 Wetlands and Non-tidal Waters |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **OPERATIONS AND MAINTENANCE (O&M) FACILITY** | | | | | | | | | | | | | | | | | | | | | |
| Port of Montauk | A new building with up to 1,000 square feet of office space and up to 6,000 square feet of equipment storage space would be constructed at the Port of Montauk. | A new building with up to 1,000 square feet) of office space and up to 6,000 square feet of equipment storage space would be constructed at the Port of Montauk. | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Port of Davisville at Quonset Point | A new building with up to 1,000 square feet of office space and up to 11,000 square feet of equipment storage space would be constructed at the Port of Davisville at Quonset Point. | A new building with up to 1,000 square feet of office space and up to 11,000 square feet of equipment storage space would be constructed at the Port of Davisville at Quonset Point. | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Port of Brooklyn | There are no plans to establish an O&M building at, or otherwise implement improvements to, the Port of Brooklyn, and use of this port is assumed to be limited to existing facilities maintained by the port. | There are no plans to establish an O&M building at, or otherwise implement improvements to, the Port of Brooklyn, and use of this port is assumed to be limited to existing facilities maintained by the port. | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Port of Galilee | There are no plans to establish an O&M building at, or otherwise implement improvements to, the Port of Galilee, and use of this port is assumed to be limited to existing facilities maintained by the port. | There are no plans to establish an O&M building at, or otherwise implement improvements to, the Port of Galilee, and use of this port is assumed to be limited to existing facilities maintained by the port. | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Port Jefferson | An existing upland building within an office park located approximately 6 miles from Port Jefferson. This building would serve as a regional O&M hub and headquarters for Orsted and multiple offshore wind projects. The building was recently purchased by Northeast Offshore, LLC, and has internal upgrades planned to establish office and warehouse space. | An existing upland building within an office park located approximately 6 miles from Port Jefferson. This building would serve as a regional O&M hub and headquarters for Orsted and multiple offshore wind projects. The building was recently purchased by Northeast Offshore, LLC, and has internal upgrades planned to establish office and warehouse space. | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

Notes: In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (miles used specifically for marine navigation). Statute miles are more commonly used and are referred to simply as miles, whereas nautical miles are referred to by name or by their abbreviation “nm.” Numbers that were calculated are rounded to the closest whole number.

* This value was calculated based on information provided.

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**Table D-2. Wind Turbine Generator Identification Numbers and Locations for the Maximum-Case Scenario as depicted in the Geophysical and Habitat Survey Viewer (Viewer) prepared by INSPIRE Environmental for the RWF and RWEC**

| COP Appendix H ID - Label not Identified in the Viewer | L045 ID - Identified as 'WTG and OSS Labels (L045)' Label in the Viewer | L085 ID - Identified as 'WTG and OSS Labels (L085)' Label in the Viewer | USCG - Label not Identified in the Viewer |
|---|---|---|---|
| WTG_01 | 1 | – | AB08 |
| WTG_02 | 2 | B01 | AC08 |
| WTG_03 | 3 | B02 | AD07 |
| WTG_04 | 4 | B03 | AD08 |
| WTG_05 | 5 | B04 | AD09 |
| WTG_06 | 6 | B05 | AD10 |
| WTG_07 | 7 | B06 | AD11 |
| WTG_08 | 8 | B07 | AE06 |
| WTG_09 | 9 | B08 | AE07 |
| WTG_10 | 10 | B09 | AE08 |
| WTG_11 | 11 | B10 | AE09 |
| WTG_12 | 12 | B11 | AE10 |
| WTG_13 | 13 | B12 | AE11 |
| WTG_14 | 14 | B13 | AF05 |
| WTG_15 | 15 | B14 | AF06 |
| WTG_16 | 16 | – | AF07 |
| OSS_2 | OSS2 | Z02 | AF08 |
| WTG_17 | 17 | B15 | AF09 |
| WTG_18 | 18 | B16 | AF10 |

| COP Appendix H ID - Label not Identified in the Viewer | L045 ID - Identified as 'WTG and OSS Labels (L045)' Label in the Viewer | L085 ID - Identified as 'WTG and OSS Labels (L085)' Label in the Viewer | USCG - Label not Identified in the Viewer |
|---|---|---|---|
| WTG_19 | 19 | B17 | AF11 |
| WTG_20 | 20 | B18 | AG04 |
| WTG_21 | 21 | B19 | AG05 |
| WTG_22 | 22 | B20 | AG06 |
| WTG_23 | 23 | B21 | AG07 |
| WTG_24 | 24 | B22 | AG08 |
| WTG_25 | 25 | B23 | AG09 |
| WTG_26 | 26 | B24 | AH04 |
| WTG_27 | 27 | B25 | AH05 |
| WTG_28 | 28 | B26 | AH06 |
| WTG_29 | 29 | B27 | AH07 |
| WTG_30 | 30 | B28 | AH08 |
| WTG_31 | 31 | B29 | AH09 |
| WTG_32 | 32 | B30 | AJ02 |
| WTG_33 | 33 | B31 | AJ03 |
| WTG_34 | 34 | B32 | AJ04 |
| WTG_35 | 35M | B33 | AJ05 |
| WTG_36 | 36 | B34 | AJ06 |
| WTG_37 | 37 | B35 | AJ07 |
| WTG_38 | 38 | B36 | AJ08 |

| COP Appendix H ID - Label not Identified in the Viewer | L045 ID - Identified as 'WTG and OSS Labels (L045)' Label in the Viewer | L085 ID - Identified as 'WTG and OSS Labels (L085)' Label in the Viewer | USCG - Label not Identified in the Viewer |
|---|---|---|---|
| WTG_39 | 39 | B37 | AJ09 |
| WTG_40 | 40 | B38 | AJ10 |
| WTG_41 | 41 | B39 | AJ11 |
| WTG_42 | 42 | B40 | AJ12 |
| WTG_43 | 43 | B41 | AJ13 |
| WTG_44 | 44 | B42 | AJ14 |
| WTG_45 | 45M | B43 | AJ15 |
| WTG_46 | 46 | – | AJ16 |
| WTG_47 | 47 | B44 | AK08 |
| WTG_48 | 48 | B45 | AK09 |
| WTG_49 | 49 | B46 | AK10 |
| WTG_50 | 50 | – | AK11 |
| WTG_51 | 51 | B47 | AK12 |
| WTG_52 | 52 | – | AK13 |
| WTG_53 | 53M | B48 | AK14 |
| WTG_54 | 54 | – | AK15 |
| WTG_55 | 55 | – | AK16 |
| WTG_92 | 92 | – | AL02 |
| WTG_93 | – | – | – |
| WTG_94 | – | – | – |

| COP Appendix H ID - Label not Identified in the Viewer | L045 ID - Identified as 'WTG and OSS Labels (L045)' Label in the Viewer | L085 ID - Identified as 'WTG and OSS Labels (L085)' Label in the Viewer | USCG - Label not Identified in the Viewer |
|---|---|---|---|
| WTG_95 | 95 | – | AL05 |
| WTG_56 | 56M | B49 | AL08 |
| WTG_57 | 57 | - | AL09 |
| WTG_58 | 58M | B50 | AL10 |
| OSS_1 | OSS1 | Z01 | AL11 |
| WTG_59 | 59M | B51 | AL12 |
| WTG_60 | 60 | – | AL13 |
| WTG_61 | 61 | – | AL14 |
| WTG_62 | 62M | B52 | AL15 |
| WTG_63 | 63M | B53 | AL16 |
| WTG_64 | 64M | B54 | AL17 |
| WTG_65 | 65 | B55 | AL18 |
| WTG_66 | 66 | B56 | AL19 |
| WTG_67 | 67 | B57 | AL20 |
| WTG_68 | 68M | B58 | AL21 |
| WTG_96 | 96 | – | AM02 |
| WTG_97 | 97 | – | AM03 |
| WTG_98 | 98 | – | AM04 |
| WTG_69 | 69 | B59 | AM11 |
| WTG_70 | 70 | B60 | AM12 |

| COP Appendix H ID - Label not Identified in the Viewer | L045 ID - Identified as 'WTG and OSS Labels (L045)' Label in the Viewer | L085 ID - Identified as 'WTG and OSS Labels (L085)' Label in the Viewer | USCG - Label not Identified in the Viewer |
|---|---|---|---|
| WTG_71 | 71 | – | AM13 |
| WTG_72 | 72M | B61 | AM14 |
| WTG_73 | 73 | B62 | AM15 |
| WTG_74 | 74 | – | AM16 |
| WTG_75 | 75 | B63 | AM17 |
| WTG_76 | 76 | B64 | AM18 |
| WTG_77 | 77 | B65 | AM19 |
| WTG_78 | 78 | B66 | AM20 |
| WTG_79 | 79 | B67 | AM21 |
| WTG_99 | 99 | – | AN04 |
| WTG_80 | 80 | B68 | AN11 |
| WTG_81 | 81M | B69 | AN12 |
| WTG_82 | 82M | B70 | AN13 |
| WTG_83 | 83M | B71 | AN14 |
| WTG_84 | 84 | B72 | AN15 |
| WTG_85 | 85 | B73 | AN16 |
| WTG_100 | 100 | – | AP04 |
| WTG_86 | 86 | B74 | AP11 |
| WTG_87 | 87 | B75 | AP12 |
| WTG_88 | 88M | B76 | AP13 |

| COP Appendix H ID - Label not Identified in the Viewer | L045 ID - Identified as 'WTG and OSS Labels (L045)' Label in the Viewer | L085 ID - Identified as 'WTG and OSS Labels (L085)' Label in the Viewer | USCG - Label not Identified in the Viewer |
|---|---|---|---|
| WTG_89 | 89M | B77 | AP14 |
| WTG_90 | 90 | B78 | AP15 |
| WTG_91 | 91 | B79 | AP16 |

Source: Revolution Wind (2023).

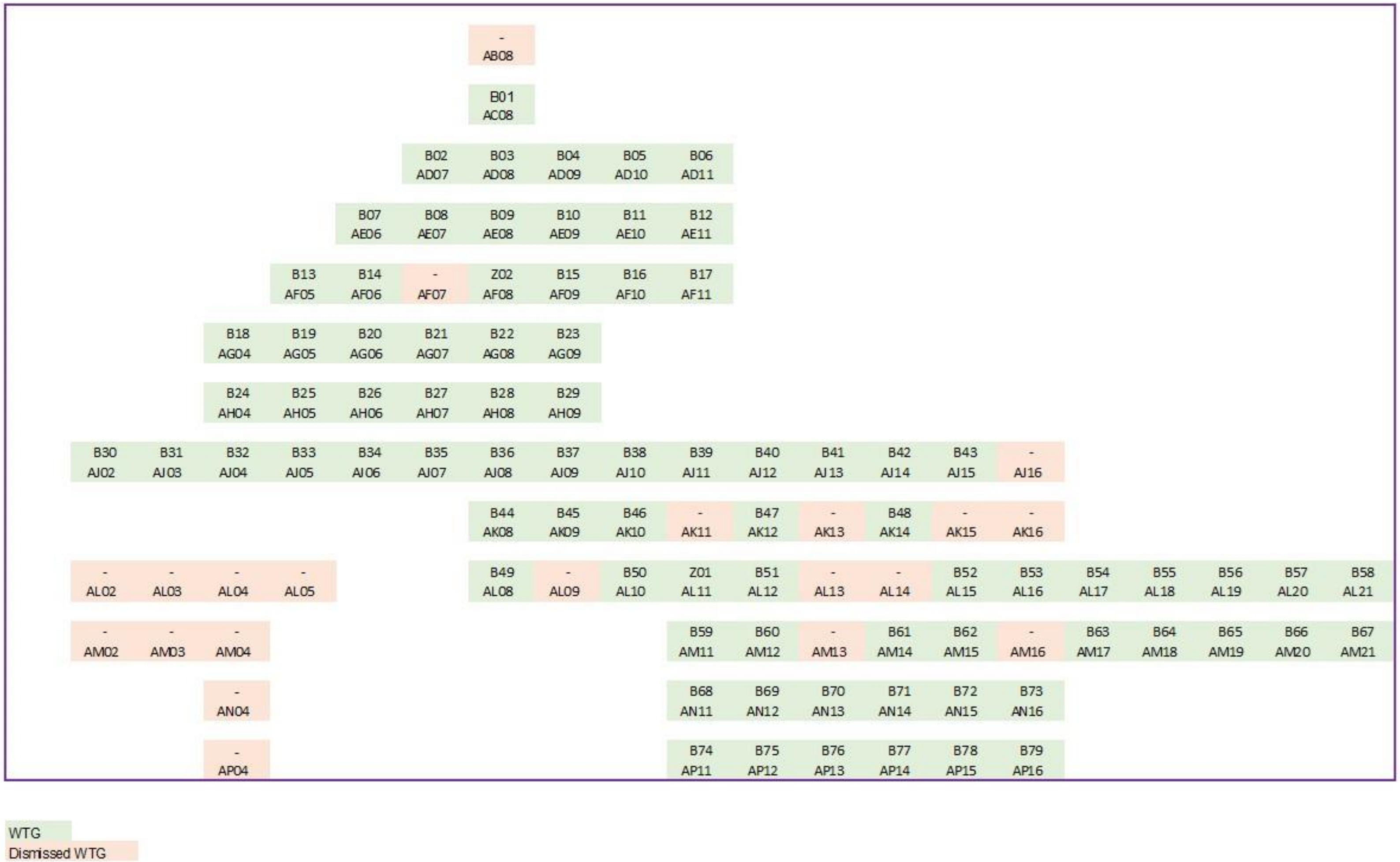


**Figure D-1. Wind turbine generator identification numbers and locations for the maximum-case scenario (Revolution Wind 2023).**

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Revolution Wind, LLC. 2023. Wind turbine generator identification numbers and locations for the maximum-case scenario. Written submittal to BOEM in response to Request for Information #57 dated July 7, 2023. Written communication (email).

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# APPENDIX E

## Planned Activities Scenario and Reasonably Foreseeable Future Activities and Projects

# Contents



# Tables

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# Planned Activities Scenario

The impacts resulting from the planned activities scenario are the incremental effects of the Proposed Action on the environment added to other reasonably foreseeable planned actions in the area (40 Code of Federal Regulations [CFR] 1502.15). This appendix discusses resource-specific planned activities that could occur if Project impacts occur in the same location and time frame as impacts from other reasonably foreseeable planned actions. The *Project* here is the construction, operations and maintenance (O&M), and decommissioning of a wind energy project located within the Bureau of Ocean Energy Management's (BOEM's) Renewable Energy Lease Area OCS-A 0486, approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island and approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island.

BOEM anticipates that impacts could occur between the start of Project construction in 2023 and the completion of Project decommissioning, which would occur within 2 years of the end of the lease (up to 35 years postconstruction). The geographic analysis area (GAA) is defined by the impact-producing factor (IPF) with the maximum geographic area of impact, for example sound during pile driving. For the mobile resources, bats, birds, finfish and invertebrates, marine mammals, and sea turtles, the species potentially impacted are those that occur within the area of impact of the Proposed Action. The GAA for these mobile resources is the general range of the species. The purpose of these analysis areas is to capture the impacts from planned activities to each of those resources potentially impacted by the Proposed Action. The GAA for each resource area is defined in the resource area sections of the environmental impact statement (EIS).

In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (miles used specifically for marine navigation). This appendix uses statute miles more commonly and refers to them simply as *miles*, whereas nautical miles are referred to by name or abbreviation *nm*.

# Reasonably Foreseeable Future Activities and Projects

This section includes a list and description of other reasonably foreseeable activities that could contribute to cumulative impacts within the defined GAA for each resource category. Projects or actions that are considered speculative per the definition provided in 43 CFR 46.30[1] are noted in subsequent tables but excluded from the planned activities impact analysis in Chapter 3.

Planned (cumulative) activities described in this section consist of 10 types of actions: 1) other offshore wind energy development activities; 2) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); 3) tidal energy projects; 4) marine minerals use and ocean-dredged material disposal; 5) military use; 6) marine transportation; 7) fisheries use and management; 8) global climate change; 9) oil and gas activities; and 10) onshore development activities.

[1] 43 CFR 46.30 – Reasonably foreseeable future actions include those federal and non-federal activities not yet undertaken, but sufficiently likely to occur, that a responsible official of ordinary prudence would take such activities into account in reaching a decision. The federal and non-federal activities that BOEM must take into account in the analysis of cumulative impacts include, but are not limited to, activities for which there are existing decisions, funding, or proposals identified by BOEM. Reasonably foreseeable future actions do not include those actions that are highly speculative or indefinite.

BOEM analyzed the possible extent of future other offshore wind energy development activities on the Atlantic Outer Continental Shelf (OCS) to determine reasonably foreseeable cumulative effects measured by installed power capacity. Table E-1 represents the status of projects as of March 17, 2023. The methodology for developing the scenario is largely the same as for the Vineyard Wind project (BOEM 2021a) and is outlined in the footnotes in Table E3-1.

## Monitoring and Mitigation

Future offshore wind projects could require monitoring or mitigation as part of BOEM approvals under the National Environmental Policy Act (NEPA) and OCSLA. Although specific measures are too speculative to include at this time, BOEM anticipates that measures could include actions such as passive acoustic monitoring, trawl surveys, acoustic telemetry, and gillnet or ventless trap surveys.

**Table E-1. Offshore Wind Activities on the U.S. Atlantic Coast (dates shown as of March 17, 2023)**

| Lease Number | States | Lessee/Developer Name | Project Name | Construction Date | Operations Date | Facility Description | BOEM Permitting Stage* | Power Purchase Agreement/ Offshore Renewable Energy Certificate Status |
|---|---|---|---|---|---|---|---|---|
| **Active Projects (state)** | | | | | | | | |
| N/A (state project) | Maine | New England Aqua Ventus, LLC | NE Aquaventus | 2024 | 2024 | 11 MW (1 WTG) | N/A | PPA with ME |
| N/A (state project) | Rhode Island | Deepwater Wind, LLC (now Orsted) | Block Island Wind Farm | 2015 | 2016 | 30 MW (5 WTGs) | N/A | PPA with RI |
| **Active Projects (federal)** | | | | | | | | |
| OCS-A 0483 | Virginia | Virginia Electric and Power Company (dba Dominion Virginia Power) | Coastal Virginia Offshore Wind | 2023 | 2023 | 2,500 to 3,000 MW (205 WTGs); one met buoy | SAP approved; New SAP submitted and approved; COP submitted | No PPAs signed to date |
| OCS-A 0486 | Rhode Island and Connecticut | Revolution Wind, LLC | Revolution Wind (Proposed Action) | 2024 | 2024 | Up to 880 MW (100 WTGs; two OSSs) | COP submitted; SAP approved | 2 PPAs with CT and one PPA with RI |
| OCS-A 0487 | New York | Sunrise Wind LLC | Sunrise Wind | 2024 | 2024 | Up to 934 MW (94WTGs) | COP submitted | OREC awarded by NYSERDA (PPA with NY) |
| OCS-A 0490 (portion) | Maryland | U.S. Wind Inc. | U.S. Wind | 2024 | 2024 | Up to 2,000 MW (121 WTGs) | COP submitted; SAP approved | OREC awarded by State of Maryland |
| OCS-A 0497 | Virginia | Virginia Department of Mines, Minerals and Energy ( | Coastal Virginia Offshore Wind | 2021 | 2021 | 12 MW (two WTGs-6 MW each); one wave/current buoy | Operating | N/A (research) |
| OCS-A 0498 (portion) | New Jersey | Ocean Wind, LLC | Ocean Wind 1 | 2024 | 2025 | 1,100 MW (98 WTGs) | COP submitted<br>SAP approved | OREC awarded by NJ |
| OCS-A 0499 | New Jersey | Atlantic Shores Offshore Wind, LLC | Atlantic Shores | 2025 | 2025 | Up to 1,510 MW (105 to 136 WTGs) | SAP approved; COP submitted | OREC signed with NJ for 1,510 MW. |
| OCS-A 0500 (portion) | Massachusetts | Bay State Wind LLC | Bay State Wind | 2026 | 2027 | 800 MW; two FLIDAR buoys; one met buoy | COP in progress<br>SAP approved | No PPA signed to date |
| OCS-A 0501 (north) | Massachusetts | Vineyard Wind LLC | Vineyard Wind 1 | 2023 | 2023 | 800 MW (62 WTGs); two met buoys | ROD issued | PPA with MA |
| OCS-A 0534 and portion of OCS-A 0501 | Massachusetts | New England Wind, LLC | Park City Wind (Phase 1)<br>Commonwealth Wind (Phase 2) | 2024 | 2026 | Up to a combined 2,284 MW (130 WTGs or ESP) positions) for both phases | COP in progress | PPA with CT (Phase 1)<br>No PPA signed to date (Phase 2) |
| OCS-A 0508 | North Carolina, Virginia | Kitty Hawk Wind, LLC | Kitty Hawk North Wind | 2027 | 2027 | Up to 1,242 MW (69 WTGs; up to two buoys; and up to two platforms | COP submitted; SAP approved | No PPA signed to date |

| Lease Number | States | Lessee/Developer Name | Project Name | Construction Date | Operations Date | Facility Description | BOEM Permitting Stage* | Power Purchase Agreement/ Offshore Renewable Energy Certificate Status |
|---|---|---|---|---|---|---|---|---|
| OCS-A 0508 (remainder) | Virginia/North Carolina | Kitty Hawk Wind, LLC | Kitty Hawk Wind, South | 2027 | 2028 | Up to 2,178 MW (121 WTGs) | SAP approved; COP in progress | No PPAs signed to date |
| OCS-A 0512 ) | New York | Empire Offshore Wind LLC | Empire Wind 1,<br>Empire Wind 2 | 2024 | 2027 | Up to 2,176 MW (147 WTGs); two met buoys; one wave/met buoy; one subsea current meter mooring | COP submitted; SAP approved | PPA with NY |
| OCS-A 0517 | New York | South Fork Wind, LLC | South Fork Wind Farm | 2023 | 2023 | 130 MW (up to 12 WTGs); one met buoy | ROD issued<br>COP approved | PPA with NY |
| OCS-A 0519 (portion) | Delaware, Maryland | Skipjack Offshore Energy, LLC | Skipjack | 2024 | 2024 | 192 MW (up to 16 WTGs); one met buoy | COP in progress | OREC awarded by State of Maryland (connection to PJM grid in DE) |
| OCS-A 0521 | Massachusetts | Mayflower Wind Energy, LLC | South Coast Wind | 2024 | 2024 | Up to 1,600–2,400 MW (147 WTGs); one met buoy | SAP approved; COP submitted | PPA with MA (up to 804 MW)<br>Applying for other PPAs |
| OCS-A 0520 | Massachusetts | Beacon Wind, LLC | Beacon Wind (Phase 1)<br>Beacon Wind (Phase 2) | 2024–2027 | 2026–2029 | Up to 2,330 MW (188 WTGs) | SAP submitted; COP in progress | No PPA signed to date |
| **Future Projects (federal)** | | | | | | | | |
| OCS-A 0482 | Delaware | GSOE I LLC<br>(Orsted and PSEG) | Garden State Offshore Energy | By 2030, spread over 2023–2030 | | | SAP approved | PPA with DE and NJ |
| OCS-A 0487 (remainder) | Rhode Island | Sunrise Wind, LLC | TBD | By 2030, spread over 2025–2030 | | | SAP approved | No PPAs signed to date |
| | | | | | | | | |
| OCS-A 0500 (remainder) | Massachusetts | Bay State Wind LLC | TBD | By 2030, spread over 2025–2030 | | | SAP approved | No PPAs signed to date |
| OCS-A 0519 (remainder) | Maryland/Delaware | Skipjack Offshore Energy, LLC | To be determined (TBD) | By 2030, spread over 2023–2030 | | | SAP approved | No PPAs signed to date |
| OCS-A 0522 | Massachusetts | Vineyard Wind LLC | Liberty Wind | By 2030, spread over 2025–2030 | | | SAP submitted | No PPAs signed to date |
| OCS-A 0532 (portion) | New Jersey | (Orsted North America) | Ocean Wind 2 | By 2030, spread over 2026–2030 | | | SAP approved | OREC awarded by NJ for 1,148 MW |

| Lease Number | States | Lessee/Developer Name | Project Name | Construction Date | Operations Date | Facility Description | BOEM Permitting Stage* | Power Purchase Agreement/ Offshore Renewable Energy Certificate Status |
|---|---|---|---|---|---|---|---|---|
| OCS-A 0537 | New York/New Jersey | Bluepoint Wind, LLC | Central Bight | By 2030, spread over 2026–2030 | | | Lease issuance | No PPAs signed to date |
| OCS-A 0538 | New York/New Jersey | Attentive Energy LLC | Hudson South B | | | | Lease issuance | No PPAs signed to date |
| OCS-A 0539 | New York/New Jersey | Community Offshore Wind, LLC | Hudson South C | | | | Lease issuance | No PPAs signed to date |
| OCS-A 0541 | New York/New Jersey | Atlantic Shores Offshore Wind Bight, LLC | Hudson South E | | | | Lease issuance | No PPAs signed to date |
| OCS-A 0542 | New York/New Jersey | Invenergy Wind Offshore LLC | Hudson South F | | | | Lease issuance | No PPAs signed to date |
| OCS-A 0544 | New York/New Jersey | Vineyard Mid-Atlantic LLC | Hudson North | | | | Lease issuance | No PPAs signed to date |
| OCS-A 0545 | North Carolina/South Carolina | TotalEnergies Renewables | TotalEnergies Renewables Wind | | | | Lease issuance | No PPAs signed to date |
| OCS-A 0546 | North Carolina/South Carolina | Duke Energy Renewables | Duke Energy Renewables Wind | | | | Lease issuance | No PPAs signed to date |
| OCS-A 0549 | New York/New Jersey | Atlantic Shores Offshore Wind, LLC | Atlantic Shores North | | | | Lease issuance | No PPAs signed to date |

Notes: – = no data; COP = construction and operations plan; CT = Connecticut; DE = Delaware; MA = Massachusetts; MD = Maryland; ME = Maine; MW = megawatts; NA = not applicable; NJ = New Jersey; NY = New York; NYSERDA = New York State Energy Research and Development Authority; OREC = offshore renewable energy certificate; PPA = power purchase agreement; RI = Rhode Island; ROD = record of decision; SAP = site assessment plan; TBD = to be determined; WTGs = wind turbine generators.

* Under BOEM Permitting Stage, COP status is assumed to be in process, under review, or not yet commenced based on publicly available information.

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# Offshore Wind Energy Development Activities

## Site Characterization Studies

A lessee is required to provide the results of site characterization activities with its site assessment plan (SAP) or COP. For the purposes of the planned activities effects analysis, BOEM makes the following assumptions for survey and sampling activities (BOEM 2016):

- Site characterization would occur on all existing leases.
- Site characterization would likely take place in the first 3 years following execution of a lease, since a lessee would likely want to generate data for its COP at the earliest possible opportunity.
- Lessees would likely survey most or all of the proposed lease area during the 5-year site assessment term to collect required geophysical information for siting of a meteorological tower and/or two buoys and commercial facilities (wind turbines). The surveys may be completed in phases, with the meteorological tower and/or buoy areas likely to be surveyed first.
- Lessee would not use air guns, which are typically used for deep penetration two-dimensional or three-dimensional exploratory seismic surveys to determine the location, extent, and properties of oil and gas resources.

Table E-2 summarizes the typical site characterization surveys, the types of equipment and/or method used, and which resources the survey information would inform (BOEM 2013, 2016).

**Table E-2**. **Typical Site Characterization Survey Information**

| Survey Type | Survey Equipment and/or Method | Resource Surveyed or Information Used to Inform |
|---|---|---|
| High-resolution geophysical surveys | Side-scan sonar, sub-bottom profiler, magnetometer, multi-beam echosounder | Shallow hazards, archaeological, Bathymetric charting, benthic habitat |
| Geotechnical/ sub-bottom sampling | Vibracores, deep borings, cone penetration tests | Geological |
| Biological | Grab sampling, benthic sled, underwater imagery/ sediment profile imaging | Benthic habitat |
| | Aerial digital imaging; visual observation from boat or airplane | Bird |
| | Ultrasonic detectors installed on survey vessels used for other surveys | Bat |
| | Visual observation from boat or airplane | Marine fauna (marine mammals and sea turtles) |
| | Direct sampling of fish and invertebrates | Fish |

Source: BOEM (2016).

## Site Assessment Activities

After SAP approval, a lessee can evaluate the meteorological conditions, such as wind resources, with the approved installation of meteorological towers and/or buoys. Site assessment activities have been approved or are in the process of being approved for multiple lease areas consisting of one to three meteorological buoys per SAP (see Table E-1). Site assessment would likely take place starting within 1 to 2 years of lease execution, because preparation of a SAP (and subsequent BOEM review) takes time. This planned activities analysis considers these site assessment activities.

## Construction and Operation of Offshore Wind Facilities

Table E-1 lists all offshore wind leasing activities that BOEM considers reasonably foreseeable by lease areas and projects, their permitting stage/assessment, and anticipated timeline.

### Commercial Fisheries Cumulative Fishery Effects Analysis

Table E-3 summarizes 1) the incremental number of construction locations that are projected to be active in each region during each year between 2021 and 2030; 2) the number of operational turbines in each region at the beginning of each year between 2021 and 2030; and 3) the total number of active construction locations and operational turbines across the Atlantic OCS by year.

**Table E-3. Offshore Wind Project Construction Schedule (dates shown as of March 27, 2023)**

<table>
<tr><th rowspan="2">Project/Region</th><th colspan="11">Number of Foundations</th></tr>
<tr><th>Before 2021</th><th>2021</th><th>2022</th><th>2023</th><th>2024</th><th>2025</th><th>2026</th><th>2027</th><th>2028</th><th>2029</th><th>2030 and Beyond</th></tr>
<tr><td>Aquaventis (state waters)</td><td>–</td><td>–</td><td>–</td><td>–</td><td>2</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>Block Island (state waters)</td><td>5</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td colspan="12">Massachusetts/Rhode Island Region</td></tr>
<tr><td>Vineyard Wind 1 part of OCS-A 0501</td><td>–</td><td>–</td><td>–</td><td>63</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>South Fork, OCS-A 0517</td><td>–</td><td>–</td><td>–</td><td>13</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>Sunrise, OCS-A 0487</td><td>–</td><td>–</td><td>–</td><td>–</td><td>95</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])</td><td>–</td><td>–</td><td>–</td><td>–</td><td>64</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>66</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>South Coast Wind, OCS-A 0521</td><td>–</td><td>–</td><td>–</td><td>–</td><td>149</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>Beacon Wind, part of OCS-A 0520 (Phase 1)</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="3">95</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>Beacon Wind, part of OCS-A 0520 (Phase 2)</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="3">95</td><td>–</td></tr>
<tr><td>Bay State Wind, part of OCS-A 0500</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="6" rowspan="4">75</td></tr>
<tr><td>Vineyard Northeast Wind (OCS-A 0522)</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>OCS-A 0500 remainder</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>OCS-A 0487 remainder</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>Estimated annual Massachusetts/Rhode Island construction</td><td>0</td><td>0</td><td>0</td><td>76</td><td>403</td><td>441</td><td>0</td><td>95</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Estimated O&M total</td><td>0</td><td>0</td><td>0</td><td>0</td><td>76</td><td>479</td><td>920</td><td>1,015</td><td>1,015</td><td>1,015</td><td>1,015</td></tr>
</table>

<table>
<tr><th rowspan="2">Project/Region</th><th colspan="11">Number of Foundations</th></tr>
<tr><th>Before 2021</th><th>2021</th><th>2022</th><th>2023</th><th>2024</th><th>2025</th><th>2026</th><th>2027</th><th>2028</th><th>2029</th><th>2030 and Beyond</th></tr>
<tr><td colspan="12">New York/New Jersey Region</td></tr>
<tr><td>Ocean Wind 1, OCS-A 0498</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="2">101</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>Atlantic Shores South, OCS-A 0499</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>-</td></tr>
<tr><td>Ocean Wind 2, part of OCS-A 0532</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="5">111</td></tr>
<tr><td>Empire Wind 1, part of OCS-A 0512</td><td>–</td><td>–</td><td>–</td><td colspan="4">57</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>Empire Wind 2, part of OCS-A 0512</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="4">90</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>OW Ocean Winds East LLC, OCS-A 0537</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="5">82</td></tr>
<tr><td>Attentive Energy LLC, OCS-A 0538</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="5">102</td></tr>
<tr><td>Bight Wind Holdings, LLC, OCS-A 0539</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="5">148</td></tr>
<tr><td>Atlantic Shores Offshore Wind Bight, OCS-A 0541</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="5">95</td></tr>
<tr><td>Invenergy Wind Offshore LLC, OCS-A 0542</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="5">99</td></tr>
<tr><td>Vineyard Mid-Atlantic LLC, OCS-A 0544</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td colspan="5">104</td></tr>
<tr><td>Atlantic Shores North, OCS-A 0549</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>165</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>Estimated annual New York/New Jersey construction</td><td>0</td><td>0</td><td>0</td><td>57</td><td>191</td><td>141</td><td>906</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Estimated O&M total</td><td>0</td><td>0</td><td>0</td><td>0</td><td>57</td><td>248</td><td>389</td><td>1,295</td><td>1,295</td><td>1,295</td><td>1,295</td></tr>
<tr><td colspan="12">Delaware/Maryland Region</td></tr>
<tr><td>Skipjack, OCS-A 0519</td><td>–</td><td>–</td><td>–</td><td>–</td><td>17</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>US Wind, OCS-A 0490</td><td>–</td><td>–</td><td>–</td><td>–</td><td>125</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>GSOE I, OCS-A 0482</td><td>–</td><td>–</td><td>–</td><td colspan="8" rowspan="2">96</td></tr>
<tr><td>OCS-A 0519 remainder</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>Estimated annual Delaware/Maryland construction</td><td>0</td><td>0</td><td>0</td><td>96</td><td>142</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>

| Project/Region | Number of Foundations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before 2021 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 and Beyond |
| Estimated O&M total | 0 | 0 | 0 | 0 | 96 | 238 | 238 | 238 | 238 | 238 | 238 |
| **Virginia/North Carolina Region** | | | | | | | | | | | |
| CVOW, OCS-A 0497 | 2 | – | – | – | – | – | – | – | – | – | – |
| CVOW-C, OCS-A 0483 | – | – | – | 208 | – | – | – | – | – | – | – |
| Kitty Hawk, OCS-A 0508 | – | – | – | – | – | – | – | 70 | – | – | – |
| Kitty Hawk Wind South, OCS-A 0508 remainder | – | – | – | – | – | – | – | 123 | | – | – |
| TotalEnergies Renewables Wind, LLC OCS-A 0545 | – | – | – | – | – | – | – | – | – | 65 | |
| Duke Energy Renewables Wind, LLC OCS-A 0546 | – | – | – | – | – | – | – | – | – | 65 | |
| Estimated annual Virginia/North Carolina construction: | 2 | 0 | 0 | 208 | 0 | 0 | 0 | 193 | 0 | 130 | 0 |
| Estimated O&M total | 2 | 2 | 2 | 2 | 210 | 210 | 210 | 210 | 403 | 533 | 533 |
| **Total** | | | | | | | | | | | |
| Estimated annual total construction | 7 | 0 | 0 | 815 | 722 | 565 | 1,050 | 0 | 0 | 0 | 0 |
| Estimated O&M total | 7 | 7 | 7 | 7 | 822 | 1,544 | 2,109 | 3,159 | 3,159 | 3,159 | 3,159 |

Note: CVOW = Coastal Virginia Offshore Wind.

# Incorporation by Reference of Cumulative Impacts Study

BOEM has completed a study of IPFs on the North Atlantic OCS to consider in an offshore wind development cumulative impacts scenario (BOEM 2019), which is incorporated by reference. The study identifies cause-and-effect relationships between renewable energy projects and resources and classifies those relationships into a manageable number of IPFs through which renewable energy projects could affect resources. It also identifies the types of actions and activities to be considered in a cumulative impacts scenario. The study identifies actions and activities that may affect the same physical, biological, economic, or cultural resources as renewable energy projects and states that such actions and activities may have the same IPFs as offshore wind projects.

The BOEM (2019) study identifies the relationships between IPFs associated with specific past, present, and reasonably foreseeable actions and activities in the North Atlantic OCS, which were incorporated into this EIS analysis. If an IPF was not associated with the RWF Project, it was not included in the impacts analysis of planned activities.

As discussed in the BOEM (2019) study, reasonably foreseeable activities other than offshore wind projects may also affect the same resources as the Project or other offshore wind projects, possibly via the same IPFs or via IPFs through which offshore wind projects do not contribute. This appendix lists reasonably foreseeable non-offshore wind activities that may contribute to the cumulative impacts of the proposed Project.

# Undersea Transmission Lines, Gas Pipelines, and Other Submarine Cables

The following existing undersea transmission lines, gas pipelines, and other submarine cables are located near the Project:

- New Shoreham (Block Island), Rhode Island, is served by a submarine power cable from the Block Island Wind Farm to New Shoreham (Block Island).
- A submarine power cable connects Block Island to the mainland electrical grid at Narragansett, Rhode Island.
- Service to Martha’s Vineyard is provided by four electric cables from Falmouth, located in three corridors through Vineyard Sound. Two cables are located in the same corridor between Elm Road in Falmouth and West Chop: one is located between Shore Street in Falmouth and Eastville (East Chop), and one connects between Mill Road in Falmouth and West Chop.
- Two cables service Nantucket through Nantucket Sound, from Dennis Port and Hyannis Port to landfall at Jetties Beach.
- Additional submarine cables, including fiber-optic cables and trans-Atlantic cables that originate near Charlestown, Rhode Island; New York City; Long Island, near Trenton, New Jersey; and Wall, New Jersey, are located offshore New England and mid-Atlantic states, but outside the proposed Lease Area.

- Two natural gas pipelines are located offshore Boston, Massachusetts, in Massachusetts Bay and lead to liquified natural gas (LNG) export facilities: the Neptune pipeline and the Northeast Gateway LNG pipeline.

The offshore wind projects listed in Table E-1 that have a COP under review are presumed to include at least one identified cable route. Cable routes have not yet been announced for the remainder of the proposed wind energy projects in Table E-1.

## Tidal Energy Projects

The following tidal energy projects have been proposed or studied on the U.S East Coast and are in operation or considered reasonably foreseeable:

- The Bourne Tidal Test Site, located in the Cape Cod Canal near Bourne, Massachusetts, is a testing platform for tidal turbines that was installed in late 2017 by the Marine Renewable Energy Collaborative. The Bourne Tidal Test Site offers a test platform for tidal turbines (MRECo 2017, 2018).
- Cobscook Bay Tidal Project, located in Maine, is a Federal Energy Regulatory Commission-(FERC) licensed tidal project that began operations in 2012. The project owner, Ocean Power Energy Company, has informed FERC that it will not apply for relicensing, and removal and site restoration activities are anticipated to be conducted prior to its current license expiration date in January 2022 (FERC 2012a).
- Western Passage Tidal Energy Project, a proposed tidal energy site in the Western Passage, received a preliminary permit from FERC in 2016. The preliminary permit allows developers to study a project but does not authorize construction.
- The Roosevelt Island Tidal Energy (RITE) Project located in the East Channel of the East River, a tidal strait connecting the Long Island Sound with the Atlantic Ocean in the New York Harbor. In 2005, Verdant Power petitioned FERC for permission to the first U.S. commercial license for tidal power. In 2012, FERC issued a 10-year license to install up to 1 MW of power (30 turbines/10 TriFrames) at the RITE project (FERC 2012b; Verdant Power 2018).

## Dredging and Port Improvement Projects

The following dredging projects have been proposed or studied between New York, New York, and Boston, Massachusetts, and are either in operation or are considered reasonably foreseeable:

- The U.S. Army Corps of Engineers (USACE) New England District partnership with Rhode Island Coastal Resources Management Council (RI CRMC) proposes a project that would dredge approximately 23,700 cubic yards of sandy material from the Point Judith Harbor Federal Navigation Project to widen the existing 15-foot-deep mean lower low water (MLLW) West Bulkhead channel by 50 feet and extend the same channel approximately 1,200 feet into the North Basin area (USACE 2018a).
- The Plymouth Harbor Federal Navigation Project in Plymouth, Massachusetts, includes maintenance dredging of approximately 385,000 cubic yards of sand and silt from approximately

75 acres of the authorized project area in order to restore the project to authorized and maintained dimensions (USACE 2018b).

- The Port of New Bedford was awarded a $15.4 million U.S. Department of Transportation Better Utilizing Investments to Leverage Development grant to improve the port's infrastructure and to help with the removal of contaminated materials. The funding will be used to extend the port's bulkhead, creating room for 60 additional commercial vessels, and additional sites for offshore wind staging (Phillips 2018).
- The Port of New Bedford is currently developing the Foss Marine Terminal, which will provide an additional full-service base of operations and terminal logistics facility to support offshore wind projects off Massachusetts and the northeastern seaboard (New Bedford Port Authority 2022). The New Bedford Foss Marine Terminal will provide storage and laydown yards for equipment and materials, berth facilities for tug and barge operations, and will host crew transfer vessel and service operation vessel support services. The redevelopment will also create new office space for project teams and a marine coordination center for technicians involved in offshore wind projects. Construction of the terminal facility is anticipated to be completed in the spring 2023.
- Proposed New Haven Harbor Improvements would include deepening the main ship channel, maneuvering area, and turning basin to -40 feet MLLW and widening the main channel and turning basin to allow larger vessels to efficiently access the Port of New Haven’s terminals. The proposed improvements would remove approximately 4.28 million cubic yards of predominately glacially deposited silts from the federal channel (USACE 2018c).
- The Nature Conservancy seeks a permit to place an artificial reef array in Narraganset Bay at 130 Shore Road in Narragansett Bay in East Providence, Rhode Island. The proposed work involves the construction of a 0.14-acre artificial reef using 91 pre-fabricated reef modules. The artificial reef array would consist of 58 Pallet Balls (4.0 × 2.9 feet) and 33 Bay Balls (3 × 2 feet). The reef modules would be transported to the project site by barge and lowered to the seafloor by crane (USACE 2019).
- The RI CRMC has awarded funding for five habitat restoration projects in the 19th year of its Rhode Island Coastal and Estuarine Habitat Restoration Trust Fund (RI CRMC 2022). These projects comprise a dam removal assessment, streambank stabilization on the Woonasquatucket River, salt marsh restoration, habitat restoration and invasive species management, and fish passage improvement on the Saugatucket River (RI CRMC 2018a).
- The Town of Dennis seeks a permit for the selective dredging of multiple navigation and mooring basins within multiple waterways in the towns of Dennis and Yarmouth. Suitable dredged material will be used as nourishment on multiple town-owned beaches in Dennis whereas material that is not deemed suitable for beach nourishment will be disposed of at the Cape Cod Bay Disposal Site and at the South Dennis Landfill. The town is requesting to dredge approximately 434,310 cubic yards from portions of these waterways over 10 years encompassing an area of approximately 96.03 acres (USACE 2018d).

The following port improvement projects have been proposed in Connecticut, Rhode Island, Massachusetts, and/or New Jersey, and are either in operation or are considered reasonably foreseeable:

- The Connecticut Port Authority (CPA) announced a $93 million public-private partnership to upgrade the Connecticut State Pier in New London to support the offshore wind industry (Sheridan 2019). According to the Connecticut Maritime Strategy 2018 (CPA 2018a), New London is the only major port between New York and Maine that does not have vertical obstruction and offshore barriers, two factors that are critical for offshore wind turbine assembly. The document includes strategic objectives to manage and redevelop the Connecticut State Pier partially to support the offshore wind industry, which could create a dramatic increase in demand for the Connecticut State Pier and regional job growth. The development partnership, announced in May 2019, includes a 3-year plan to upgrade infrastructure to meet heavy-lift requirements of Orsted and Eversource offshore wind components (Cooper 2019). Redevelopment of the Connecticut State Pier is considered a reasonably foreseeable activity.
- In Rhode Island, Revolution Wind, LLC has committed to investing approximately $40 million in improvements at the Port of Providence, the Port of Davisville at Quonset Point, and possibly other Rhode Island ports for the Revolution Wind Project (Kuffner 2018). This investment will position Rhode Island ports to participate in construction and operation of future offshore wind projects in the region (Rhode Island Governor's Office 2018). The Port of Davisville has added a 150-megaton mobile harbor crane, which will enable the port to handle wind turbines and heavy equipment, and enables the Port of Davisville to participate in regional offshore wind projects (Port of Davisville 2017). Further improvements at Rhode Island ports to support the offshore wind industry are considered reasonably foreseeable.
- The Massachusetts Clean Energy Center (MassCEC) has identified 18 waterfront sites in Massachusetts that may be available and suitable for use by the offshore wind industry. Potential activities at these sites include manufacturing of offshore wind transmission cables, manufacture and assembly of turbine components, substation manufacturing and assembly, O&M bases, and storage of turbine components (MassCEC 2017a, 2017b, 2017c).
- The MassCEC manages the New Bedford Marine Commerce Terminal in New Bedford, Massachusetts. The 29-acre facility was completed in 2015 and is the first in North America designed specifically to support the construction, assembly, and deployment of offshore wind projects (MassCEC 2018). The New Bedford Port Authority Strategic Plan 2018–2023 contains goals related to expanding the New Bedford Marine Commerce Terminal to improve and expand services to the offshore wind industry, including development of North Terminal with the capacity to handle two separate offshore wind installation projects in the future (Port of New Bedford 2018). Vineyard Wind signed an 18-month lease with the Marine Commerce Terminal in October 2018 (Port of New Bedford 2020) and has supported the New Bedford Port Authority with grants to develop publicly owned facilities to support shore-based operations for offshore wind facilities (Vineyard Wind 2019).

## Marine Minerals Use and Ocean Dredged Material Disposal

The closest active lease in BOEM's Marine Minerals Program for sand borrow areas for beach replenishment is located offshore New Jersey near Harvey Cedars, Surf City, Long Beach Township, Ship Bottom, and Beach Haven (Lease Number OCS-A-0505) (BOEM 2018).

In addition, reconnaissance and/or design-level OCS studies along the East Coast from Rhode Island to Florida have identified potential future sand resources. Sand resources identified nearest the Project include locations offshore Rhode Island (between Block Island and Charlestown), Long Island (Rockaway Beach, Long Beach, and Fire Island, New York), and Sandy Hook, New Jersey.

The EPA Region 1 is responsible for designating and managing ocean disposal sites for materials offshore in the region of the Project. The USACE issues permits for ocean disposal sites; all ocean sites are for the disposal of dredged material permitted or authorized under the Marine Protection, Research, and Sanctuaries Act (16 United States Code [USC] 1431 et seq. and 33 USC 1401 et seq.). There are nine active projects along the Massachusetts, Rhode Island, Connecticut, and New York coasts, with the closest dredge disposal project, the Rhode Island Sound Disposal Site, located northeast of Block Island (USACE 2018e).

## Military Use

Military activities can include various vessel training exercises, submarine and antisubmarine training, and U.S. Air Force exercises. The U.S. Navy, the U.S. Coast Guard (USCG), and other military entities have numerous facilities in the region. Major onshore regional facilities include Joint Base Cape Cod, Naval Station Newport, Newport Naval Undersea Warfare Center, Naval Submarine Base New London, and USCG Academy (BOEM 2013; Epsilon Associates, Inc 2018; RI CRMC 2010). The U.S. Atlantic Fleet also conducts training and testing exercises in the Narraganset Bay Operating Area, and the Newport Naval Undersea Warfare Center routinely performs testing in the area (BOEM 2013).

## Marine Transportation

Marine transportation in the region is diverse and sourced from many ports and private harbors from New York to Massachusetts. Commercial vessel traffic in the region includes research, tug/barge, liquid tankers (such as those used for liquid petroleum), cargo, military and search-and-rescue vessels, and commercial fishing vessels. Recreational vessel traffic includes cruise ships, sailboats, and charter boats. A number of federal agencies, state agencies, educational institutions, and environmental non-governmental organizations participate in ongoing research offshore including oceanographic, biological, geophysical, and archaeological surveys.

One new regional maritime highway project that has received funding from the U.S. Department of Transportation (USDOT) Maritime Administration (MARAD) is a new barge service (Davisville/Brooklyn/ Newark Container-on-Barge Service). This service is proposed to run twice each week in state waters between Newark, New Jersey; Brooklyn, New York; and the Port of Davisville in Rhode Island (USDOT MARAD 2021), which is located on Quonset Point, one of the potential O&M locations. The project received grant funding from MARAD in August 2018 (fiscal year 2017) to purchase material for handling equipment for the biweekly barge service (USDOT MARAD 2022).

## National Marine Fisheries Service Activities

Research and enhancement permits may be issued for marine mammals protected by the Marine Mammal Protection Act (MMPA) and for threatened and endangered species under the ESA. The National Marine Fisheries Service (NMFS) is anticipated to continue issuing research permits under section 10(a)(1)(A) of the ESA to allow take of certain ESA-listed species for scientific research. Scientific research permits issued by NMFS currently authorize studies on ESA-listed species in the Atlantic Ocean, some of which occur in portions of the Lease Area. Current fisheries management and ecosystem monitoring surveys conducted by or in coordination with the Northeast Fisheries Science Center (NEFSC) could overlap with offshore wind lease areas in the New England region and south into the Mid-Atlantic region. Surveys include 1) the NEFSC Bottom Trawl Survey, a more than 50-year multispecies stock assessment tool using a bottom trawl; 2) the NEFSC Sea Scallop/Integrated Habitat Survey, a sea scallop stock assessment and habitat characterization tool, using a bottom dredge and camera tow; 3) the NEFSC Surfclam/Ocean Quahog Survey, a stock assessment tool for both species using a bottom dredge; and 4) the NEFSC Ecosystem Monitoring Program, a more than 40-year shelf ecosystem monitoring program using plankton tows and conductivity, temperature, and depth units. These surveys are anticipated to continue within the region, regardless of offshore wind development.

The regulatory process administered by NMFS, which includes stock assessments for all marine mammals and 5-year reviews for all ESA-listed species, assists in informing decisions on take authorizations and the assessment of project-specific and cumulative impacts that consider past, present, and reasonably foreseeable future actions in biological opinions. Stock assessments completed regularly under MMPA include estimates of potential biological removal that stocks of marine mammals can sustainably absorb. MMPA take authorizations require that a proposed action have no more than a negligible impact on species or stocks, and that a proposed action impose the least practicable adverse impact on the species. MMPA authorizations are reinforced by monitoring and reporting requirements so that NMFS is kept informed of deviations from what has been approved. Biological opinions for federal and non-federal actions are similarly grounded in status reviews and conditioned to avoid jeopardy and to allow continued progress toward recovery. These processes help to ensure that, through compliance with these regulatory requirements, a proposed action would not have a measurable impact on the conservation, recovery, and management of the resource.

### Directed Take Permits for Scientific Research and Enhancement

NMFS issues permits for research on protected species for scientific purposes. These scientific research permits include the authorization of directed take for activities such as capturing animals and taking measurements and biological samples to study their health, tagging animals to study their distribution and migration, photographing and counting animals to get population estimates, taking animals in poor health to an animal hospital, and filming animals. NMFS also issues permits for enhancement purposes; these permits are issued to enhance the survival or recovery of a species or stock in the wild by taking actions that increase an individual’s or population’s ability to recover in the wild. In waters near the Lease Area, scientific research and enhancement permits have been issued previously for satellite, acoustic, and multi-sensor tagging studies on large and small cetaceans, research on reproduction, mortality, health, and conservation issues for North Atlantic right whales, and research on population dynamics of harbor and gray seals. Reasonably foreseeable future impacts from scientific research and enhancement permits include physical and behavioral stressors (e.g., restraint and capture, marking, implantable and suction tagging, biological sampling).

### Fisheries Use and Management

NMFS implements regulations to manage commercial and recreational fisheries in federal waters, including those within which the Project would be located; the State of New York, state of Rhode Island, and Commonwealth of Massachusetts regulate commercial fisheries in state waters (within 3 nautical miles of the coastline). There are several aquaculture sites in Narragansett Bay; however, the Lease Area and the RWEC centerline does not intersect any of these sites (Suffolk County 2018). The closest aquaculture site to the RWEC centerline is located on the western shoreline of Conanicut Island, approximately 1,427 feet (435 m) from the RWEC route centerline (VHB 2023).

The project overlaps two of NMFS' eight regional councils to manage federal fisheries: Mid-Atlantic Fishery Management Council (MAFMC), which includes New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia and North Carolina; and New England Fishery Management Council (NEFMC), which includes Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut (NEFMC 2016). The councils manage species with many fishery management plans that are frequently updated, revised, and amended and coordinate with each other to jointly manage species across jurisdictional boundaries (MAFMC 2019). Many of the fisheries managed by the councils are fished for in state waters or outside of the Mid-Atlantic region, so the council works with the Atlantic States Marine Fisheries Commission (ASMFC). ASMFC is composed of the 15 Atlantic coast states and coordinates the management of marine and anadromous resources found in the states' marine waters. In addition, the lobster and Jonah crab fisheries are cooperatively managed by the states and NMFS under the framework of the ASMFC (2019).

The fishery management plans of the councils and ASMFC were established, in part, to manage fisheries to avoid overfishing. They accomplish this through an array of management measures, including annual catch quotas, minimum size limits, and closed areas. These various measures can further reduce (or increase) the size of landings of commercial fisheries in the Northeast and the Mid-Atlantic regions.

NOAA Fisheries also manages highly migratory species (HMS), such as tuna and sharks, that can travel long distances and cross domestic boundaries.

## Global Climate Change

Section 7.6.1.4 of the *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf* (Minerals Management Service [MMS] 2007) describes global climate change with respect to assessing renewable energy development. Climate change is predicted to affect Northeast fishery species differently (Hare et al. 2016), and the NMFS biological opinion discusses in detail the potential impacts of global climate change on protected species that occur within the proposed action area (NMFS 2013).

The Intergovernmental Panel on Climate Change (IPCC) released a special report in October 2018 that compared risks associated with an increase of global warming of 1.5 degrees Celsius (°C) and an increase of 2°C. The report found that climate-related risks depend on the rate, peak, and duration of global warming, and that an increase of 2°C was associated with greater risks associated with climatic changes such as extreme weather and drought; global sea level rise; impacts to terrestrial ecosystems; impacts to marine biodiversity, fisheries, and ecosystems and their functions and services to humans; and impacts to health, livelihoods, food security, water supply, and economic growth (IPCC 2018).

States and regions look to offshore wind as a key component in their strategic plans to meet emissions goals in part because offshore wind can provide a low-carbon/no-carbon electricity supply source for current and increasing needs of electrified heating and transportation. Offshore wind projects produce less net greenhouse gas (GHG) emissions over the life of the projects when compared to other energy sources currently in use. Table E-4 summarizes regional plans and policies that are in place to address climate change, and Table E-5 summarizes resiliency plans.

### Table E-4. Climate Change Plans and Policies

| Plans and Policies | Summary/Goal |
|---|---|
| **Connecticut** | |
| 2008 Global Warming Solutions Act | Sets forth statutory requirements to reduce GHG emissions 10% below 1990 levels by 2020 and 80% below 2001 levels by 2050 (State of Connecticut 2008). |
| Control of Carbon Dioxides Emissions/$CO_2$ Budget Trading Program (2008) | Sets forth statutory requirements to establish a carbon dioxide ($CO_2$) allowance tracking system wherein $CO_2$ allowance allocations are established under the Connecticut $CO_2$ Budget Trading Program Base Budget. Budget sources are identified, cataloged, monitored and reported, transferred, and tracked under a certification program in an effort to cap and reduce power sector $CO_2$ emissions. |
| Regional Greenhouse Gas Initiative (RGGI) (2009) | The nation's first mandatory, market-based cap-and-trade program to reduce emissions of $CO_2$. Under the program, which began in 2009, participating RGGI states (Rhode Island, Connecticut, Delaware, Massachusetts, Maryland, Maine, New Hampshire, New York, Vermont, and New Jersey; New Jersey withdrew in 2011) established a regional cap on $CO_2$ emissions from fossil fuel–fired electric generating facilities, and required these power plants to possess a tradable $CO_2$ allowance for each ton of $CO_2$ they emit. Under RGGI, $CO_2$ allowances are distributed through quarterly allowance auctions. |
| An Act Concerning Electric and Fuel Cell Electric Vehicles (Public Act 16-135) (2016) | Sets forth several provisions related to electric vehicles (EVs), including requirements related to data collection, EV charging stations, and electric rate structures. |
| Building A Low Carbon Future for Connecticut: Achieving a 45% GHG reduction by 2030 (2018) | Proposed set of strategies to achieve 45% GHG reduction below 2001 levels target by 2030. These strategies ensure Connecticut is on a downward trajectory to the 80% reduction target by 2050 required by the Global Warming Solutions Act (State of Connecticut 2018a). |
| 2018 Act Concerning Climate Change Planning and Resiliency (Public Act 18-82) | Act passed by the Connecticut General Assembly that adopted GC3's recommendation of 45% GHG mid-term reduction target below 2001 levels by 2030 and integrates GHG reduction more explicitly into the DEEP Comprehensive Energy Strategy (CES) and Integrated Resource Plan (IRP) (State of Connecticut 2018b). |
| Comprehensive Energy Strategy (CES) (2018) | Connecticut Department of Energy and Environmental Protection (DEEP) update to Connecticut's CES to advance the State's goal of creating a cheaper, cleaner, more reliable energy future for Connecticut's residents and businesses. The CES analyzes energy use and key trends of the region (State of Connecticut 2018c) |
| Executive Order No. 3, (2019) | Re-establishes and expands the membership and responsibilities of the Governor's Council on Climate change (GC3), originally established in 2015. Orders GC3 to report to the Governor regarding the state's progress on the implementation of the strategies identified in *Building a Low Carbon Future for Connecticut: Achieving a 45% GHG reduction by 2030* (State of Connecticut 2019) |

| Plans and Policies | Summary/Goal |
|---|---|
| Integrated Resources Plan (2020) | DEEP is required to prepare an Integrated Resource Plan (IRP) every 2 years, which is comprised of an assessment of the future electric needs and a plan to meet those future needs. Executive Order 3 directed DEEP to analyze pathways and recommend strategies to achieve a 100 percent zero carbon electric supply by 2040 in this IRP (State of Connecticut 2020). |
| Taking Action on Climate Change and Building a More Resilient Connecticut for All (2021) | Phase 1 report in response to Executive Order 3's request for progress on mitigation strategies and preparation of an Adaptation and Resilience Plan. Provides information on GC3 members and Working Group members, GC3 background and process, the Equity and Environmental Justice Working Group, the impacts of climate change in Connecticut, and recommendations for near-term action (State of Connecticut 2021) |
| **Massachusetts** | |
| Global Warming Solutions Act (GWSA) of 2008 | Framework to reduce GHG emissions by requiring 25% reduction in emissions from all sectors below 1990 baseline emission level in 2020, at least 80% reduction in 2050. Full implementation of these policies is projected to result in total net reduction of 25.0 million metric tons of $CO_2$ equivalent, or 26.4% below 1990 baseline level (Commonwealth of Massachusetts 2018a). |
| Massachusetts Clean Energy and Climate Plan (CECP) for 2020; 2015 CECP Update | Policies that aim to reduce GHG emissions in the commonwealth across all sectors; full implementation of policies would result in reducing emissions by at least 25% below 1900 level in 2020 (Commonwealth of Massachusetts 2015). |
| Executive Order 569, Establishing an Integrated Climate Strategy for the Commonwealth and "Act to Promote Energy Diversity" (2016) | Calls for large procurements of offshore wind and hydroelectric resources (Commonwealth of Massachusetts 2016). |
| Environmental Bond Bill and An Act to Advance Clean Energy (2018) | Sets new targets for offshore wind, solar, and storage technologies; expands Renewable Portfolio Standard requirements for 2020–2029; establishes a Clean Peak Standard; and permits fuel switching in energy efficiency programs (Commonwealth of Massachusetts 2018a). |
| Massachusetts State Hazard Mitigation and Climate Adaption Plan 2018 | Updated 2013 plan to comprehensively integrate climate change impacts and adaptation strategies with hazard mitigation planning while complying with federal requirements for state hazard mitigation plans and maintaining eligibility for federal disaster recovery and hazard mitigation funding under the Stafford Act. The plan will next be submitted to the Federal Emergency Management Agency (FEMA) for approval. In 2020, a new 2030 emissions limit and CECP for 2030 will be published (Commonwealth of Massachusetts 2018a, 2018b). |
| Massachusetts 2050 Decarbonization Roadmap | A planning process by the Massachusetts Executive Office of Energy and Environmental Affairs to identify cost-effective and equitable strategies to ensure Massachusetts reduces GHG emissions by at least 85% by 2050 and achieves net-zero emissions (Commonwealth of Massachusetts 2020a) |

| Plans and Policies | Summary/Goal |
|---|---|
| Massachusetts Clean Energy and Climate Plan (CECP) for 2030 | The Clean Energy and Climate Plan for 2030 (2030 CECP) provides details on the actions the Commonwealth will undertake through the next decade to ensure the 2030 emissions limit is met. The 2030 CECP is prepared in coordination with the development of the 2050 Decarbonization Roadmap such that the strategies, policies, and actions outlined in the 2030 CECP can help the Commonwealth achieve net zero GHG emissions by 2050. The Interim 2030 CECP was built upon the 2020 CECP and the 2015 CECP Update (Commonwealth of Massachusetts 2020b). |
| 2030 GHG Emissions Limit | The 2030 emissions limit of 45% below the 1990 GHG emissions level was set on December 30, 2020, in accordance with Executive Order 569 to help the Commonwealth meet the 2050 emissions limit (Commonwealth of Massachusetts 2020c) |
| Net Zero by 2050 Emissions Limit | A 2050 statewide emissions limit of net zero GHG emissions was established by the Commonwealth. This is defined as a level of statewide GHG emissions that is equal in quantity to the amount of $CO_2$ or its equivalent that is removed from the atmosphere and stored annually by, or attributable to, the Commonwealth; provided, however, that in no event shall the level of emissions be greater than a level that is 85 percent below the 1990 level (Commonwealth of Massachusetts 2020d). |
| **New York** | |
| Reforming the Energy Vision (New York State 2014) | State's energy policy to build integrated energy network; Clean energy goal to reduce GHGs by 40% by 2030 and by 80% by 2050. |
| Order Adopting a Clean Energy Standard (State of New York Public Service Commission 2016) | Requirement that 50% of New York's electricity come from renewable energy sources by 2030. |
| New York State Energy Plan 2015; 2017 Biennial Report to 2015 Plan (New York State Energy Research Development Authority [NYSERDA] 2015, 2017a) | Requires 40% reduction in GHGs from 1990 levels; 50% electricity will come from renewable energy resources; and 600 trillion British thermal units (Btu) increase in statewide energy efficiency. |
| Governor Cuomo State of State Address 2017, 2018, 2021 | 2017: Set offshore wind energy development goal of 2,400 MW by 2030 (Governor's Office 2017a).<br>2018: Procurement of at least 800 MW of offshore wind power between two solicitations in 2018 and 2019; new energy efficiency target for investor-owned utilities to more than double utility energy efficiency progress by 2025; energy storage initiative to achieve 1,500 MW of storage by 2025 and up to 3,000 MW by 2030 (Governor's Office 2018a, 2018b).<br>2021: The governor's 2021 agenda—Reimagine \| Rebuild \| Renew—establishes a goal of building out its renewable energy program. The agenda notes the development of two new offshore wind farms more than 20 |

| Plans and Policies | Summary/Goal |
|---|---|
| | miles off the shore of Long Island, the creation of dedicated offshore port facilities, and additional transmission capacity development. |
| New York State Offshore Wind Master Plan (2017) (NYSERDA 2017b) | Grants NYSERDA ability to award 25-year long-term contracts for projects ranging from approximately 200 MW to approximately 800 MW, with an ability to award larger quantities if sufficiently attractive proposals are received. Each proposer is also required to submit at least one proposal of approximately 400 MW. Bids are due in February 2019, awards are expected in spring 2019; and contracts are expected to be executed thereafter. |
| 2020 Offshore Wind Solicitation | As noted above, NYSERDA has provisionally awarded two offshore wind projects, totaling 2,490 MW. Empire Wind 2 (1,260 MW) and Beacon Wind (1,230 MW) of Equinor Wind US LLC will generate enough clean energy to power 1.3 million homes and will be major economic drivers, supporting the following:<br>More than 5,200 direct jobs<br>Combined economic activity of $8.9 billion in labor, supplies, development, and manufacturing statewide<br>$47 million in workforce development and just access funding |
| The Climate Leadership and Community Protection Act (CLCPA), enacted on July 18, 2019, signed into law in July 2019 and effective January 1, 2020 | CLCPA establishes economy-wide targets to reduce GHG emissions by 40% of 1990 levels by 2030 and 85% of 1990 levels by 2050. |
| **Rhode Island** | |
| Air Pollution Control Regulation No. 37-Rhode Island's Low-Emission Vehicle Program (2001) | The purpose of this regulation is to specify the requirements for Rhode Island's Low-Emission Vehicle Program to reduce motor vehicle GHG emissions. |
| Air Pollution Control Regulation No. 46, 'CO2 Budget Trading Program' (2008) | The purpose of this regulation is to establish the Rhode Island component of the $CO_2$ Budget Trading Program, which is designed to reduce anthropogenic emissions of $CO_2$ from the $CO_2$ budget sources in an economically efficient manner. Budget sources are identified, cataloged, monitored and reported, transferred, and tracked under a certification program in an effort to cap and reduce power sector $CO_2$ emissions. |
| RGGI (2009) | The RGGI is the nation's first mandatory, market-based cap-and-trade program to reduce emissions of $CO_2$. Under the program, which began in 2009, Rhode Island receives $CO_2$ allowance proceeds, which are invested in a variety of consumer benefit programs, including energy efficiency, renewable energy, direct energy bill assistance and other GHG reduction programs. |

| Plans and Policies | Summary/Goal |
|---|---|
| Resilient Rhode Island Act (2014) | Established the Executive Climate Change Coordinating Council (EC4) and set specific GHG reduction targets; incorporates consideration of climate change impacts into the powers and duties of all state agencies (State of Rhode Island 2014). |
| Energy 2035 Rhode Island State Energy Plan (2015) | Long-term comprehensive strategy for energy services across all sectors using a secure, cost-effective, and sustainable energy system; plan to increase sector fuel diversity, produce net economic benefits, and reduce GHG emissions by 45% by the year 2035 (State of Rhode Island 2015b). |
| Governor's Climate Priorities (2018) Executive Order 15-17, 17-06 | Increasing in-state renewable energy tenfold by 2020 (to 1,000 MWs) through new development and regional procurement (State of Rhode Island 2015a, 2017, 2018a). |
| Rhode Island Greenhouse Gas Emissions Reductions Plan (2016) | Targets for GHG reductions: 10% below 1990 levels by 2020; 45% below 1990 levels by 2035; 80% below 1990 levels by 2040 (State of Rhode Island 2016). |
| Resilient Rhody (2018) | Planning document outlining climate resiliency actions; focuses on leveraging emissions reduction targets and adaptation (State of Rhode Island 2018b). |
| Executive Order 20-01, Advancing a 100% Renewable Energy Future for Rhode Island by 2030 | Calls the Rhode Island Office of Energy Resources (OER) to conduct economic and energy market analyses to develop an actionable plan to reach 100% renewable electricity by 2030. The OER must provide this specific and implementable action plan by December 31, 2020 (State of Rhode Island 2020a). |
| The Road to 100% Renewable Electricity by 2030 in Rhode Island | Provides economic analysis of the key factors that will guide Rhode Island in the coming years as the state accelerates its adoption of carbon-free renewable resources. The OER developed specific policy, programmatic, planning, and equity-based actions that will support achieving the 100% renewable electricity goal (Rhode Island OER 2020). |
| 2021 Act on Climate | This legislation updates Rhode Island's climate-emission reduction goals laid out in the 2014 Resilient RI Act and address areas such as environmental injustices, public health inequities, and a fair employment transition as fossil-fuel jobs are replaced by green energy jobs. The state will develop a plan to incrementally reduce climate emissions to net-zero by 2050 and is to be updated every 5 years (State of Rhode Island 2020b). |

### Table E-5. Resiliency Plans and Policies in the Lease Area

| Plans and Policies | Summary |
|---|---|
| **Connecticut** | |

| Plans and Policies | Summary |
|---|---|
| Act Authorizing Municipal Climate Change and Coastal Resiliency Reserve Funds (CCCRRF) (Public Act 19-77) | Act approved July 1, 2019. Upon the recommendation of the chief elected official and budget-making authority, and approval of the legislative body of a municipality, the reserve fund may be used and appropriated to pay for municipal property losses, capital projects and studies related to mitigating hazards and vulnerabilities of climate change including, but not limited to, land acquisition (Connecticut General Assembly 2019). |
| Resilient Connecticut | Connecticut Institute for Resilience & Climate Adaptation (CIRCA) was awarded an $8 million from the National Disaster Relief Competition(NDRC) to develop the *Resilient Connecticut* project. Coordination of CIRCA, state agencies, and regional councils of governments and municipalities initiated the development of a Planning Framework to establish resilient communities through smart planning that incorporates economic development framed around transit-oriented development, conservation strategies, and critical infrastructure improvements (Resilient Connecticut (CIRCA 2021). |
| An Act Concerning Climate Change Adaptation (Public Act 21-115) | Act approved July 6, 2021. This proposal addresses the rising seas, frequent flooding, heat waves, and drought expected between now and 2050. It prioritizes the protection of frontline vulnerable communities and provides Connecticut's communities more options to move from adaptation and resilience planning to implementing their project pipeline, including the use of nature-based and green infrastructure solutions (Connecticut General Assembly 2021). |
| **Massachusetts** | |
| Municipal Vulnerability Preparedness grant program (MVP) (2017) | Provides support for cities and towns to plan for resiliency and implement key climate change adaptation actions for resiliency. The City of New Bedford has received MVP designation as of November 1, 2018 (Commonwealth of Massachusetts 2019a). |
| Coastal Grant and Resilience Program | Provides financial and technical support for local efforts to increase awareness and understanding of climate impacts, identify and map vulnerabilities, conduct adaptation planning, redesign vulnerable public facilities and infrastructure, and implement non-structural approaches that enhance natural resources and provide storm damage protection (Commonwealth of Massachusetts 2019b). |
| General Appropriations Bill, FY2022 (Section 2000-0101) | Designation of funds for the Executive Office of Energy and Environmental Affairs to coordinate and implement strategies for climate change adaptation and preparedness, including, but not limited to, resiliency plans for the commonwealth in a report to be delivered by February 3, 2022 (Commonwealth of Massachusetts Legislature 2021). |
| Nantucket's Coastal Resilience Plan | The plan is currently under development, and while no actions have been identified to date, potential shoreline management activities could include sediment management, construction of seawalls and similar structures, and other activities (Town and County of Nantucket 2018a, 2018b). |

| Plans and Policies | Summary |
|---|---|
| **New York** | |
| Part 490 of Community Risk and Resiliency Act (CRRA) of 2014 | Establishes statewide science-based sea-level rise projections for coastal regions of the state. As of 2019, DEC is in the process of developing a State Flood Risk Management Guidance document for state agencies (New York State Department of Environmental Conservation [NYSDEC] n.d. [2019]). |
| NY Rising Community Reconstruction (2018) | $20.4 million in projects on Long Island to help flood-prone communities plan and prepare for extreme weather events as they continue projects to recover from Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee. Three projects were announced for Suffolk County and five for Nassau County (Governor's Office 2018b). |
| Water Infrastructure Improvement Act (WIIA), Water Quality Improvement Project (WQIP) Program, and Intermunicipal Grant (IMG) | $600 million available to communities statewide for programs to fund projects to upgrade infrastructure and make communities more resilient to flooding and other impacts of climate-driven severe storms and weather events (Governor's Office 2021). |
| **Rhode Island** | |
| Shoreline Change Special Area Management Plan (Beach SAMP) | The RI CRMC developed and adopted the Beach SAMP to improve the state's resilience and manage the shoreline (RI CRMC 2018b). |
| **Regional** | |
| New England Governor's and Eastern Canadian Premiers (NEG/ECP) Regional Climate Change Initiative | The NEG/ECP Regional Climate Change Initiative includes seven New England states (Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont). This initiative encourages advancement of regional discussions and collaborative efforts to reduce greenhouse gas emissions by identifying strategies, policies, and measures through which the region could achieve its 2030 reduction marker and 2050 target (NEG/ECP 2022). |

## Oil and Gas Activities

The Project would be located in the North Atlantic Planning Area of the OCS Oil and Gas Leasing Program (National OCS Program). On September 8, 2020, the White House issued a presidential memorandum for the Secretary of the Interior on the withdrawal of certain areas of the U.S. OCS from leasing disposition for 10 years, including the areas currently designated by BOEM as the South Atlantic and Straits of Florida Planning Areas (The White House 2020a). The South Atlantic Planning Area includes the OCS off South Carolina, Georgia, and northern Florida. On September 25, 2020, the White House issued a similar memorandum for the Mid-Atlantic Planning Area that lies south of the northern administrative boundary of North Carolina (The White House 2020b). This withdrawal prevents consideration of these areas for any leasing for purposes of exploration, development, or production during the 10-year period beginning July 1, 2022, and ending June 30, 2032. However, at this time, there has been no decision by the Secretary of the Interior regarding future oil and gas leasing in the North Atlantic or remainder of the Mid-Atlantic Planning Areas. Existing leases in the withdrawn areas are not affected.

BOEM issues geological and geophysical (G&G) permits to obtain data for hydrocarbon exploration and production; locate and monitor marine mineral resources; aid in locating sites for alternative energy structures and pipelines; identify possible human-made, seafloor, or geological hazards; and locate potential archeological and benthic resources. G&G surveys are typically classified into the following categories by equipment and survey type:

- Deep-penetration seismic air gun surveys (2-D, 3-D, 4-D, ocean-bottom nodal, and azimuth multi-vessel surveys)
- Air gun HRG surveys that are used to investigate the shallow subsurface for geohazards (also known as shallow hazard surveys) and that are used during initial site evaluation, drilling rig emplacement, and platform or pipeline design and emplacement
- Electromagnetic surveys, deep stratigraphic and shallow test drilling, and various remote-sensing methods
- Non-air gun HRG surveys (similar to those used to support OCS wind energy leasing and site assessment activities) to detect and monitor geohazards, archaeological resources, and benthic communities
- Geological and geotechnical seafloor sampling (similar to those used to support OCS wind energy leasing and site assessment activities) to assess the suitability of seafloor sediments for supporting structures (e.g., platforms, pipelines, and cables)

Detailed information on each of the specific G&G survey types and descriptions can be found in Appendix F of *Gulf of Mexico OCS Proposed Geological and Geophysical Activities: Western, Central, and Eastern Planning Areas; Final Programmatic Environmental Impact Statement* (BOEM 2017).

There are currently no G&G permits under BOEM review for areas offshore of the northeast Atlantic states; however, areas under consideration for G&G surveys are located in federal waters offshore from Delaware to Florida (BOEM 2021b).

Eight LNG ports are located on the East Coast of the United States. Table E-6 lists existing, approved, and proposed LNG ports on the East Coast of the United States that provide (or may in the future provide) services such as natural gas export, natural gas supply to the interstate pipeline system or local distribution companies, or storage of LNG for periods of peak demand, or production of LNG for fuel and industrial use (FERC 2021).

**Table E-6. Liquid Natural Gas Terminals Located in the Northeastern United States**

| Terminal Name | Type | Company | Jurisdiction | Distance from Project (approximate) | Status |
|---|---|---|---|---|---|
| Everett, MA | Import terminal | GDF SUEZ—DOMAC | FERC | 90 miles north | Existing |
| Offshore Boston, MA | Import terminal | GDF SUEZ – Neptune LNG | U.S. Department of Transportation Maritime Administration (MARAD)/USCG | 100 miles north | Existing |
| Offshore Boston, MA | Import terminal, authorized to re-export delivered LNG | Excelerate Energy—Northeast Gateway | MARAD/USCG | 95 miles north | Existing |
| Cove Point, MD (Chesapeake Bay) | Import terminal | Dominion—Cove Point LNG | FERC | 340 miles southwest | Existing |
| Cove Point, MD (Chesapeake Bay) | Export terminal | Dominion—Cove Point LNG | FERC | 340 miles southwest | Existing |
| Elba Island, GA (Savannah River) | Import terminal | El Paso—Southern LNG | FERC | 835 miles southwest | Existing |
| Elba Island, GA (Savannah River) | Export terminal | Southern LNG Company | FERC | 835 miles southwest | Existing |
| Jacksonville, FL | Export terminal | Eagle LNG Partners | FERC | 960 miles southwest | Approved |

Source: FERC (2021)

## Onshore Development Activities

Onshore development activities that may contribute to impacts from planned activities include visible infrastructure such as onshore wind turbines and cell towers, port development, and other energy projects such as transmission and pipeline projects. Coastal development projects permitted through regional planning commissions and towns may also contribute to impacts from planned activities. These may include residential, commercial, and industrial developments spurred by population growth in the region (Table E-7).

**Table E-7. Existing, Approved, and Proposed Onshore Development Activities**

| Type | Description |
|---|---|
| Local planning documents | • Suffolk County Master Plan (Suffolk County 2015)<br>• A City Master Plan: New Bedford 2020 (City of New Bedford 2010)<br>• Town of North Kingstown Comprehensive Plan Update 2008 (Town of North Kingstown 2008)<br>• Washington County Transfer of Development Rights (TDR) Study (Washington County Regional Planning Council 2012)<br>• North Kingstown Comprehensive Plan Re-Write 2019 (Interface Studio 2019) |
| Onshore wind projects | • According to the U.S. Geological Survey (USGS), there are nine onshore wind projects located within the 41-mile viewshed of the project (USGS 2018). |
| Communications towers | • There are numerous communications towers located in Suffolk County, on offshore islands, and within the viewshed of the proposed Project components. Within the recreation/tourism geographic analysis area, there are 864 communications towers, 10 of which exceed the Federal Aviation Administration (FAA) height limit for marking/lighting requirements (FAA 2016).<br>• The East Hampton Town Board is replacing its aging 800-megahertz frequency emergency communication system tower to a 700-megahertz system with updated equipment. This will require the replacement of a 150-foot communication tower with a 300-foot lattice tower and the raising of a 55-foot monopole to 85 feet. This upgrade also requires replacing antennas at towers near the East Hampton Airport in Wainscott, at the Amagansett firehouse, and at the East Hampton Town Hall complex (Chinese 2018). |
| Development projects | • As a part of New York State's $100 billion infrastructure project, $5.6 billion will go to transform the Long Island Railroad (LIRR) to improve system connectivity. Within Suffolk County, the following stations will receive funds for upgrades: Brentwood, Deer Park, East Hampton, Northport, Ronkonkoma, Stony Brook, Port Jefferson, and Wyandanch. The East Hampton historic LIRR station will undergo upgrades and modernizations (Metropolitan Transit Authority 2017; Governor's Office 2017a). Additional plans for transit-oriented design (TOD) and highway improvements are planned in Suffolk County in state and county planning documents.<br>• The Division of Statewide Planning, Rhode Island Department of Transportation, and Rhode Island Public Transit Authority prepared the Rhode Island State Transportation Improvement Program (STIP) for the Federal Fiscal Year (FFY) 2022-2023 for the adoption by the State Planning Council (State of Rhode Island 2021).<br>• Fire Island Inlet to Montauk Point (FIMP) Project is a $1.2 billion project by the USACE, NYDEC, and Long Island, NY, municipalities to engage in inlet management; beach, dune and berm construction; breach response plans; raising and retrofitting 4,400 homes; road-raising; groin modifications; and coastal process features. Within Suffolk County, portions of the Towns of Babylon, Islip, Brookhaven, Southampton, and East Hampton; 12 incorporated villages along Long Island's south shore (mainland); Fire Island National Seashore; and the Poospatuck and Shinnecock Indian Reservations will be involved in this project (USACE 2018f). |

| Type | Description |
|---|---|
| | • The USACE is working to remediate and cleanup a former defense site (former NIKE Battery PR-58 and Disaster Village Training Area) at Quonset Development Corporation in North Kingstown, RI. A feasibility study was performed from 2014 to 2016, and the final remedial investigation/feasibility study was published in 2016. Pre-design investigations, followed by remedial designs and engineering plans, and remedial action is proposed for 2021 (USACE 2018g).<br>• The Massachusetts Department of Environmental Protection (MassDEP) Bureau of Air and Waste approved National Grid's application for the construction and operation of a diesel generator and a battery electric storage system at an existing electric generating facility located at 32 Bunker Road in Nantucket, approximately 1 mile north of the coastline. The facilities are anticipated to be operational in 2019 (MassDEP 2017; Utility Dive 2018). |
| Port studies/upgrades | The USACE completed the Lake Montauk Harbor Feasibility Study in 2020. The study determined that Lake Montauk Harbor has insufficient channel and depth to support commercial fishing fleet activities. The study evaluated a range of alternative navigation improvement plans; the recommended plan consisted of deepening the existing navigation channel to -17 feet MLLW depth, creating a deposition basin immediately east of the channel at a width of 100 feet, and placing dredged material on the shoreline west of the inlet for a distance of 3,000 feet and a width of approximately 44 feet.<br>Ports in New York, Connecticut, Rhode Island, and Massachusetts may require upgrades to support the offshore wind industry developing in the northeastern United States. Upgrades may include onshore developments or underwater improvements (such as dredging).<br>• In December 2017, NYSERDA issued an offshore wind master plan that assessed 54 distinct waterfront sites along the New York Harbor and Hudson River and 11 distinct areas with multiple small sites along the Long Island coast. Twelve waterfront areas and five distinct areas were singled out for "potential to be used or developed into facilities capable of supporting OSW projects" (Table 26; NYSERDA 2017b). Nearly all identified sites would require some level of infrastructure upgrade (from minimal to significant) depending on OSW activities intended for the site. Particular sites of interest include Red Hook-Brooklyn, South Brooklyn Marine Terminal, and the Port of Coeymans (NYSERDA 2017b). For additional information regarding specific proposed improvements to these ports, see DockNYC (2018), Capital Region Economic Development Council (2018), American Association of Port Authorities (2016), Rulison (2018), and New York City Economic Development Corporation (2018).<br>• The CPA is currently evaluating proposals from parties to develop, finance, and manage the Connecticut State Pier in New London under a long-term operating agreement (CPA 2018b). According to the Connecticut Maritime Strategy 2018 (CPA 2018a), New London is the only major port between New York and Maine that does not have vertical obstruction and offshore barriers, two factors that are critical for offshore wind turbine assembly. The document includes strategic objectives to manage and redevelop the Connecticut State Pier partially to support the offshore wind industry, which could create a dramatic increase in demand for the Connecticut State Pier and regional job growth. Redevelopment of the State Pier is considered a reasonably foreseeable activity, though specific redevelopment plans are not yet available.<br>• In Rhode Island, DWW has committed to investing approximately $40 million in improvements at the Port of Providence, the Port of Davisville at Quonset Point, and possibly other Rhode Island ports for the Revolution Wind Project (Kuffner 2018). The |

| Type | Description |
|---|---|
| | Port of Davisville has added a 150-megaton mobile harbor crane, which will enable the port to handle wind turbines and heavy equipment, and enables the Port of Davisville to participate in regional offshore wind projects (Port of Davisville 2017). Further improvements at Rhode Island ports to support the offshore wind industry are considered reasonably foreseeable.<br>• The MassCEC has identified 18 waterfront sites in Massachusetts that may be available and suitable for use by the offshore wind industry. Potential activities at these sites include manufacturing of offshore wind transmission cables, manufacture and assembly of turbine components, substation manufacturing and assembly, O&M bases, and storage of turbine components (MassCEC 2017a, 2017b, 2017c). The Draft New Bedford Port Authority Strategic Plan 2018 – 2023 contains goals related to expanding the New Bedford Marine Commerce Terminal to improve and expand services to the offshore wind industry (MassCEC 2018; Port of New Bedford 2018), but no new improvements were identified.<br>• New York State proposed port improvements include the governor's 2021 agenda—Reimagine | Rebuild | Renew—which includes upgrades to create five dedicated port facilities for offshore wind, including the following:<br>• The nation's first offshore wind tower manufacturing facility, to be built at the Port of Albany<br>• An offshore wind turbine staging facility and O&M hub to be established at the South Brooklyn Marine Terminal<br>• Increasing the use of the Port of Coeymans for cutting-edge turbine foundation manufacturing<br>• Buttressing ongoing O&M out of Port Jefferson and Port of Montauk Harbor in Long Island |

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# APPENDIX E1

## Description and Screening of Relevant Offshore Wind and Non–Offshore Wind Impact-Producing Factors and Negligible Impact Determinations

# Contents



# Tables

# Introduction

The Bureau of Ocean Energy Management (BOEM) developed the tables in Appendix E1 for each resource category based on the 2019 study titled *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019). The next page provides an overview table of the impact-producing factors (IPFs) considered for each resource in the environmental impact statement (EIS).

Tables E1-1 to E2-21 provide an analysis of the relevant ongoing and future non–offshore wind (OSW) activities by IPF for each resource, as well as a reference to where in the Revolution Wind Farm and Revolution Export Cable Project EIS each of those IPFs is analyzed in relation to future OSW activities and the Proposed Action and alternatives, if applicable. Some IPFs were determined either not applicable or to have negligible impacts and therefore do not warrant detailed analysis in the EIS pursuant to 40 Code of Federal Regulations (CFR) 1502.15. In these cases, IPF analysis is solely provided in Tables E1-1 to E2-21.

A full list of abbreviations is provided in the EIS's Abbreviations section. Please refer to this section for abbreviations used in the tables in this appendix.

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**Appendix E1 Overview Table**

| IPFs | Air | | Bats | | Benthic Habitat and Invertebrates | | Birds | | Coastal Habitats and Fauna | | Commercial Fisheries and For-Hire Recreational Fishing | | Cultural Resources | | Demographics, Employment, and Economics | | Environmental Justice | | Finfish and Essential Fish Habitat | | Land Use and Coastal Infrastructure | | Marine Mammals | | Navigation and Vessel Traffic | | Other Marine Uses | | Recreation and Tourism | | Sea Turtles | | Visual Resources | | Water Quality | | Wetlands and Non-Tidal Waters | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** | **Off** | **On** |
| Accidental releases | X | X | | | X | | X | X | | | X | | X | X | | | | X | X | | X | X | X | | | | X | X | | | X | | | | X | X | | X |
| Air emissions | X | X | | | | | | | | | | | | | | | X | X | | | | | | | | | | | | | | | | | | | | |
| Anchoring | | | | | X | | | | | | X | | X | | | | | | X | | | | | | X | | | | X | X | X | | | | X | | | |
| Bycatch | | | | | X | | | | | | | | | | | | | | | | | | X | | | | | | | | X | | | | | | | |
| Discharges | | | | | X | | | | | | | | | | | | | X | | | | | | | | | X | X | | | | | | | X | X | | X |
| Electromagnetic fields | | | | | X | | | | | | | | | | | | | | X | | X | X | X | | | | | | | | X | | | | | | | |
| Energy generation, energy security | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | |
| Light | | | X | X | X | | X | X | | | X | | X | X | X | | X | | X | | X | X | X | | | | X | X | X | X | X | | X | X | | | | |
| New cable emplacement and maintenance | | | | X | X | | X | X | | X | X | | X | X | X | | X | X | X | | X | X | X | | X | | X | X | X | X | X | | | | X | X | | |
| Noise | | | X | X | X | | X | X | | X | X | | | | | | X | X | X | | X | X | X | | | | X | X | X | X | X | | | | | | | |
| Port utilization | | | | | X | | | | | | | X | | | | X | | | X | | X | X | X | | X | | X | X | X | X | X | | | | X | X | | |
| Presence of structures | | | X | X | X | | X | X | | X | X | | X | X | X | | X | X | X | | X | X | X | | X | | X | X | X | X | X | | X | X | X | X | | X |
| Fisheries management activities | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sediment deposition and burial | | | | | X | | | | | | | | | | | | | | X | | | | X | | | | | | | | X | | | | | | | X |
| Traffic | | | | | X | | X | X | | | X | | | | X | X | X | X | X | | | | X | | X | X | X | | X | X | X | | | | | | | |
| Climate change | X | X | | | X | | X | X | | X | X | | X | X | X | | X | | X | | | | X | | | | X | X | | | X | | | | | | | |
| Ocean acidification | | | | | X | | X | X | | | | | | | | | | | X | | | | X | | | | | | | | X | | | | | | | |

Notes: Off = Offshore, On = Onshore

# Air Quality

**Table E1-1. Summary of Activities and the Associated Impact-Producing Factors for Air Quality**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/ hazmat | Accidental releases of air toxics or HAPS are due to potential chemical spills. Ongoing releases occur in low frequencies. These could lead to short-term periods of toxic pollutant emissions through surface evaporation. According to the U.S. Department of Energy, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution Federation Limited (2021), which collects data on oil spills from tankers and other sources. From 1990 to1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and offshore it was less than 70,000 barrels.<br>Approximately 253,000 gallons of coolants, oils and lubricants, and fuel is estimated to be stored within WTG foundations and the OSS within the GAA for existing and permitted OSW COP projects. All OSW projects are required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and BSEE. | Accidental releases of air toxics or HAPS would be due to potential chemical spills. Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. These could lead to short-term periods of toxic pollutant emissions through evaporation. Air quality impacts would be short term and limited to the local area at and around the accidental release location. | Air quality impacts associated with accidental spills from other reasonably foreseeable projects could also occur; however, releases would be short term, localized, and generally small in volume and would not contribute to air quality in measurable amounts. Therefore, impacts to air quality would be **negligible** adverse. See Table E1-4 for a quantitative analysis of these risks. | **Offshore:** The Proposed Action and Alternatives C through F would result in air quality impacts from air emissions associated with accidental spills during construction and installation. Releases would be short term, localized, and generally small in volume and would not contribute to air quality in measurable amounts. Construction under Alternatives C through F could result in a reduced risk of inadvertent spills due to the reduced number of installed WTGs, resulting in a potential decrease in Project-related spill emissions. However, impacts to air quality under the Proposed Action and Alternatives C through F would still be **negligible** adverse.<br>Once the RWF has been constructed, spills are unlikely. Air quality impacts associated with any accidental spills would be short term, localized, and generally small in volume and would not contribute to air quality in measurable amounts. Alternatives C through F would result in O&M and decommissioning impacts to air quality at quantities and durations similar to, or slightly reduced from, the Proposed Action. However, impacts to air quality under the Proposed Action and Alternatives C through F would be **negligible** adverse.<br>BOEM estimates that the Proposed Action and Alternatives C through F would result in up to an 11% incremental increase in total chemical usage over the No Action Alternative in the water quality GAA. However, with the implementation of EPMs and compliance with regulations, the incremental additional effects of accidental releases from the Proposed Action would not contribute appreciably to overall impacts on air quality. Project-related accidental spills or discharges, including those associated with vessel allisions or collisions, associated with Alternatives C through F would result in air quality impacts at quantities and durations similar to, or slightly reduced from, the | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, construction and installation, O&M, and cumulative impacts would be **negligible** adverse. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | Proposed Action. Therefore, when combined with past, present, and reasonably foreseeable projects, the Proposed Action and Alternatives C through F would result in **negligible** adverse cumulative impacts to air quality due to accidental releases. | |
| | | | | **Onshore:** Inadvertent spills in onshore waters during construction, such as the release of fuels and oils from vehicles or infrastructure, which would disperse rapidly, would be classified as routine and would be localized, short term, and minor (BOEM 2015). Therefore, **negligible** adverse impacts to air quality from onshore spills are anticipated from the Proposed Action during construction and installation and O&M. The Proposed Action when combined with past, present, and other reasonably foreseeable projects would also result in short-term and **negligible** adverse cumulative impacts on air quality.<br>Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** adverse. | **Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, construction and installation, O&M, and cumulative impacts would be **negligible** adverse. |
| Air emissions: Construction and decommissioning | Air emissions originate from combustion engines and electric power generated by burning fuel. These activities are regulated under the CAA to meet set standards. Air quality has generally improved over the last 35 years; however, some areas in the Northeast have experienced a decline in air quality over the last 2 years. Some areas of the Atlantic Coast remain in nonattainment for $O_3$, with the source of this pollution from power generation. Many of these states have made commitments toward cleaner energy goals to improve this, and OSW is part of these goals. Primary processes and activities that could affect the air quality impacts are expansions and modifications to existing fossil fuel power plants, onshore and offshore activities involving renewable energy facilities, and various construction activities.<br>Construction of permitted OSW projects in the GAA is estimated to generate tons of 1,451 $NO_X$, 33 tons of $SO_2$, 49 tons of $PM_{10}$, and 97,026 tons of $CO_2$. Operation of permitted and built OSW projects in the GAA | The largest air quality impacts over the next 35 years would occur during the construction phase of any one project; however, projects would be required to comply with the CAA. During the limited construction and decommissioning phases, emissions could occur that are above de minimis thresholds and would require offsets and mitigation. Primary emission sources would be due to increased commercial vehicular traffic, air traffic, public vehicular traffic, and combustion emissions from construction equipment as well as fugitive emissions from construction-generated dust. As projects come online, power generation emissions overall would decline, and the industry as a whole would have a net benefit on air quality. | See Section 3.4.2.2.2 for analysis. | See Section 3.4.2.3 and Section 3.4.2.1, Table 3.4-5 for analysis. | See Section 3.4.2.1, Table 3.4-5 for analysis. |
| Air emissions: O&M | | Activities associated with O&M of onshore wind projects would have a proportionally very small contribution to emissions compared to construction and decommissioning activities over the next 35 years. Emissions would largely be due to commercial vehicular traffic and operation of | See Section 3.4.2.2.2 for analysis. | See Section 3.4.2.3 and Section 3.4.2.1, Table 3.4-5 for analysis. | See Section 3.4.2.1, Table 3.4-5 for analysis. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | is estimated to generate 303 tons of $NO_X$, 2 tons of $SO_2$, 11 tons of $PM_{10}$, and 20,466 tons of $CO_2$. This volume represents a negligible increase to county emissions; additionally, only a portion of the generated emissions would actually reach nearby counties and would depend on wind conditions at the time the emissions are generated. | emergency diesel generators. Such activity would result in short-term, intermittent, and widely dispersed emissions and small air quality impacts. | | | |
| Air emissions: Power generation emissions reductions | | Many Atlantic states have committed to clean energy goals, with OSW playing a large role. Other reductions include transitioning to onshore wind and solar.<br>The No Action Alternative without implementation of other future OSW projects could result in increased air quality impacts regionally due to the need to construct and operate new energy generation facilities to meet future power demands. Unless substituted by other, non-OSW sources, these facilities could consist of new natural gas–fired power plants or coal-fired, oil-fired, or clean coal–fired plants. These types of facilities would likely have larger and continuous emissions and result in greater regional-scale impacts on air quality. | See Section 3.4.2.2.2 for analysis. | See Section 3.4.2.3 and Section 3.4.2.1, Table 3.4-5 for analysis. | See Section 3.4.2.1, Table 3.4-5 for analysis. |
| Climate change | Constructed and permitted OSW projects would produce GHG emissions (nearly all $CO_2$) that can contribute to climate change; however, these contributions would be minuscule compared to aggregate global emissions. $CO_2$ is relatively stable in the atmosphere and generally mixed uniformly throughout the troposphere and stratosphere. Hence, the impact of GHG emissions does not depend upon the source location. Increasing energy production from OSW projects would likely decrease GHG emissions by replacing energy from fossil fuels. | Development of future onshore wind projects would produce a small overall increase in GHG emissions over the next 35 years. However, these contributions would be very small compared to the aggregate global emissions. The impact on climate change from these activities would be very small.<br>As more projects come online, some reduction in GHG emissions would be expected from modifications of existing fossil fuel facilities to reduce power generation. Overall, it is anticipated that there would be no cumulative impact on global warming as a result of onshore wind project activities. | See Section 3.4.2.2.2 for analysis. | See Section 3.4.2.3 and Section 3.4.2.1, Table 3.4-5 for analysis. | See Section 3.4.2.1, Table 3.4-5 for analysis. |

* Includes all constructed and permitted COP projects that occur within the air quality GAA: Block Island, SFWF.

# Bats

**Table E1-2. Summary of Activities and the Associated Impact-Producing Factors for Bats**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Noise: Pile driving | Noise from pile driving associated with permitted OSW COP projects is occurring during installation of foundations for offshore structures. Noise from pile driving also occurs | Similar to ongoing activities, noise associated with pile-driving activities would be limited to nearshore waters, and these high-intensity but low-exposure risks would not be expected | See Section 3.5.2.2.2 for analysis. | See Section 3.5.2.3 and Section 3.5.2.1, Table 3.5-1 for analysis during offshore activities. | See Section 3.5.2.1, Table 3.5-1 for analysis during offshore activities. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded and would result in high-intensity, low-exposure-level long-term but localized intermittent risk to bats in nearshore waters. Direct impacts are not expected to occur as recent research has shown that bats could be less sensitive to temporary threshold shifts than other terrestrial mammals (Simmons et al. 2016). Indirect impacts (i.e., displacement from potentially suitable habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior (Schaub et al. 2008). Construction activity would be temporary and highly localized.<br>No pile-driving noise is anticipated for built OSW COP projects in the GAA. | to result in direct impacts. Some indirect impacts (i.e., displacement from potentially suitable foraging habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior (Schaub et al. 2008). Construction activity would be temporary and highly localized, and no population-level effects would be expected. | | | |
| Noise: Onshore Construction | Noise from onshore construction associated with permitted OSW COP projects is occurring during installation of various project components (cables, substation etc.). Other onshore construction occurs regularly for generic infrastructure projects in the bats GAA. There is a potential for displacement caused by equipment if construction occurs at night (Schaub et al. 2008). Any displacement would only be temporary. No individual or population-level impacts would be expected. Some bats roosting in the vicinity of construction activities could be disturbed during construction but would be expected to move to a different roost farther from construction noise. This behavior would not be expected to result in any impacts as frequent roost switching is a common component of a bat's life history (Hann et al. 2017; Whitaker 1998).<br>No onshore construction noise is anticipated for built OSW COP projects in the GAA. | Onshore construction is expected to continue at current trends. Some behavioral responses and avoidance of construction areas could occur (Schaub et al. 2008). However, no injury or mortality would be expected. | See Section 3.5.2.2.2 for analysis. | See Section 3.5.2.3 and Section 3.5.2.1, Table 3.5-1 for analysis during onshore activities. | See Section 3.5.2.1, Table 3.5-1 for analysis during onshore activities. |
| Presence of structures: Migration disturbances | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. There could also be a few non-OSW structures scattered throughout the offshore bats GAA, such as navigation and weather buoys and light towers (NOAA 2020a). Migrating bats can easily fly around or over these sparsely distributed structures, and no | The infrequent installation of future new structures in the marine environment of the next 35 years is expected to continue. As described under Ongoing Activities, these structures would not be expected to cause disturbance to migrating tree bats in the marine environment. | See Section 3.5.2.2.2 for analysis. | See Section 3.5.2.3 and Section 3.5.2.1, Table 3.5-1 for analysis. | See Section 3.5.2.1, Table 3.5-1 for analysis. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | migration disturbance would be expected. Bat use of offshore areas is very limited and generally restricted to spring and fall migration. Very few bats would be expected to encounter structures on the OCS, and no population-level effects would be expected. | | | | |
| Presence of structures: Turbine strikes | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. There could also be a few non-OSW structures in the offshore bats GAA, such as navigation and weather buoys, turbines, and light towers (NOAA 2020a). Migrating tree bats can easily fly around or over these sparsely distributed structures, and no strikes would be expected. | The infrequent installation of future new structures in the marine environment of the next 35 years is expected to continue. As described under Ongoing Activities, these structures would not be expected to result in increased collision risk to migrating tree bats in the marine environment. | See Section 3.5.2.2.2 for analysis. | See Section 3.5.2.3 and Section 3.5.2.1, Table 3.5-1 for analysis. | See Section 3.5.2.1, Table 3.5-1 for analysis. |
| New cable emplacement/maintenance | Constructed and permitted OSW COP projects are introducing new onshore cable in the GAA. Other non-OSW cable emplacement and maintenance activities are expected to continue to follow current trends. Potential direct effects on individuals could occur if these activities include tree removal when bats are potentially present. Injury or mortality could occur if trees being removed are occupied by bats at the time of removal. While there is some potential for indirect impacts associated with habitat loss, no individual or population-level effects would be expected. | Future non-OSW development would continue to occur at the current rate. This development has the potential to result in habitat loss and could result in injury or mortality of individuals. | See Section 3.5.2.2.2 for analysis. | See Section 3.5.2.3 and Section 3.5.2.1, Table 3.5-1 for analysis during onshore activities. | See Section 3.5.2.1, Table 3.5-1 for analysis during onshore activities. |
| Light: Vessels | Nighttime vessel activity associated with permitted and built OSW COP projects is occurring during installation and O&M of various project components (cables, substation etc.). Ocean vessels have an array of lights, including navigational lights, deck lights, and interior lights. Bats could demonstrate attraction to or avoidance of construction vessels installing offshore facilities, particularly if insects (i.e., prey) are drawn to the lights of the vessels. The impact is localized and temporary. This attraction would not be expected to result in an increased risk of collision with vessels. Population-level impacts would not be expected. | No future activities were identified within the bats GAA other than ongoing activities. | See Section 3.5.2.2.2 for analysis. | See Section 3.5.2.3 and Section 3.5.2.1, Table 3.5-1 for analysis. | See Section 3.5.2.1, Table 3.5-1 for analysis. |
| Light: Structures | Constructed and permitted OSW COP projects are introducing 83 lighted structures into the | Light from onshore structures is expected to gradually increase in proportion with human | See Section 3.5.2.2.2 for analysis. | See Section 3.5.2.3 and Section 3.5.2.1, Table 3.5-1 for analysis. | See Section 3.5.2.1, Table 3.5-1 for analysis. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | GAA. Buoys, towers, and onshore structures with lights could also attract bats. Onshore structures like houses and ports emit a great deal more light than offshore buoys and towers. This attraction has the potential to result in an increased risk of collision with lighted structures (Hüppop et al. 2006). Light from structures is widespread and permanent near the coast but minimal offshore. | population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore. | | | |
| Climate change: Warming and sea level rise, storm severity/frequency | Storms during breeding and roosting season could reduce productivity and increase mortality. Intensity of this impact is speculative. | No future activities were identified within the bats GAA other than ongoing activities. | | Climate change, including increased storm severity/frequency and increased disease frequency, could impact bats. However, the intensity and extent of these potential impacts are speculative at this time; therefore, climate change is not discussed further in the context of potential impacts to bats. | Same as the Proposed Action and Alternatives C through F. |
| Climate change: Warming and sea level rise, increased disease frequency | Disease can weaken, lower reproductive output, and/or kill individuals. Some tropical diseases would move northward. Extent and intensity of this impact is highly speculative. | No future activities were identified within the bats GAA other than ongoing activities. | | Climate change, including increased storm severity/frequency and increased disease frequency, could impact bats. However, the intensity and extent of these potential impacts are speculative at this time; therefore, climate change is not discussed further in the context of potential impacts to bats. | Same as the Proposed Action and Alternatives C through F. |

* Includes all constructed and permitted COP projects that occur within the bats GAA: Block Island, SFWF, Vineyard Wind 1, Coastal Virginia Offshore Wind.

## Birds

**Table E1-3. Summary of Activities and the Associated Impact-Producing Factors for Birds**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/hazmat | Constructed and permitted OSW COP projects can accidentally release fuel, oils, or other hazardous materials in the GAA. See Table E1-4 for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Ingestion of hydrocarbons can lead to morbidity and mortality due to decreased hematological function, dehydration, drowning, hypothermia, starvation, and weight loss (Briggs et al. 1997; Haney et al. 2017; Paruk et al. 2016). Additionally, even small exposures that result in feather oiling can lead to sublethal effects that include | Gradually increasing vessel traffic over the next 35 years would increase the potential risk of accidental releases and associated impacts, including mortality, decreased fitness, and health effects on individuals. Impacts are unlikely to affect populations. | See Section 3.7.2.2.2 for analysis. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis. | See Section 3.7.2.1, Table 3.7-1 for analysis. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | changes in flight efficiencies and result in increased energy expenditure during daily and seasonal activities, including chick provisioning, commuting, courtship, foraging, long-distance migration, predator evasion, and territory defense (Maggini et al. 2017). These impacts rarely result in population-level impacts.<br>All vessels would comply with USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills. | | | | |
| Accidental releases: Trash and debris | Constructed and permitted OSW COP projects can potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris in the GAA. Trash and debris are also accidentally discharged through onshore sources; fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation, navigation, and traffic; survey activities; and cable, line, and pipeline laying on an ongoing basis. In a study from 2010, students at sea collected more than 520,000 bits of plastic debris per square mile. In addition, many fragments come from consumer products blown out of landfills or tossed out as litter. (Law et al. 2010). Birds could accidentally ingest trash mistaken for prey. Mortality is typically a result of blockages caused by both hard and soft plastic debris (Roman et al. 2019).<br>All vessels would adhere to federal, state, and local regulations regarding disposal of solid and liquid wastes. | As population and vessel traffic increase gradually over the next 35 years, accidental release of trash and debris could increase. This could result in increased injury or mortality of individuals. However, there does not appear to be evidence that the volumes and extents would have any impact on bird populations. | See Section 3.7.2.2.2 for analysis. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis. | See Section 3.7.2.1, Table 3.7-1 for analysis. |
| Light: Vessels | Nighttime vessel activity associated with permitted and built OSW COP projects is occurring during installation and O&M of various project components (cables, substation etc.). Ocean vessels have an array of lights, including navigational lights, deck lights, and interior lights. Such lights can attract some birds. The impact is localized and temporary. This attraction would not be expected to result in an increased risk of collision with vessels. Population-level impacts would not be expected. | Gradually increasing vessel traffic over the next 35 years would increase the potential for bird and vessel interactions. While birds could be attracted to vessel lights, this attraction would not be expected to result in increased risk of collision with vessels. No population-level impacts would be expected. | See Section 3.7.2.2.2 for analysis during offshore activities. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. | See Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Light: Structures | Constructed and permitted OSW COP projects are introducing 83 lighted structures into the GAA. Buoys, towers, and onshore structures with lights can also attract birds. Onshore structures like houses and ports emit a great deal more light than offshore buoys and towers. This attraction has the potential to result in an increased risk of collision with lighted structures (Hüppop et al. 2006). Light from structures is widespread and permanent near the coast but minimal offshore. | Light from onshore structures is expected to gradually increase in proportion with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore. | See Section 3.7.2.2.2 for analysis. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis. | See Section 3.7.2.1, Table 3.7-1 for analysis. |
| New cable emplacement/ maintenance | Constructed and permitted OSW COP projects are introducing an estimated 498 miles of new offshore cable in the GAA. Other non-OSW cable emplacement and maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances would be temporary and generally limited to the emplacement corridor. Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be temporary and limited to the emplacement corridor. Suspended sediment could impair the vision of diving birds that are foraging in the water column (Cook and Burton 2010). However, given the localized nature of the potential impacts, individuals would be expected to successfully forage in nearby areas not affected by increased sedimentation, and no biologically significant impacts on individuals or populations would be expected. | Future new cables would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in localized, short-term impacts. Impacts would be temporary and localized, with no biologically significant impacts on individuals or populations. | See Section 3.7.2.2.2 for analysis. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis. | See Section 3.7.2.1, Table 3.7-1 for analysis. |
| Noise: Aircraft | Aircraft routinely travel in the GAA for birds. With the possible exception of rescue operations and survey aircraft, no ongoing aircraft flights would occur at altitudes that would elicit a response from birds. If flights are at a sufficiently low altitude, birds could flush, resulting in nonbiologically significant increased energy expenditure. Disturbance, if any, would be localized and temporary, and impacts would be expected to dissipate once the aircraft has left the area. | Aircraft noise is likely to continue to increase as commercial air traffic increases; however, very few flights would be expected to be at a sufficiently low altitude to elicit a response from birds. If flights are at a sufficiently low altitude, birds could flush, resulting in nonbiologically significant increased energy expenditure. Disturbance, if any, would be localized and temporary and impacts would be expected to dissipate once the aircraft has left the area. | See Section 3.7.2.2.2 for analysis. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis. | See Section 3.7.2.1, Table 3.7-1 for analysis. |
| Noise: G&G | Noise from G&G surveys associated with permitted OSW COP projects may occur in the GAA. Infrequent site characterization surveys and scientific surveys produce high- | Same as ongoing activities, with the addition of possible future oil and gas surveys. | See Section 3.7.2.2.2 for analysis. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis. | See Section 3.7.2.1, Table 3.7-1 for analysis. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | intensity impulsive noise around sites of investigation. These activities could result in diving birds leaving the local area. Non-diving birds would be unaffected. Any displacement would only be temporary during non-migratory periods, but impacts could be greater if displacement were to occur in preferred feeding areas during seasonal migration periods. | | | | |
| Noise: Pile driving | Noise from pile driving associated with permitted OSW COP projects is occurring during installation of foundations for offshore structures. Noise from pile driving also occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water could result in intermittent, temporary, localized impacts on diving birds due to displacement from foraging areas if birds are present in the vicinity of pile-driving activity. The extent of these impacts depends on pile size, hammer energy, and local acoustic conditions. No biologically significant impacts on individuals or populations would be expected.<br>No pile-driving noise is anticipated for built OSW COP projects in the GAA. | No future activities were identified within the GAA for birds other than ongoing activities. | See Section 3.7.2.2.2 for analysis during offshore activities. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. | See Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. |
| Noise: Onshore construction | Noise from onshore construction associated with permitted OSW COP projects is occurring during installation of various project components (cables, substation etc.). Other onshore construction is routinely used in generic infrastructure projects. Equipment could cause displacement. Any displacement would only be temporary, and no individual fitness or population-level impacts would be expected.<br>No onshore construction noise is anticipated for built OSW COP projects in the GAA. | Onshore construction would continue at current trends. Some behavior responses could range from escape behavior to mild annoyance, but no individual injury or mortality would be expected. | See Section 3.7.2.2.2 for analysis during onshore activities. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis during onshore activities. | See Section 3.7.2.1, Table 3.7-1 for analysis during onshore activities. |
| Noise: Vessels | Noise from vessel activity associated with permitted and built OSW COP projects is occurring during installation and O&M of various project components (cables, substation etc.). Other ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Sub- | No future activities were identified within the GAA for birds other than ongoing activities. | See Section 3.7.2.2.2 for analysis during offshore activities. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. | See Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | surface noise from vessels could disturb diving birds foraging for prey below the surface. The consequence to birds would be similar to noise from G&G but likely less because noise levels are lower. | | | | |
| Presence of structures: Entanglement, gear loss, gear damage | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Additionally, each year, 2,551 seabirds die annually from interactions with U.S. commercial fisheries on the Atlantic (Sigourney et al. 2019). Even more die due to abandoned commercial fishing gear (nets). In addition, recreational fishing gear (hooks and lines) is periodically lost on existing buoys, pilings, hard protection, and other structures and has the potential to entangle birds. | No future activities were identified within the GAA for birds other than ongoing activities. | See Section 3.7.2.2.2 for analysis during offshore activities. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. | See Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. |
| Presence of structures: Fish aggregation | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Structures, including tower foundations, scour protection around foundations, and various hard protections atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these objects. These impacts are local and can be short term to permanent. These fish aggregations can provide localized, short-term to permanent beneficial impacts to some bird species because they could increase prey species availability. | New cables, installed incrementally in the GAA for birds over the next 20 to 35 years would likely require hard protection atop portions of the cables (see New cable emplacement/maintenance row above). Any new towers, buoys, or piers would also create uncommon relief in a mostly flat seascape. Structure-oriented fishes could be attracted to these locations. Abundance of certain fishes could increase. These impacts are expected to be local and could be short term to permanent. These fish aggregations can provide localized short-term to permanent beneficial impacts on some bird species due to increased prey species availability. | See Section 3.7.2.2.2 for analysis during offshore activities. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. | See Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. |
| Presence of structures: Migration disturbances | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. There could also be a few non-OSW structures scattered about the offshore GAA for birds, such as navigation and weather buoys and light towers (NOAA 2020a). Migrating birds could easily fly around or over these sparsely distributed structures. | The infrequent installation of future new structures in the marine or onshore environment over the next 35 years would not be expected to result in migration disturbances. | See Section 3.7.2.2.2 for analysis during offshore activities. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. | See Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. |
| Presence of structures: Turbine strikes, displacement, and attraction | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. There could also be a few non-OSW structures in the offshore GAA for birds, such as navigation and weather buoys, turbines, and light towers (NOAA 2020a). Given the limited number of structures currently in the GAA, individual and population-level impacts | The installation of future new structures in the marine or onshore environment over the next 35 years would not be expected to result in an increase in collision risk or displacement. Some potential for attraction and opportunistic roosting exists but would be expected to be limited given the anticipated number of structures. | See Section 3.7.2.2.2 for analysis during offshore activities. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. | See Section 3.7.2.1, Table 3.7-1 for analysis during offshore activities. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | due to displacement from current foraging habitat would not be expected. Stationary structures in the offshore environment would not be expected to pose a collision risk to birds. Some birds like cormorants and gulls could be attracted to these structures and opportunistically roost on these structures. | | | | |
| Traffic | General aviation accounts for approximately two bird strikes per 100,000 flights (Dolbeer et al. 2019). Additionally, aircraft are used for scientific and academic surveys in marine environments. | Bird fatalities associated with general aviation would be expected to increase and follow the current trend in commercial air travel. Aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. These flights would be well below 100,000 flights, and no bird strikes would be expected to occur. | Aircraft flying at low altitudes and vehicle traffic could cause birds to flush, resulting in increased energy expenditure. Disturbance to birds, if any, would be temporary and localized, with impacts dissipating once the aircraft has left the area. General aircraft traffic accounts for approximately two bird strikes per 100,000 flights (Dolbeer et al. 2019). Because aircraft flights associated with OSW development would be minimal in comparison to baseline conditions, aircraft strikes with birds are rare. For this reason, aircraft traffic would not be expected to contribute to overall impacts on birds and as a result, BOEM expects no measurable impacts to birds from aircraft traffic.<br>Planned future offshore projects, specifically wind projects, would result in increased short-term construction vessel traffic and long-term maintenance vessel traffic. Some of the vessel traffic from planned future projects would use designated shipping channels. Vessel traffic could cause seabirds to flush, resulting in temporary habitat loss (Schwemmer et al. 2011). Avoidance of shipping channels could result in long-term habitat loss and fragmentation; however, these adverse impacts would be short-term **negligible** as birds would become habituated to channeled traffic. | **Offshore:** Helicopters could be used for crew changes and construction support during installation of the WTGs; however, their use would be infrequent and used during foundation construction (see COP Appendix T [Tech Environmental 2023]). Vessel traffic associated with construction activities could flush birds in the path of vessels, causing temporary displacement from the area; however, impacts would be temporary and similar to baseline conditions because vessel traffic already occurs, resulting in similar temporary displacement of birds in the GAA (Stantec 2018). The expected adverse impacts of aircraft and vessel traffic associated with each alternative alone would not increase the impacts of this IPF beyond the impacts described under the No Action Alternative. Alternatives C through F would reduce the number of WTGs installed, potentially resulting in a reduced number of helicopter trips and vessel traffic required during construction. However, no measurable change from Proposed Action construction impacts to birds from this IPF is anticipated. Therefore, impacts under the Proposed Action and Alternatives C through F are expected to be short term **negligible** adverse.<br>A hoist-equipped helicopter could be used to support O&M of the RWF; however, helicopter use would be infrequent (see COP Appendix T [Tech Environmental 2023]). Increases in vessel traffic during maintenance activities would be limited and infrequent. The expected adverse impacts to birds from aircraft and vessel traffic associated with the Proposed Action and Alternatives C through F alone would not increase the impacts of this IPF beyond the impacts described under the No Action Alternative: short term **negligible** adverse. | Similar impacts to the Proposed Action and Alternatives C through F. Therefore, construction and installation, O&M, and cumulative impacts would be **negligible** adverse. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | Aircraft flights associated with Project activities would be infrequent, and aircraft strikes with birds would be rare. Aircraft flights associated with other past, present, and reasonably foreseeable activities passing through the Lease Area would be minimal and infrequent. Vessel traffic could cause birds to flush, resulting in a temporary loss of habitat during construction activities associated with all Project alternatives. Impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. However, impacts would be temporary and similar to baseline conditions because vessel traffic already occurs in the GAA (Stantec 2018) and birds are habituated to regularly used shipping channels. In the context of reasonably foreseeable environmental trends, the combined aircraft and vessel traffic impacts from ongoing and planned actions, including the Proposed Action and Alternatives C through F, would be similar to the impacts under the No Action Alternative: long term **negligible** adverse. | |
| | | | | **Onshore:** Aircraft traffic would not have an onshore impact on birds. Therefore, impacts would be **negligible** adverse under all alternatives. | Similar impacts to the Proposed Action and Alternatives C through F. Therefore, impacts would be **negligible** adverse. |
| Climate change: Warming and sea level rise, storm severity/frequency, altered habitat/ecology | Increased storm frequency and severity during the breeding season can reduce productivity of bird nesting colonies and kill adults, eggs, and chicks.<br>Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 30 years, influencing the distribution of bird prey resources. | No future activities were identified within the GAA for birds other than ongoing activities. | See Section 3.7.2.2.2 for analysis. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis. | See Section 3.7.2.1, Table 3.7-1 for analysis. |
| Climate change: Ocean acidification | Increasing ocean acidification could affect prey species upon which some birds feed and could lead to shifts in prey distribution and abundance. Intensity of impacts on birds is speculative. | No future activities were identified within the GAA for birds other than ongoing activities. | See Section 3.7.2.2.2 for analysis. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis. | See Section 3.7.2.1, Table 3.7-1 for analysis. |
| Climate change: Warming and sea level rise, altered migration patterns | Birds rely on cues from the weather to start migration. Wind direction and speed influence the amount of energy used during migration. For nocturnal migrants, wind | No future activities were identified within the GAA for birds other than ongoing activities. | See Section 3.7.2.2.2 for analysis. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis. | See Section 3.7.2.1, Table 3.7-1 for analysis. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/ Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | assistance is projected to increase across eastern portions of the continent (0.32 m/s; 9.6%) during spring migration by 2091, and wind assistance is projected to decrease within eastern portions of the continent (0.17 m/s; 6.6%) during autumn migration (La Sorte et al. 2018). | | | | |
| Climate change: Warming and sea level rise, increased disease frequency | Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 35 years, influencing the frequencies and distributions of various diseases of birds. | No future activities were identified within the GAA for birds other than ongoing activities. | See Section 3.7.2.2.2 for analysis. | See Section 3.7.2.3 and Section 3.7.2.1, Table 3.7-1 for analysis. | See Section 3.7.2.1, Table 3.7-1 for analysis. |

* Includes all constructed and permitted COP projects that occur within the birds GAA: Block Island, SFWF, Vineyard Wind 1, Coastal Virginia Offshore Wind.

## Water Quality

No IPFs with solely negligible impacts were identified.

**Table E1-4. Summary of Activities and the Associated Impact-Producing Factors for Water Quality**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/ hazmat | Constructed and permitted OSW COP projects can accidentally release an estimated 200,000 gallons of fuel, oils, or other hazardous materials in the GAA. Accidental releases of fuels and fluids also occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable, line, and pipeline laying activities. According to the Department of Energy, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution Federation Limited (2021), which collects data on oil spills from tankers and other sources. From 1990 to 1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and into the offshore was < 70,000 barrels. Impacts on water quality would be expected to brief and localized from accidental releases. | Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities. Impacts are unlikely to affect water quality. | See Section 3.21.2.2.2 for analysis. | See Section 3.21.2.3 and Section 3.21.2.1, Table 3.21-1 for analysis. | See Section 3.21.2.1, Table 3.21-1 for analysis. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | All vessels would comply with USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills. | | | | |
| Accidental releases: Trash and debris | Constructed and permitted OSW COP projects can potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris in the GAA. Trash and debris could be also accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities, and cable, line, and pipeline laying. Accidental releases of trash and debris are expected to be low probability events. BOEM assumes operator compliance with federal and international requirements for management of shipboard trash; such events also have a relatively limited spatial impact.<br>All vessels would adhere to federal, state, and local regulations regarding disposal of solid and liquid wastes. | As population and vessel traffic increase gradually over the next 35 years, accidental release of trash and debris could increase. However, there does not appear to be evidence that the volumes and extents anticipated would have any effect on water quality. | See Section 3.21.2.2.2 for analysis. | See Section 3.21.2.3 and Section 3.21.2.1, Table 3.21-1 for analysis. | See Section 3.21.2.1, Table 3.21-1 for analysis. |
| Anchoring | Constructed and permitted OSW COP projects are introducing an estimated 821 acres of anchoring in the GAA. Other non-OSW impacts from anchoring occur due to ongoing military use and survey, commercial, and recreational activities. | Impacts from anchoring could occur semiregularly over the next 35 years due to offshore military operations or survey activities. These impacts would include increased seafloor disturbance resulting in increased turbidity levels. All impacts would be localized, short term, and temporary. | See Section 3.21.2.2.2 for analysis within offshore waters. Anchoring would not impact onshore waters. | See Section 3.21.2.3 and Section 3.21.2.1, Table 3.21-1 for analysis within offshore waters. Anchoring would not impact onshore waters. | See Section 3.21.2.1, Table 3.21-1 for analysis within offshore waters. Anchoring would not impact onshore waters. |
| New cable emplacement/ maintenance | Constructed and permitted OSW COP projects are introducing an estimated 193 miles of new offshore cable in the GAA. Elevated suspended sediment concentrations can also occur under natural tidal conditions and increase during storms, trawling, and vessel propulsion. Survey activities and new cable and pipeline laying activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances would be short term and either be limited to the emplacement corridor or localized. | Suspension of sediments could continue to occur infrequently over the next 35 years due to survey activities and submarine cable, line, and pipeline-laying activities. Future new cables would occasionally disturb the seafloor and cause short-term increases in turbidity and minor alterations in localized currents resulting in local short-term impacts. The FCC has two pending submarine telecommunication cable applications in the North Atlantic. If the cable routes enter the water quality GAA, short-term disturbance in the form of increased suspended sediment and turbidity would be expected. | See Section 3.21.2.2.2 for analysis. | See Section 3.21.2.3 and Section 3.21.2.1, Table 3.21-1 for analysis. | See Section 3.21.2.1, Table 3.21-1 for analysis. |
| Port utilization: Expansion | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. Between 1992 and 2012, global shipping traffic also | The general trend along the coastal region from Virginia to Maine is that port activity would increase modestly over the next 35 years. Port modifications and channel- | See Section 3.21.2.2.2 for analysis. | See Section 3.21.2.3 and Section 3.21.2.1, Table 3.21-1 for analysis. | See Section 3.21.2.1, Table 3.21-1 for analysis. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia to Maine is that port activity would increase modestly. The ability of ports to receive the increase in larger ships would require port modifications, which, along with additional vessel traffic, could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future. | deepening activities are being undertaken to accommodate the increase in vessel traffic and deeper draft vessels that transit the Panama Canal locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future. | | | |
| Presence of structures | Constructed and permitted OSW COP projects are introducing 17 structures into the GAA. The installation of onshore and offshore structures leads to alteration of local water currents. These disturbances would be local but, depending on the hydrologic conditions, have the potential to impact water quality through the formation of sediment plumes. | Impacts associated with the presence of structures includes temporary sediment disturbance during maintenance. This sediment suspension would lead to interim and localized impacts. | See Section 3.21.2.2.2 for analysis. | See Section 3.21.2.3 and Section 3.21.2.1, Table 3.21-1 for analysis. | See Section 3.21.2.1, Table 3.21-1 for analysis. |
| Discharges | Constructed and permitted OSW COP projects can potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris in the GAA. Discharges impact water quality by introducing nutrients, chemicals, and sediments to the water. There are regulatory requirements related to prevention and control of discharges, the prevention and control of accidental spills, and the prevention and control of nonindigenous species. | Increased coastal development is causing increased nutrient pollution in communities. In addition, ocean disposal activity in the North Atlantic and Mid-Atlantic is expected to gradually decrease or remain stable. Impacts of ocean disposal on water quality are minimized because the EPA has established dredge spoil criteria and regulate the disposal permits issued by the USACE.<br>The impact on water quality from sediment suspension during these future activities would be short term and localized. | See Section 3.21.2.2.2 for analysis. | See Section 3.21.2.3 and Section 3.21.2.1, Table 3.21-1 for analysis. | See Section 3.21.2.1, Table 3.21-1 for analysis. |

* Includes two constructed and permitted COP projects that occur within the water quality GAA: Block Island, SFWF.

# Coastal Habitats and Fauna

**Table E2-1**. **Summary of Activities and the Associated Impact-Producing Factors for Coastal Habitats and Fauna**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| New cable emplacement/ maintenance | Onshore buried transmission cables are present in the area near the Project onshore and offshore improvements. Onshore activities would only occur where permitted by local land use authorities, which would avoid long-term land use conflicts. Continual development of residential, commercial, industrial, solar, transmission, gas pipeline, onshore wind turbine, transportation infrastructure, sewer infrastructure, and cell tower projects could permanently convert various areas. | No known proposed onshore structures are reasonably foreseeable and proposed to be located in the GAA for coastal habitats and fauna. | A small amount of infrequent construction impacts associated with onshore power infrastructure would be required over the next 6 to 10 years to tie future OSW energy projects to the electric grid. Typically, this would require only small, if any, amounts of coastal habitat removal and would likely occur in previously disturbed areas. Habitat loss occurs when an area supporting wildlife is converted to non-habitat that lacks the natural resources to support occupancy for any species, such as paved areas. Short-term and temporary impacts associated with habitat loss or avoidance during construction could occur, and injury or mortality of individuals could occur. For this reason, land disturbance associated with onshore construction activities would have a **negligible** contribution to overall adverse impacts on coastal habitats and fauna. | **Onshore**: During construction of the onshore transmission cable and associated activities within the landfall work area, land disturbance could result in small temporary impacts (e.g., displacement and potential injury and/or mortality of individuals) on coastal fauna. Land disturbance and subsequent habitat removal or alteration could result from the RWEC connection to the landfall work area and construction of the onshore transmission cable. Potential indirect impacts to coastal habitats would include the spread of invasive species, reduction in habitat quality, and displacement of wildlife and resources based on changes to habitat conditions.<br>The potential for onshore construction and habitat alteration to significantly affect coastal habitat is limited because the landfall work area consists of areas of predominately human-made shoreline and grassland/shrubland areas as a result of previous human activity. Habitat conversion is not a factor for developed areas (e.g., existing buildings, mowed lawns, parking lots, roads) within the landfall envelope. The construction period for the onshore facilities would occur over approximately 18 months, and the infrastructure at the landfall work area would be placed underground when completed. HDD would be employed to connect the RWEC and the landfall work area. This would limit or completely avoid direct impacts to the human-made shoreline and ruderal grassland/shrubland because the RWEC would be installed under these resources. The temporary onshore construction work area for the HDD operations would likely be situated within a previously developed area (e.g., an existing parking lot) and would not impact the human-made shoreline and/or the ruderal grassland/shrubland. However, if these habitat types are disturbed, these impacts would be short term because the area would be reseeded to re-establish previous conditions. The human-made shoreline does not support | Similar impacts to the Proposed Action and Alternatives C through F. Therefore, construction and installation, O&M, and cumulative impacts would be **negligible** adverse. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | any vegetative growth. A potential indirect impact to coastal habitat from onshore construction and habitat alteration linked to construction of the landfall work area is habitat degradation via the spread of invasive species. If vegetative clearing is required within the ruderal grassland/shrubland for construction of the landfall work area, then this could provide an opportunity for invasive plant species to outcompete native plants. The baseline conditions of the ruderal grassland/shrubland habitat already support a high occurrence of invasive plant species. Habitats with high levels of invasive species can degrade habitat quality for wildlife by reducing the amount of native plant material available for foraging. However, this area of undisturbed habitat is so small it is unlikely to provide a significant habitat resource to wildlife. The spread of invasive species would be managed in compliance with state and federal regulations. Impacts to coastal habitats and fauna from construction activities at the landfall work area would be considered short-term **negligible** adverse for the Proposed Action and Alternatives C through F.<br><br>As noted within the landfall work area impact assessment, wildlife species subject to direct mortality during construction of the onshore facilities are those with limited or no mobility. Onshore transmission cable installation would result in temporary ground disturbance, but permanent disturbances are not anticipated. Most of the temporary ground disturbance would be from a trench that would follow along paved roads or previously disturbed areas (e.g., parking lots) except for a small portion that intersects approximately 0.02 acre of plantation and ruderal forest.<br><br>The onshore transmission cable would be up to 1 mile long with a maximum temporary disturbance corridor of 25 feet (30 feet at splice vaults) and a maximum disturbance depth of 10 feet that would be mostly limited to established road ROWs or previously disturbed areas such as parking lots with little to no impact to adjacent coastal and terrestrial habitat. Where the onshore transmission cable would connect to the OnSS, it would be | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | installed below a proposed access driveway. Some of the alternative routes under consideration within the transmission cable envelope contain segments that would pass through undeveloped, vegetated areas. If selected, these routes would require vegetative clearing and would be maintained as managed lawn and or gravel access road to maintain access to the cable infrastructure belowground. Since these segments of the onshore transmission cable routes under consideration would be installed within previously undeveloped areas, the impacts resulting from habitat alteration and conversion would be considered long term and **negligible**. Regular O&M activities would not cause further habitat alteration or impact coastal habitats and fauna. However, when cable inspection or repairs require excavation, this nonroutine maintenance could cause limited land disturbance to create access to the infrastructure. Such occurrences are expected to be infrequent and would result in localized and short-term **negligible** adverse impacts to coastal habitats and fauna for the Proposed Action and Alternatives C through F. Decommissioning of the onshore transmission cable would have similar impacts on coastal habitats and fauna to those described for the construction phase if the underground infrastructure is removed. If the infrastructure is abandoned in place, it would not have any impacts.<br><br>Construction and installation, O&M, and decommissioning of the onshore transmission cable under all Project alternatives would incrementally contribute to the habitat conversion and habitat loss described under the No Action Alternative. Because of the small amount of affected onshore habitat, land disturbance from the Proposed Action and Alternatives C through F when added to other past, present, and reasonably foreseeable projects would result in **negligible** adverse incremental impacts to coastal habitats and fauna. | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Presence of structures | Periodic clearing of shrubs and tree saplings along existing utility ROWs causes disturbance and temporary displacement of mobile species and could cause direct injury or mortality of less mobile species, resulting in short-term impacts that are less than noticeable. Continual development of residential, commercial, industrial, solar, transmission, gas pipeline, onshore wind turbine, and cell tower projects also causes disturbance, displacement, and potential injury and/or mortality of fauna, resulting in small temporary impacts. | No future activities were identified within the GAA other than ongoing activities. | See Section 3.8.2.2.2 for analysis. | See Section 3.8.2.3 and Section 3.8.2.1, Table 3.8-2 for analysis of onshore impacts. The IPF would not impact offshore resources. | See Section 3.8.2.1, Table 3.8-2 for analysis of onshore impacts. The IPF would not impact offshore resources. |
| Noise: Onshore/offshore construction | Ongoing noise from construction occurs frequently near shores of populated areas in New England and the Mid-Atlantic region but infrequently offshore. Noise from construction near shorelines is expected to gradually increase over the next 30 years, in line with human population growth along the coast of the GAA. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. | No future activities were identified within the GAA other than ongoing activities. | Onshore construction noise has the potential to have a **negligible** adverse impact on coastal fauna. BOEM anticipates that these impacts would be temporary and highly localized. Habitat-related impacts (i.e., displacement from potentially suitable habitats) could occur as a result of construction activities. These impacts would likely be limited to temporary behavioral avoidance, and no permanent impacts would be expected. Given the temporary and localized nature of potential impacts, and the current level of development within the GAA, no individual fitness or population-level impacts would occur as a result of noise associated with onshore construction activities. | **Onshore:** Another potential indirect impact to coastal fauna during construction of the onshore facilities is displacement or avoidance behavior of individuals due to noise. The overall installation schedule for onshore facilities is expected to be approximately 1 year (see COP Section 3.2, Project Schedule). Construction would typically result in temporary increases in noise. As described in VHB’s onshore acoustic assessment (VHB 2023a), noise was evaluated based generally on the noisiest condition when the loudest construction equipment would be in operation. The primary noise sources generated during construction would be from increased traffic volumes (i.e., delivery trucks carrying construction equipment and supplies and automobiles used for daily commuting to various work sites) and HDD at the landfall work area. Sound-generating construction equipment associated with HDD operations would include a drill rig, a generator, and mud pumps. Unlike most other construction activities that can be limited to daytime hours, it is typically necessary for HDD operations to occur continuously to minimize the risk of soil settlement and equipment failures. Other noise-generating equipment used during HDD operations would include an excavator, a crane, and either an impact or vibratory sheet pile driver for site preparation. The onshore acoustic assessment (VHB 2023a) indicates that construction equipment used to support construction of the landfall work area could create sound levels that range from 56 to 101 dBA at 50 feet from the noise source. Ambient | Similar impacts to the Proposed Action and Alternatives C through F. Therefore, construction and installation, O&M, and cumulative impacts would be **negligible** adverse. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | sound measurements conducted within the GAA under existing conditions ranged from 44 to 45 dBA (Leq) at night and 49 to 50 dBA during the day (VHB 2023a).<br>Construction of the onshore transmission cable would involve different construction phases, each using noise-generating equipment such as bulldozers, backhoes, front-end loaders, aerial lifts, trenchers, compactors, concrete saws, graders, pumps, compressors, and trucks. Because the onshore transmission cable installation process would progress along the cable route during this period, the exposure to construction noise would be limited to a discrete duration at any location along the route. The onshore acoustic assessment (VHB 2023a) indicates that construction equipment used to support construction of the onshore transmission cable could create sound levels that range from 73 to 90 dBA at 50 feet from the noise source depending on the installation methodology. The sequence for construction of the OnSS and ICF would typically include clearing the site of vegetation, grading the site, installing environmental erosion controls, installing the foundations and erecting buildings for housing equipment, and restoring any disturbed areas on the site and removing environmental controls. The types of construction equipment used would generally include backhoes, cranes, refrigerator units, front-end loaders, and generators. The onshore acoustic assessment (VHB 2023a) indicates that construction equipment used to support construction of the OnSS could create sound levels that range from 80 to 85 dBA at 50 feet from the noise source.<br>Potential impacts to coastal fauna from the temporary increase in construction-generated noise could include avoidance behavior and displacement during the construction period (Brown et al. 2012). Because the construction period is temporary, noise impacts on wildlife species during construction of the onshore facilities of the Proposed Action and Alternatives C through F are expected to be temporary **negligible** adverse.<br>No impacts related to noise would be expected from operation of the onshore transmission | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | cable because the infrastructure would be underground. However, when cable inspection or repairs require excavation, this non-routine maintenance could generate equipment- and vehicle-related noise. Such occurrences are expected to be infrequent and would result in localized and short-term **negligible** adverse impacts to coastal habitats and fauna. Decommissioning of the onshore transmission cable would have similar impacts from noise on coastal habitats and fauna to those described for the construction phase if the underground infrastructure is removed. If the infrastructure is abandoned in place, it would not have any impacts.<br>O&M at the proposed OnSS and ICF would introduce new sources of sound, including transformers, shunt reactors, harmonic filters, cooling and ventilation associated with the outdoor substation equipment as well as condensers, pumps, skids, and auxiliary transformers associated with the synchronous condenser building. Operational sound from the OnSS and ICF is modeled to be 45.5 dBA (Leq) or less when measured at the nearest anthropogenic noise sensitive receivers, which would fall within the ambient sound range measured at baseline conditions (44 to 45 dBA (Leq) at night and 49 to 50 dBA during the day) (VHB 2023a), and no impacts to coastal fauna are expected.<br>Temporary noise could occasionally be generated during non-routine maintenance at all onshore facilities. Infrequent vehicle usage within the OnSS and ICF could create temporary disturbance to wildlife adjacent to the OnSS, but such disturbance would be short term, and normal wildlife activity would likely resume after the traffic ceases. Impacts from noise during decommissioning of onshore facilities would be similar to those during construction: temporary **negligible** adverse for all Project alternatives.<br>Construction, O&M, and decommissioning of the onshore facilities would also produce temporary noise that would lead to short-term negligible incremental impacts, if any, on coastal habitats and fauna. The onshore elements of the Proposed Action and | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | Alternatives C through F would be in already developed areas with existing noise disturbance where wildlife is habituated to human activity. Therefore, the cumulative impact of noise generated by the Proposed Action and Alternatives C through F on coastal habitats and fauna when combined with past, present, and reasonably foreseeable projects would be localized and short term **negligible** adverse. | |
| Climate change: Warming and sea level rise, altered habitat/ecology | Climate change, influenced in part by GHG emissions, is altering the seasonal timing and patterns of species distributions and ecological relationships, likely causing permanent changes of unknown intensity gradually over the next 35 years. | No future activities were identified within the GAA other than ongoing activities. | See Section 3.8.2.2.2 for analysis. | See Section 3.8.2.3 and Section 3.8.2.1, Table 3.8-2 for analysis of onshore impacts. The IPF would not impact offshore resources. | See Section 3.8.2.1, Table 3.8-2 for analysis of onshore impacts. The IPF would not impact offshore resources. |

* No constructed and permitted COP projects occur within the coastal habitats and fauna GAA.

## Wetlands and Non-tidal Waters

**Table E2-2. Summary of Activities and the Associated Impact-Producing Factors for Wetlands and Non-tidal Waters**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/ hazmat | Ongoing onshore construction projects that involve vehicles and equipment that use fuel, fluids, or hazardous materials could result in an accidental release. Intensity and extent would vary, depending on the size, location, and materials involved in the release. | No future activities were identified within the GAA for wetlands and non-tidal waters other than ongoing activities. | See Section 3.22.2.2.2 for analysis. | See Section 3.22.2.3 and Section 3.22.2.1, Table 3.22-2 for analysis of onshore impacts. The IPF would not impact offshore resources. | See Section 3.22.2.1, Table 3.22-2 for analysis of onshore impacts. The IPF would not impact offshore resources. |
| Accidental releases: Trash and debris | Ongoing releases of trash and debris occur from onshore sources; fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey activities; and cable, line, and pipeline laying. | No future activities were identified within the GAA for wetlands and non-tidal waters other than ongoing activities. | See Section 3.22.2.2.2 for analysis. | See Section 3.22.2.3 and Section 3.22.2.1, Table 3.22-2 for analysis of onshore impacts. The IPF would not impact offshore resources. | See Section 3.22.2.1, Table 3.22-2 for analysis of onshore impacts. The IPF would not impact offshore resources. |
| Discharges | Discharges impact water quality by introducing nutrients, chemicals, and sediments to the water. There are regulatory requirements related to the prevention and control of discharges, the prevention and control of accidental spills, and the prevention and control of nonindigenous species. | Increased future coastal development has the potential to cause increased nutrient pollution in communities, approximately 80% of which is due to groundwater contamination by septic systems. In addition, ocean disposal activity in the North Atlantic is expected to gradually decrease or remain stable. Impacts of ocean disposal on water quality are minimized because the EPA has | See Section 3.22.2.2.2 for analysis. | See Section 3.22.2.3 and Section 3.22.2.1, Table 3.22-2 for analysis of onshore impacts. The IPF would not impact offshore resources. | See Section 3.22.2.1, Table 3.22-2 for analysis of onshore impacts. The IPF would not impact offshore resources. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | established dredge spoil criteria and regulates the disposal permits issued by the USACE. | | | |
| New cable emplacement/ maintenance | No known proposed cables are reasonably foreseeable and proposed to be located in the GAA for wetlands and non-tidal waters. | Any new cable or pipeline installed in the GAA would likely require hard protection atop portions of the route. Such protection is anticipated to increase incrementally over the next 30 years. | See Section 3.22.2.2.2 for analysis. | See Section 3.22.2.3 and Section 3.22.2.1, Table 3.22-2 for analysis of onshore impacts. The IPF would not impact offshore resources. | See Section 3.22.2.1, Table 3.22-2 for analysis of onshore impacts. The IPF would not impact offshore resources. |
| Presence of structures | Ongoing development of onshore properties, especially shoreline parcels, periodically could lead to unvegetated or otherwise unstable soils. Precipitation events could potentially mobilize the soils into nearby surface waters, leading to potential erosion and sedimentation effects and subsequent increased turbidity. No known proposed structures are reasonably foreseeable and proposed to be located in the GAA for wetlands and non-tidal waters. | Impacts associated with the presence of structures includes temporary sediment disturbance during maintenance and ongoing development. This sediment suspension would lead to short-term and localized impacts. | See Section 3.22.2.2.2 for analysis. | See Section 3.22.2.3 and Section 3.22.2.1, Table 3.22-2 for analysis of onshore impacts. The IPF would not impact offshore resources. | See Section 3.22.2.1, Table 3.22-2 for analysis of onshore impacts. The IPF would not impact offshore resources. |
| Sediment deposition and burial | Ongoing cable or structure maintenance activities can infrequently disturb sediments; these disturbances are local and limited to the emplacement corridor. Precipitation events could potentially mobilize the disturbed sediments into nearby surface waters, leading to potential erosion and sedimentation effects and subsequent increased turbidity. | No future activities were identified within the GAA other than ongoing activities. | Dredge materials from future OSW activities would not be disposed of in areas with wetlands or other WOTUS within the GAA. Therefore, **negligible** adverse impacts to wetlands and non-tidal waters within the GAA are anticipated. | Dredged materials from Project activities would not be disposed of in areas with wetlands or other WOTUS. Therefore, sediment deposition and burial impacts on wetlands and non-tidal waters from construction and installation would be the same for the Proposed Action and Alternatives C through F: **negligible** adverse.<br>O&M of onshore O&M facilities could include dredging activities for the Proposed Action and Alternatives C through F; however, materials from O&M activities would not be disposed of in areas with wetlands or other WOTUS. Therefore, **negligible** adverse impacts to wetlands and non-tidal waters from sediment deposition and burial are anticipated for all Project alternatives.<br>Dredge materials from the Proposed Action and Alternatives C through F and other future OSW projects within the GAA would not be disposed of in areas with wetlands or other WOTUS. As a result, when combined with past, present, and reasonably foreseeable projects, the Proposed Action and Alternatives C through F are expected to result in **negligible** adverse impacts to wetlands and non-tidal waters. | Similar impacts to the Proposed Action and Alternatives C through F. Therefore, construction and installation impacts would be short term **negligible** adverse. O&M impacts to wetlands and non-tidal waters are anticipated to be **negligible** adverse. When combined with past, present, and reasonably foreseeable projects, Alternative G is expected to result in **negligible** adverse impacts to wetlands and non-tidal waters. |
| Climate change: Warming and sea | Climate change, influenced in part by ongoing GHG emissions, is expected to continue to | No future activities were identified within the GAA other than ongoing activities. | Impacts of climate change, including increased storm severity and frequency, are | Air pollutants could impact onshore biological resources, including wetlands and WOTUS. | Similar impacts to the Proposed Action and Alternatives C through F. Therefore, |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| level rise, altered habitat/ecology | contribute to a widespread loss of shoreline habitat from rising seas and erosion. In submerged habitats, warming is altering ecological relationships and the distributions of ecosystem engineer species, likely causing permanent changes of unknown intensity gradually over the next 3 years. | | ongoing stressors for wetlands and non-tidal waters. Future OSW projects aim to combat climate change and associated effects by reducing GHG emissions. Under the No Action Alternative, the long-term net decrease in GHG emissions from other ongoing and future OSW and other non-fossil fuel–based energy generation projects would be slightly less than with the Proposed Action. As a result, the effects to wetlands and non-tidal waters would be **negligible** to **minor** adverse, as they are anticipated to occur but have no measurable influence within the GAA. | Acidification of soils, lakes, and streams could result in changes in community structure and biodiversity within these habitats. The OCS air permitting process will require air dispersion modeling of these emissions to demonstrate compliance with the NAAQS. Specifically, EPA requires modeling of NAAQS and Class I significant impact levels for the purpose of PSD permitting for the construction and operation of Revolution Wind. Compliance with the NAAQS offshore in and near the Lease Area will be evaluated with air quality dispersion modeling through EPAs OCS permitting. Because air emissions generated during the construction and installation period would not exceed applicable air emission standards the impacts to onshore wetlands and non-tidal waters would be short-term **negligible** adverse.<br>While cumulative air emissions in the region would increase during construction, it is important to note that the Proposed Action could also contribute to a long-term net decrease in emissions by substituting some existing fossil fuel sources with a renewable source. Therefore, impacts to wetlands and non-tidal waters are anticipated to be **negligible** adverse.<br>The cumulative impacts from global climate change would be the same as those described for future OSW activities without the Proposed Action because emissions from other past, present, and reasonably foreseeable projects, in combination with air emissions generated during construction and O&M would not exceed applicable air emission standards. Thus, potential impacts to wetlands and non-tidal waters from the incremental contribution to climate change attributed to the Proposed Action when combined with past, present, and other reasonably foreseeable projects are uncertain but are anticipated to qualify as long term **negligible** adverse.<br>Alternatives C through F would have the same onshore activities and facilities as the Proposed Action; therefore, climate change impacts on wetlands and non-tidal waters | construction and installation impacts would be short term **negligible** adverse. O&M impacts to wetlands and non-tidal waters are anticipated to be **negligible** adverse. Potential impacts to wetlands and non-tidal waters from the incremental contribution to climate change attributed to the Proposed Action when combined with past, present, and other reasonably foreseeable projects are uncertain but are anticipated to qualify as long term **negligible** adverse. |

| Associated IPFs: Sub-IFPs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | would be the same as those described for the Proposed Action: **negligible** adverse. | |

* No constructed and permitted COP projects occur within the wetlands and non-tidal waters GAA.

## Benthic Habitat and Invertebrates

**Table E2-3. Summary of Activities and the Associated Impact-Producing Factors for Benthic Habitat and Invertebrates**

| Associated IPFs: Sub-IFPs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/ hazmat | Constructed and permitted OSW COP projects can accidentally release an estimated 900,000 gallons of fuel, oils, or other hazardous materials into the invertebrates GAA. See Table E1-4 for a discussion of ongoing accidental releases. Accidental releases of hazmat occur periodically, mostly consisting of fuels, lubricating oils, and other petroleum compounds. Because most of these materials tend to float in seawater, they rarely contact benthic resources. The chemicals with potential to sink or dissolve rapidly often dilute to nontoxic levels before they affect benthic resources. The corresponding impacts on benthic resources are rarely noticeable. Impacts, including mortality and decreased fitness, are localized and temporary and rarely affect invertebrate populations.<br>All vessels would comply with USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills. | Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. Impacts are unlikely to affect invertebrate populations. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Accidental releases: Invasive species | Invasive species are periodically released accidentally during ongoing activities, including the discharge of ballast water and bilge water from marine vessels. The impacts on benthic resources (e.g., competitive disadvantage, smothering) depend on many factors but can be noticeable, widespread, and permanent. | No future activities were identified within the GAA other than ongoing activities. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Accidental releases: Trash and debris | Constructed and permitted OSW COP projects can potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris into the invertebrates GAA. Other ongoing releases of trash and debris occurs from onshore sources; fisheries use; dredged | No future activities were identified within the GAA other than ongoing activities. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on |

| Associated IPFs: Sub-IFPs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey activities; and cable, line, and pipeline laying. However, there does not appear to be evidence that ongoing releases have detectable impacts on benthic resources.<br>All vessels would adhere to federal, state, and local regulations regarding disposal of solid and liquid wastes. | | | effect on benthic habitat or invertebrates and are not analyzed. | benthic habitat or invertebrates and are not analyzed. |
| Anchoring | Constructed and permitted OSW COP projects are introducing an estimated 944 acres of anchoring in the invertebrates GAA. This, combined with regular vessel anchoring related to other ongoing military, survey, commercial, and recreational activities, continues to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. These impacts include increased turbidity levels and the potential for direct contact to cause injury and mortality of benthic resources as well as physical damage to their habitats. These impacts are greatest for sessile or slow-moving species (e.g., corals, sponges, and sedentary shellfish). All impacts are localized; turbidity is temporary; injury and mortality are recovered in the short term; and physical damage can be permanent if it occurs in eelgrass beds or hard-bottom habitat. | No future activities were identified within the GAA other than ongoing activities. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Bycatch | Bycatch occurs in various gillnet and trawl fisheries in New England and the Mid-Atlantic Coast, with hotspots driven by fishing intensity (Lewison et al. 2014; NMFS 2018a). | No future activities were identified within the GAA for this resource other than ongoing activities. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| EMFs | Constructed and permitted OSW COP projects can generate EMF and substrate heating effects, altering the environment for benthic invertebrates and other organisms associated with those habitats.<br>EMFs also continuously emanate from existing telecommunication and electrical power transmission cables. New cables generating EMFs are infrequently installed in | No future activities were identified within the GAA other than ongoing activities. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |

| Associated IPFs: Sub-IFPs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | the GAA. Some benthic species can detect EMFs, although EMFs do not appear to present a barrier to movement.<br>The extent of impacts (behavioral changes) is likely less than 50 feet (15.2 m) from the cable and the intensity of impacts on benthic resources is likely undetectable. | | | | |
| Light: Vessels | Nighttime vessel activity associated with permitted and built OSW COP projects is occurring during installation and O&M of various project components (cables, substation etc.). Marine vessels have an array of lights, including navigational lights and deck lights. There is little downward-focused lighting and therefore only a small fraction of the emitted light enters the water. Light can attract invertebrates, potentially affecting distributions in a highly localized area. Light could also disrupt natural cycles (e.g., spawning), possibly leading to short-term impacts. | See table cell to the left. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Light: Structures | Constructed and permitted OSW COP projects are introducing 83 lighted structures into the invertebrate GAA. Offshore buoys and towers emit light, and onshore structures, including buildings and ports, emit a great deal more on an ongoing basis. Light can attract invertebrates, potentially affecting distributions in a highly localized area. Light could also disrupt natural cycles, e.g., spawning, possibly leading to short-term impacts. Light from structures is widespread and permanent near the coast, but minimal offshore. | Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| New cable emplacement/ maintenance | Constructed and permitted OSW COP projects are introducing an estimated 498 miles of new offshore cable in the GAA. This and other non-OSW cable maintenance activities infrequently disturb benthic resources and cause temporary increases in suspended sediment; these disturbances would be local and limited to the emplacement corridor. New cables are infrequently added near shore. Cable emplacement/maintenance activities injure and kill benthic resources and result in temporary to long-term habitat alterations. The intensity of impacts depends on the time (season) and place (habitat type) | Future new cables would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in local short-term impacts.<br>The FCC has two pending submarine telecommunication cable applications in the North Atlantic. If the cable routes enter the GAA for this resource, short-term disturbance would be expected. The intensity of impacts would depend on the time (season) and place (habitat type) where the activities would occur. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |

| Associated IPFs: Sub-IFPs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | where the activities occur. (See also the IPFs of seafloor profile alterations and sediment deposition and burial.) | | | | |
| Noise: Aircraft | Noise from aircraft reaches the sea surface on a regular basis. However, there is not likely to be any impact of aircraft noise on benthic habitat and invertebrates, as very little of the aircraft noise propagates through the water. | Aircraft noise is likely to continue to increase as commercial air traffic increases. However, there is not likely to be any impact of aircraft noise on benthic habitat and invertebrates. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Noise: Onshore/offshore construction | Noise from onshore construction associated with permitted OSW COP projects is occurring during installation of various project components (cables, substation etc.). Other noise from construction occurs frequently in the nearshores of populated areas in New England and the Mid-Atlantic region but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Detectable impacts of construction noise on benthic resources rarely, if ever, overlap from multiple sources. See also sub-IPF for Noise: Pile driving. | Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the GAA for this resource. Detectable impacts of construction noise on benthic resources would rarely, if ever, overlap from multiple sources. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Noise: G&G | Noise from G&G surveys associated with permitted OSW COP projects may occur in the invertebrate GAA. Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb invertebrates in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions. Detectable impacts of G&G noise on benthic resources rarely, if ever, overlap from multiple sources. | Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 35 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seafloor, potentially resulting in injury or mortality to invertebrates in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less intense sound waves more similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary. Detectable impacts of G&G noise on benthic resources would rarely, if ever, overlap from multiple sources. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Noise: O&M | Noise from O&M associated with built OSW COP projects may occur in the invertebrate | New or expanded marine minerals extraction and commercial fisheries could intermittently | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore |

| Associated IPFs: Sub-IFPs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | GAA. Some invertebrates could be able to hear the continuous underwater noise of operational WTGs. As measured at the BIWF, this low-frequency noise barely exceeds ambient levels at 164 feet (50 m) from the WTG base. Based on the results of Thomsen et al. (2015), sound pressure levels would be expected to be at or below ambient levels at relatively short distances (approximately 164 feet [50 m]) from WTG foundations. These low levels of elevated noise likely have little to no impact.<br>Noise is also created by O&M of marine minerals extraction and commercial fisheries, each of which has small local impacts. | increase noise during their O&M over the next 35 years. Impacts would likely be small and local. | activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Noise: Pile driving | Noise from pile driving associated with permitted OSW COP projects is occurring during installation of foundations for offshore structures. Noise from pile driving also occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seafloor can cause injury and/or mortality to benthic resources in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. Eggs, embryos, and larvae of invertebrates could also experience developmental abnormalities or mortality resulting from this noise, although thresholds of exposure are not known (Hawkins and Popper 2017; Weilgart 2018). The extent depends on pile size, hammer energy, and local acoustic conditions. | No future activities were identified within the GAA other than ongoing activities. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Noise: Cable laying/trenching | Noise from trenching/cable laying associated with permitted OSW COP projects may occur in the invertebrates GAA. Infrequent trenching activities for other pipeline and cable laying, as well as other cable burial methods, also emit noise. These disturbances are local, temporary, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension. | New or expanded submarine cables and pipelines are likely to occur in the GAA. These disturbances would be infrequent over the next 35 years, local, temporary, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |

| Associated IPFs: Sub-IFPs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Port utilization: Expansion | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 35 years. | Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future. In addition, the general trend along the coast from Virginia to Maine is that port activity would increase modestly. The ability of ports to receive the increase could require port modifications, leading to local impacts.<br>Future channel-deepening activities would likely be undertaken. Existing ports have already affected benthic resources and invertebrates, and future port projects would implement BMPs to minimize impacts. Although the degree of impacts would likely be undetectable outside the immediate vicinity of the ports, adverse impacts for certain species and/or life stages could lead to impacts on benthic resources and invertebrates beyond the vicinity of the port. | **Offshore:** The development of an OSW industry on the Mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Activities like dredging and the expansion or development of new overwater structures could lead to adverse effects on coastal and estuarine benthic habitats and invertebrates or benthic resources. However, any such impacts would be outside the GAA for benthic habitat and the nature and extent of these impacts on invertebrates cannot currently be quantified as no specific port improvement activities have been proposed. Therefore, these activities would have a **negligible** adverse impact on benthic resources and invertebrates. Any future port expansion would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential environmental effects. | **Offshore:** Several regional ports could be used during Project construction and decommissioning, including ports in Baltimore, MD; New Bedford, MA; New London, CT; Norfolk, VA; Paulsboro, NJ; and Providence, RI, as well as Europe. The development of an OSW industry on the Mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Port improvements could include activities like dredging and the development of new overwater structures that could adversely affect benthic resources or invertebrates within the GAA, but no specific improvements are included in the Proposed Action and Alternatives C through F. Any future port expansion incentivized by the Project would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential environmental effects. Therefore, these localized and cumulative habitat impacts would have **a negligible** adverse effect on benthic habitats or marine invertebrates during Project construction, O&M, and decommissioning. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, these localized and cumulative habitat impacts would have **a negligible** adverse effect on benthic habitats or marine invertebrates during Project construction, O&M, and decommissioning. |
| Presence of structures: Entanglement, gear loss, gear damage | Constructed and permitted OSW COP projects are introducing 83 structures into the invertebrates GAA. Additionally, commercial and recreational fishing gear are periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb, injure, or kill benthic resources, creating small short-term, localized impacts. | Future new cables would present additional risk of gear loss, resulting in small short-term, localized impacts (disturbance, injury). | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Presence of structures: Hydrodynamic disturbance | Constructed and permitted OSW COP projects are introducing 83 structures into the invertebrates GAA. Human-made structures, especially tall vertical structures such as foundations for towers of various purposes, continuously alter local water flow at a fine scale. Water flow typically returns to background levels within a relatively short distance from the structure. Therefore, impacts on benthic resources and invertebrates are typically undetectable. Indirect impacts of structures influencing primary productivity and higher trophic levels | Tall vertical structures can increase seafloor scour and sediment suspension. Impacts would likely be highly localized and difficult to detect. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |

| Associated IPFs: Sub-IFPs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | are possible but are not well understood. New structures are periodically added. | | | | |
| Presence of structures: Fish aggregation | Constructed and permitted OSW COP projects are introducing 83 structures into the invertebrates GAA. Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, continuously create uncommon relief in a mostly sandy seascape. Structure-oriented fishes are attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes can adversely affect populations and communities of benthic resources. These impacts are local and permanent. | New cables installed in the GAA over the next 35 years would likely require hard protection atop portions of the route (see the New cable emplacement/maintenance row in this table). Any new towers, buoys, or piers would also create uncommon relief in a mostly flat, sandy seascape. Structure-oriented fishes could be attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes could adversely affect populations and communities of benthic resources. These impacts are expected to be local and permanent as long as the structures remain. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Presence of structures: Habitat conversion | Constructed and permitted OSW COP projects are introducing 83 structures into the invertebrates GAA. Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables continuously provide uncommon hard-bottom habitat. A large portion is homogeneous sandy seascape but there is some other hard and/or complex habitat. Benthic species dependent on hard-bottom habitat and structure-oriented species thus benefit on a constant basis; however, the diversity could decline over time as early colonizers are replaced by successional communities dominated by blue mussels and anemones (Degraer et al. 2019: Chapter 7) and the new habitat can also be colonized by invasive species (e.g., certain tunicate species). Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat. | Any new towers, buoy, piers, or cable protection structures would create uncommon relief in a mostly sandy seascape. Benthic species dependent on hard-bottom habitat could benefit, although the new habitat could also be colonized by invasive species (e.g., certain tunicate species), and the diversity could decline over time as early colonizers are replaced by successional communities dominated by blue mussels and anemones (Degraer et al. 2019: Chapter 7). Soft bottom is the dominant habitat type in the region, and species that rely on this habitat would not likely experience population-level impacts (Greene et al. 2010; Guida et al. 2017). | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Presence of structures: Migration disturbances | Constructed and permitted OSW COP projects are introducing 83 structures into the invertebrates GAA. Human structures in the marine environment (e.g., shipwrecks, artificial reefs, and oil platforms) can attract invertebrates that approach the structures during their migrations. To date, BOEM has not identified any published evidence to suggest that human structures pose a barrier to, or slow, migratory invertebrates. | The infrequent installation of future new structures in the marine environment over the next 35 years could attract invertebrates that approach the structures during their migrations. This could slow migrations. Migratory animals would likely be able to proceed from structures unimpeded. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Presence of structures: Transmission cable infrastructure | Constructed and permitted OSW COP projects are introducing an estimated 498 miles of new offshore cable in the invertebrates GAA. The presence of transmission cable infrastructure, especially hard protection atop cables, causes impacts through entanglement/gear loss/damage, fish aggregation, and habitat conversion. | See other sub-IPFs within Presence of structures rows. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Discharges | Constructed and permitted OSW COP projects can potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris in the invertebrates GAA. The gradually increasing amount of vessel traffic is increasing the cumulative permitted discharges from vessels. Many discharges are required to comply with permitting standards established to ensure potential impacts on the environment are minimized or mitigated. However, there does not appear to be evidence that the volumes and extents have any impact on benthic resources. | There is the potential for new ocean dumping/dredge disposal sites in the Northeast. Impacts (disturbance, reduction in fitness) of infrequent ocean disposal to benthic resources are short term because spoils are typically recolonized naturally. In addition, the EPA has established dredge spoil criteria and it regulates the disposal permits issued by the USACE; these discharges are required to comply with permitting standards established to ensure potential impacts on the environment are minimized or mitigated. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Sediment deposition and burial | Ongoing sediment dredging for navigation purposes and installation of permitted OSW COP projects can result in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local and limited to the emplacement corridor. Sediment deposition could have adverse impacts on some benthic resources, especially eggs and larvae, including smothering and loss of fitness—particularly demersal eggs such as longfin squid, which are known to have high rates of egg mortality if egg masses are exposed to abrasion or burial. Impacts could vary based on season/time of year. Where dredged materials are disposed, benthic resources are smothered. However, such areas are typically recolonized naturally in the short term. Most sediment dredging projects have time-of-year restrictions to minimize impacts on benthic resources. Most benthic resources in the GAA are adapted to the turbidity and periodic sediment deposition that occur naturally in the GAA. | The USACE and/or private ports could undertake dredging projects periodically. Where dredged materials are disposed, benthic resources are buried. However, such areas are typically recolonized naturally in the short term. Most benthic resources in the GAA are adapted to the turbidity and periodic sediment deposition that occur naturally in the GAA. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7, and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| Vessel traffic | While ongoing OSW and non-OSW vessel activity could have some effect on behavior, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. | Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels, this is still a relatively small adjustment when considering the whole of New England vessel traffic. | **Offshore:** Construction and operational vessel traffic from future wind farm development and decommissioning would not be expected to measurably affect marine invertebrates and benthic habitat structure and composition. Although construction and O&M of vessel cooling systems could entrain planktonic eggs and larvae of fish and invertebrates, leading to injury or mortality of some individuals, these effects are not expected to be measurable relative to natural mortality rates, which can range from 1 to 10% per day or higher (White et al. 2014). Therefore, these effects are unlikely to be significant at the population level. Vessel traffic would have no measurable effects on benthic habitat and benthic or pelagic invertebrates aside from underwater noise exposure and vessel anchoring, which are addressed separately above. Therefore, vessel traffic effects on benthic habitat and invertebrates from the construction, O&M, and decommissioning of planned and potential future OSW energy projects would be **negligible** adverse relative to baseline conditions in the affected environment. | **Offshore:** Construction, O&M, and decommissioning of vessel cooling systems could entrain planktonic eggs and larvae of fish and invertebrates, leading to injury or mortality of individuals. However, these short-term effects are not expected to be measurable relative to natural mortality rates and are therefore unlikely to be significant at the population level. Therefore, vessel traffic effects on invertebrates and benthic habitat would be **negligible** adverse for all Project alternatives and configurations.<br>Although Alternatives C through F would decrease the total number of vessel trips and duration of vessel activity required for O&M and decommissioning relative to the Proposed Action, impacts would remain **negligible** adverse for all Project alternatives.<br>The construction and O&M of all Project alternatives and other planned and potential future OSW energy projects would require the use of construction and operational vessels. This would increase the number of vessels operating in the invertebrate GAA for the foreseeable future. However, vessel-related entrainment mortality is unlikely to be significant at the population level for any invertebrate species. Therefore, vessel traffic cumulative effects on benthic habitat and invertebrates in combination with other planned and potential future OSW energy projects would be **negligible** adverse relative to baseline conditions in the affected environment. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, vessel traffic effects on invertebrates and benthic habitat would be **negligible** adverse for all Project alternatives and configurations.<br>Although Alternative G would decrease the total number of vessel trips and duration of vessel activity required for O&M and decommissioning relative to the Proposed Action, impacts would remain **negligible** adverse for all Project alternatives.<br>Vessel traffic cumulative effects on benthic habitat and invertebrates in combination with other planned and potential future OSW energy projects would be **negligible** adverse relative to baseline conditions in the affected environment. |
| Climate change: Ocean acidification | Ongoing $CO_2$ emissions causing ocean acidification could contribute to reduced growth or the decline of benthic invertebrates that have calcareous shells, as well as reefs and other habitats formed by shells, over the course of the next 35 years. | No future activities were identified within the GAA other than ongoing activities. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |
| Climate change: Warming and sea level rise, altered habitat, ecology, | Climate change, influenced in part by ongoing GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the distributions of benthic species and altering ecological relationships, likely causing permanent | No future activities were identified within the GAA other than ongoing activities. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no | See Sections 3.6.2.4 through 3.6.2.7 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on |

| Associated IPFs: Sub-IFPs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| and migration patterns | changes of unknown intensity gradually over the next 35 years. | | measurable effect on benthic habitat or invertebrates and are not analyzed. | effect on benthic habitat or invertebrates and are not analyzed. | benthic habitat or invertebrates and are not analyzed. |
| Climate change: Warming and sea level rise, disease frequency | Climate change, influenced in part by ongoing GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the frequencies of various diseases of benthic species and likely causing permanent changes of unknown intensity over the next 35 years. | No future activities were identified within the GAA other than ongoing activities. | See Sections 3.6.2.2.2 and 3.6.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.4 through 3.6.2.7 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. | See Sections 3.6.2.8 and 3.6.2.9 and Section 3.6.2.1, Table 3.6-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed. |

* No constructed and permitted COP projects occur within the benthic habitat GAA. Four constructed and permitted COP projects occur within the invertebrates GAA: Block Island, SFWF, Vineyard Wind 1, and Coastal Virginia Offshore Wind.

## Finfish and Essential Fish Habitat

**Table E2-4. Summary of Activities and the Associated Impact-Producing Factors for Finfish and Essential Fish Habitat**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/hazmat | Constructed and permitted OSW COP projects can accidentally release an estimated 900,000 gallons of fuel, oils, or other hazardous materials in the GAA. See Table E1-4 for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Impacts, including mortality, decreased fitness, and contamination of habitat, are localized and temporary and rarely affect populations.<br>All vessels would comply with USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills. | Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. Impacts are unlikely to affect populations. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Accidental releases: Invasive species | Invasive species are periodically released accidentally during ongoing activities, including the discharge of ballast water and bilge water from marine vessels. The impacts on finfish and EFH depend on many factors, but can be widespread and permanent. | No future activities were identified within the GAA for this resource other than ongoing activities. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Anchoring | Constructed and permitted OSW COP projects are introducing an estimated 944 acres of anchoring in the GAA. This, combined with vessel anchoring related to other ongoing military use and survey, commercial, and recreational activities continues to cause temporary to permanent impacts in the immediate area where anchors and chains meet | Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. These impacts would include increased turbidity levels and potential for direct contact, causing mortality of benthic species and, possibly, degradation of sensitive | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | the seafloor. Impacts on finfish and EFH are greatest for sensitive EFH (e.g., eelgrass, hard bottom) and slow-moving species. | habitats. All impacts would be localized; turbidity would be temporary; impacts from direct contact would be recovered in the short term. Degradation of sensitive habitats such as certain types of hard bottom (e.g., boulder piles), if it occurs, could be long term. | | | would have no measurable effect on finfish or EFH and are not analyzed. |
| EMFs | Constructed and permitted OSW COP projects can generate EMF and substrate heating effects, altering the environment for finfish and benthic-associated EFH invertebrates.<br>EMFs also emanate continuously from installed telecommunication and electrical power transmission cables. Biologically significant impacts on finfish and EFH have not been documented for AC cables (CSA Ocean Sciences, Inc. and Exponent 2019; Thomsen et al. 2015), but behavioral impacts have been documented for benthic species (skates and lobster) near operating DC cables (Hutchison et al. 2018). The impacts are localized and affect the animals only while they are within the EMF. There is no evidence to indicate that EMF from undersea AC power cables negatively affects commercially and recreationally important fish species within the southern New England area (CSA Ocean Sciences, Inc. and Exponent 2019). | During operation, future new cables would produce EMF. (See table cell to the left.)<br>Submarine power cables in the GAA for this resource are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels. EMF of any two sources would not overlap (even for multiple cables within a single export cable corridor). Although the EMF would exist as long as a cable was in operation, impacts, on finfish and EFH would likely be difficult to detect. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Light: Vessels | Nighttime vessel activity associated with permitted and built OSW COP projects is occurring during installation and O&M of various project components (cables, substation etc.). Marine vessels have an array of lights, including navigational lights and deck lights. There is little downward-focused lighting and therefore only a small fraction of the emitted light enters the water. Light can attract finfish, potentially affecting distributions in a highly localized area. Light could also disrupt natural cycles (e.g., spawning), possibly leading to short-term impacts. | See table cell to the left. | Artificial light can attract finfish and can influence or disrupt biological functions (e.g., timing of cod spawning) (Rich and Longcore 2006) that are triggered by changes in daily and seasonal daylight cycles. Planned future activities include up to 3,088 offshore WTGs and OSS foundations. The construction and O&M of these structures would introduce new short-term and long-term sources of artificial light to the offshore environment in the form of vessel lighting and navigation and safety lighting on the structures, respectively. Orr et al. (2013) developed design and mitigation recommendations for reduction of biologically significant impacts from artificial light in OSW infrastructure. Based on these findings, BOEM (2021) has issued design guidance for avoiding and minimizing artificial lighting impacts from such activities and has concluded that adherence to these measures should effectively avoid adverse effects on fish. BOEM would require all future | **Offshore:** Artificial lighting during construction, O&M, and decommissioning at the RWF would be associated with navigational and deck lighting on vessels from dusk to dawn. Lighting would be hooded and directed downward to avoid unnecessary illumination of the surrounding environment to the extent practicable. Reaction of finfish, including EFH species, to this artificial light is highly species dependent and could include attraction and/or avoidance of the area. Artificial lighting could disrupt the migration patterns of fish, increase risk of predation and disrupt predator prey interactions, and alter species' richness and community composition in the affected area (Nightingale et al. 2006; Orr et al. 2013). However, these types of effects are most associated with bright permanent lights on nearshore and overwater structures. The Project would comply with BOEM (2021) issued design guidance for | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, lighting effects on finfish and EFH would be short term to long term **negligible** adverse for Alternative G, with reduced impacts under Alternatives G due to a decrease in total duration of construction vessel activity.<br>BOEM estimates a cumulative total of up to 3,155 offshore WTGs and OSS foundations for Alternative G plus all other future OSW projects in the finfish and EFH GAA. For reasons described in the preceding paragraph, the cumulative impacts associated with all Project alternatives when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse, mostly attributable to existing, ongoing activities. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | offshore energy projects to comply with this guidance. Given the minimal and localized nature of anticipated lighting impacts under this guidance, the related effects from proposed future activities on finfish and EFH in the GAA are likely to be **negligible** adverse. | avoiding and minimizing artificial lighting impacts. Therefore, lighting effects on finfish and EFH would be short term to long-term **negligible** adverse for the Proposed Action and Alternatives C through F, with reduced impacts under Alternatives C through F due to a decrease in total duration of construction vessel activity.<br>BOEM estimates a cumulative total of up to 3,183 offshore WTGs and OSS foundations for the Project plus all other future OSW projects in the finfish and EFH GAA. For reasons described in the preceding paragraph, the cumulative impacts associated with all Project alternatives when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse, mostly attributable to existing, ongoing activities. | |
| Light: Structures | Constructed and permitted OSW COP projects are introducing 83 lighted structures into the GAA. Offshore buoys and towers emit light, and onshore structures, including buildings and ports, emit a great deal more on an ongoing basis. Light can attract finfish, potentially affecting distributions in a highly localized area. Light could also disrupt natural cycles (e.g., spawning), possibly leading to short-term impacts. Light from structures is widespread and permanent near the coast but minimal offshore. | Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore. | See Light: Vessels for analysis. | See Light: Vessels for analysis of impacts. | See Light: Vessels for analysis of impacts. |
| New cable emplacement/ maintenance | Constructed and permitted OSW COP projects are introducing an estimated 498 miles of new offshore cable in the GAA. This and other non-OSW cable maintenance activities can disturb the seafloor and cause temporary increases in suspended sediment; these disturbances are local and limited to the cable corridor. New cables are infrequently added near shore. Cable emplacement/maintenance activities disturb, displace, and injure finfish and result in temporary to long-term habitat alterations. The intensity of impacts depends on the time (season) and place (habitat type) where the activities occur. (See also the IPF of Sediment deposition and burial.) | Future new cables would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in local short-term impacts.<br>The FCC has two pending submarine telecommunications cable applications in the North Atlantic. If the cable routes enter the GAA for this resource, short-term disturbance would be expected. The intensity of impacts would depend on the time (season) and place (habitat type) where the activities would occur. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Noise: Aircraft | Noise from aircraft reaches the sea surface on a regular basis. However, aircraft noise is not | Aircraft noise is likely to continue to increase as commercial air traffic increases. However, | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | likely to impact finfish and EFH, as very little of the aircraft noise propagates through the water. | aircraft noise is not likely to impact aircraft noise on finfish and EFH. | activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Noise: Onshore/Offshore construction | Noise from onshore construction associated with permitted OSW COP projects is occurring during installation of various project components (cables, substation etc.). Other noise from construction occurs frequently in nearshores of populated areas in New England and the Mid-Atlantic region but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. See also sub-IPF for Noise: Pile driving. | Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the GAA for this resource. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Noise: G&G and scientific surveys | Noise from G&G and scientific surveys associated with permitted OSW COP projects may occur in the GAA. Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb finfish in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions. | Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 35 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seafloor, potentially resulting in injury or mortality to finfish in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves more similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize, but are likely local and temporary. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Noise: O&M | Noise from O&M associated with built OSW COP projects may occur in the GAA. Some finfish and invertebrates could be able to hear the continuous underwater noise of operational WTGs. As measured at the BIWF, this low frequency noise barley exceeds ambient levels at 164 feet (50 m) from the WTG base. Based on the results of Thomsen et al. (2015), sound pressure levels would be expected to be at or below ambient levels at relatively short distances (approximately 164 feet [50 m]) from WTG foundations. These low levels of elevated noise likely have little to no impact. | New or expanded marine minerals extraction and commercial fisheries could intermittently increase noise during their O&M over the next 35 years. Impacts would likely be small and local. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | Noise is also created by O&M of marine minerals extraction and commercial fisheries, each of which has small local impacts. | | | | |
| Noise: Pile driving | Noise from pile driving associated with permitted OSW COP projects is occurring during installation of foundations for offshore structures. Noise from pile driving also occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or the seafloor can cause injury and/or mortality to finfish in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. Eggs, embryos, and larvae of finfish and invertebrates could also experience developmental abnormalities or mortality resulting from this noise, although thresholds of exposure are not known (Hawkins and Popper 2017; Weilgart 2018). Potentially injurious noise could also be considered as rendering EFH temporarily unavailable or unsuitable for the duration of the noise. The extent depends on pile size, hammer energy, and local acoustic conditions. | No future activities were identified within the GAA for this resource other than ongoing activities. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Noise: Cable laying/ trenching | Noise from trenching/cable laying associated with permitted OSW COP projects may occur in the GAA. Infrequent trenching activities for other pipeline and cable laying, as well as other cable burial methods, also emit noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension. | New or expanded submarine cables and pipelines are likely to occur in the GAA for this resource. These disturbances would be infrequent over the next 35 years, temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Noise: Vessels | While ongoing OSW and non-OSW vessel noise could have some effect on behavior and masking, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this sub-IPF include permitted and construction OSW COP projects, commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. | See table cell to the left. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Port utilization: Expansion | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the | Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is | The development of an OSW industry on the Mid-Atlantic OCS could incentivize the expansion or improvement of regional ports | **Offshore:** Several regional ports could be used during Project construction, including ports in Baltimore, MD; New Bedford, MA; | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, Project-specific |

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| | United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 35 years. | expected to continue as human population increases. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future. In addition, the general trend along the coast from Virginia to Maine is that port activity would increase modestly. The ability of ports to receive the increase could require port modifications, leading to local impacts.<br>Future channel-deepening activities would likely be undertaken. Existing ports have already affected finfish and EFH, and future port projects would implement BMPs to minimize impacts. Although the degree of impacts on EFH would likely be undetectable outside the immediate vicinity of the ports, adverse impacts on EFH for certain species and/or life stages could lead to impacts on finfish and EFH beyond the vicinity of the port. | to support planned and future projects. Activities like dredging and the expansion or development of new overwater structures could lead to adverse effects on finfish, including EFH species, and coastal and estuarine habitats. Resulting effects on finfish would vary depending on the types of species and habitats present. However, the nature and extent of these impacts cannot currently be quantified as no specific port improvement activities have been proposed. All future port improvements would be subject to independent environmental permitting and regulatory review. Any resulting effects on finfish would be evaluated as part of those efforts. Therefore, impacts to finfish and EFH would be **negligible** adverse. | New London, CT; Norfolk, VA; Paulsboro, NJ; and Providence, RI, as well as Europe. The development of an OSW industry on the Mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Port improvements could include activities like dredging and the development of new overwater structures that could adversely affect finfish and EFH within the GAA, but no specific improvements are included in the Proposed Action and Alternatives C through F. Any future port expansion would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential environmental effects.<br>Therefore, Project-specific and cumulative port utilization impacts would be **negligible** adverse. | and cumulative port utilization impacts would be **negligible** adverse. |
| Presence of structures: Entanglement, gear loss, gear damage | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb habitats and potentially harm individuals, creating small localized, short- to long-term impacts. | No future activities were identified within the GAA for this resource other than ongoing activities. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Presence of structures: Hydrodynamic disturbance | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Human-made structures, especially tall vertical structures such as foundations for towers of various purposes, continuously alter local water flow at a fine scale. Water flow typically returns to background levels within a relatively short distance from the structure. Therefore, impacts on finfish and EFH are typically undetectable. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood. New structures are periodically added. | Tall vertical structures can increase seafloor scour and sediment suspension. Impacts would likely be highly localized and difficult to detect. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Presence of structures: Fish aggregation | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly sandy seascape. | New cables, installed incrementally in the GAA for this resource over the next 20 to 35 years, would likely require hard protection atop portions of the route (see the New cable emplacement/maintenance IPF). Any new towers, buoys, or piers would also create | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities |

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| | Structure-oriented fishes are attracted to these locations. These impacts are local and often permanent. Fish aggregation could be considered adverse, beneficial, or neutral. | uncommon relief in a mostly sandy seascape. Structure-oriented fishes could be attracted to these locations. Abundance of certain fishes could increase. These impacts are local and could be permanent. | measurable effect on finfish or EFH and are not analyzed. | onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | would have no measurable effect on finfish or EFH and are not analyzed. |
| Presence of structures: Habitat conversion | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly sandy seascape. A large portion is homogeneous sandy seascape, but there is some hard-bottom and/or complex habitat; structure-oriented species thus benefit on a constant basis. Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat. | New cable, installed incrementally in the GAA over the next 20 to 35 years, would likely require hard protection atop portions of the route (see New cable emplacement/maintenance row). Any new towers, buoys, or piers would also create uncommon relief in a mostly sandy seascape. Structure-oriented species would benefit (Claisse et al. 2014; Smith et al. 2016). Soft bottom is the dominant habitat type from Cape Hatteras to the Gulf of Maine (over 60 million acres), and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010). | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Presence of structures: Migration disturbances | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Human-made structures in the marine environment (e.g., shipwrecks, artificial reefs, and oil platforms), can attract finfish that approach the structures during their migrations. This could slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement (Fabrizio et al. 2014; Moser and Shepherd 2009; Secor et al. 2018). There is no evidence to suggest that structures pose a barrier to migratory animals. | The infrequent installation of future new structures in the marine environment over the next 35 years could attract finfish that approach the structures during their migrations. This could tend to slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement (Fabrizio et al. 2014; Moser and Shepherd 2009; Secor et al. 2018). Migratory animals would likely be able to proceed from structures unimpeded. | See Section 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Presence of structures: Transmission cable infrastructure | See other sub-IPFs within the Presence of structures IPF. | See other sub-IPFs within the Presence of structures IPF | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Sediment deposition and burial | Ongoing sediment dredging for navigation purposes and installation of permitted OSW COP projects can result in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local and limited to the emplacement corridor. Sediment | No future activities were identified within the GAA for this resource other than ongoing activities. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | deposition could have negative impacts on eggs and larvae, including smothering and loss of fitness. Impacts could vary based on season/time of year. | | | | would have no measurable effect on finfish or EFH and are not analyzed. |
| Vessel traffic | Ongoing OSW and non-OSW activities that contribute to this IPF include permitted and constructed OSW COP projects, commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel impacts are largely associated with noise, as discussed above. | Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels, this is still a relatively small adjustment when considering the whole of New England vessel traffic. Vessel traffic is expected to continue at or near current levels. | Construction and O&M vessel cooling systems could entrain planktonic fish eggs and larvae, leading to injury or mortality of some finfish, including EFH individuals. However, these effects are not expected to be measurable relative to natural mortality rates, which can range from 1 to 10% per day or higher (White et al. 2014) and are therefore unlikely to be significant at the population level. Therefore, vessel traffic effects on finfish and EFH from the construction, O&M, and decommissioning of planned and potential future OSW energy projects would be **negligible** adverse relative to baseline conditions in the affected environment. | Vessels used for Project construction, O&M, and decommissioning could entrain planktonic finfish eggs and larvae in their cooling systems, leading to injury or mortality of individuals. However, these effects are not expected to be measurable relative to natural mortality rates and are therefore unlikely to be significant at the population level. Therefore, vessel traffic effects on finfish and EFH from Project construction, O&M, and decommissioning would be **negligible** adverse.<br>The construction and O&M of the Proposed Action and Alternatives C through F and other planned and potential future OSW energy projects would require the use of construction and operational vessels. This would increase the number of vessels operating in the finfish and EFH GAA for the foreseeable future. While the number of vessels operating in the GAA is large, the number of individual eggs and larvae exposed to entrainment-related mortality effects from individual vessels is negligible relative to natural mortality rates. Therefore, vessel traffic cumulative effects on finfish and EFH from the construction, O&M, and decommissioning of the Proposed Action and Alternatives C through F in combination with other planned and potential future OSW energy projects would be **negligible** adverse relative to baseline conditions in the affected environment. | Similar impacts to the Proposed Action and Alternatives C through F. Therefore, vessel traffic effects on finfish and EFH from Project construction, O&M, and decommissioning would be **negligible** adverse.<br>Vessel traffic cumulative effects on finfish and EFH from the construction, O&M, and decommissioning of Alternatives G in combination with other planned and potential future OSW energy projects would be **negligible** adverse relative to baseline conditions in the affected environment. |
| Climate change: Ocean acidification | Continuous carbon dioxide emissions causing ocean acidification could contribute to reduced growth or the decline of finfish and EFH over the course of the next 35 years. | No future activities were identified within the GAA for this resource other than ongoing activities. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Climate change: Warming and sea | Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters over the | See above. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| level rise, altered habitat/ ecology | next 35 years, influencing the distributions of finfish and EFH. This sub-IPF has been shown to affect the distribution of fish in the northeast United States, with several species shifting their centers of biomass either northward or to deeper waters (Hare et al. 2016). | | marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Climate change: Warming and sea level rise, altered migration patterns | See above. | See above. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |
| Climate change: Warming and sea level rise, disease frequency | Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 35 years, influencing the frequencies of various diseases of finfish. | See above. | See Sections 3.13.2.2.2 and 3.13.2.3.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.4 through 3.13.2.7 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. | See Sections 3.13.2.8 through 3.13.2.9 and Section 3.13.2.1, Table 3.13-3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed. |

*Includes all constructed and permitted COP projects within the finfish and EFH GAA: Block Island, SFWF, Vineyard Wind 1, and Coastal Virginia Offshore Wind.

## Marine Mammals

**Table E2-5. Summary of Activities and the Associated Impact-Producing Factors for Marine Mammals**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/hazmat | Constructed and permitted OSW COP projects can accidentally release an estimated 900,000 gallons of fuel, oils, or other hazardous materials in the GAA. See Table E1-4 for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Marine mammal exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality or sublethal effects on individual fitness, including adrenal effects, hematological effects, liver effects lung disease, poor body condition, skin lesions, and several other health affects attributed to oil exposure (Kellar et al. 2017; Mazet et al. 2001; Mohr et al. 2008; Smith et al. 2017; Sullivan et al. 2019; Takeshida et al. 2017). | Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases described for ongoing activities. | **Offshore:** BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100–220 (101 Stat. 1458)). Baulch and Perry (2014) identified ingested debris as the likely cause of mortality in 22% of beached marine mammal carcasses. Approximately 50% of marine mammal species worldwide have been documented ingesting marine litter (Werner et al. 2016). While development of future OSW facilities and associated marine | **Offshore:** Construction vessels and offshore structures pose a theoretical source of marine debris and entanglement risk and accidental discharges of petroleum products and other toxic substances. Marine debris is a known source of adverse effects to marine mammals (Laist 1997; NOAA-MDP 2014a, 2014b). Revolution Wind would follow strict oil spill prevention and response procedures during all Project phases; would comply with all debris and pollution requirements; and has developed a detailed spill response and containment plan as a Project EPM. These regulatory requirements and the EPM would effectively avoid releases of abandoned marine debris and would avoid and minimize | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, effects on marine mammals from this impact mechanism would be **negligible** adverse for Alternative G.<br>The risk to marine mammals from trash and debris from Alternative G in combination with those from other planned and potential future activities would be **negligible** adverse. Moreover, Alternative G would similarly include the inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. These would provide a **minor** benefit by removing potentially harmful marine debris from the environment. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | Additionally, accidental releases could result in impacts on marine mammals due to effects to prey species (see Table E2-4). All vessels would comply with USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills. | | vessels could be a source of accidental releases of trash and debris, BOEM and USCG requirements would effectively avoid and minimize impacts such that the resulting effects to marine mammals would be **negligible** adverse.<br>BOEM also requires applicants to develop spill response and containment plans to quickly address accidental spills of fuels, lubricants, and other contaminants. A total of approximately 34 million gallons of coolants, fuels, oils, and lubricants could be stored within WTG foundations and OSSs across all projected OSW projects along the Atlantic Coast. A large spill of toxic materials (fuels, lubricants, and other contaminants) could potentially injure or kill several individual marine mammals and adversely affect habitat suitability and would require extensive mitigation to offset. All future OSW projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and the BSEE. Oil spill response plans are required for each project and would provide for rapid spill response, cleanup, and other measures that would help to minimize potential impact on affected resources. Given the low probability of a large spill event, impacts to marine mammals from this IPF are likely to be **negligible** adverse. | impacts from accidental spills such that adverse effects on marine mammals are unlikely to occur. In the unlikely event that an accidental spill should occur, individual marine mammals could be injured or killed; habitat suitability could be adversely affected; and extensive mitigation would be required. However, due to the low likelihood of such an event, the temporary nature of the impacts, and established EPMs, effects on marine mammals from this impact mechanism would be **negligible** adverse for the Proposed Action and Alternatives C through F.<br>Existing and planned future OSW-energy development could result in the accidental release of water quality contaminants or trash/debris, which could theoretically lead to an increase in debris and pollution in the marine mammal GAA (see Section 3.15.1 for characterization of existing marine pollution conditions). Compliance with debris and pollution requirements would effectively minimize releases of trash and debris. Given these restrictions, the risk to marine mammals from trash and debris from the Proposed Action and Alternatives C through F in combination with those from other planned and potential future activities is **negligible** adverse. Moreover, the Proposed Action and Alternatives C through F would similarly include the inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a **minor** benefit by removing potentially harmful marine debris from the environment. | |
| Accidental releases: Trash and debris | Constructed and permitted OSW COP projects can potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris in the GAA. Trash and debris could also be accidentally discharged through fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey activities; and cable, line, and pipeline laying, and debris carried in river outflows or windblown from onshore. Accidental releases of trash and | As population and vessel traffic increase gradually over the next 35 years, accidental release of trash and debris could increase. Trash and debris could continue to be accidentally released through fisheries use and other offshore and onshore activities. There could also be a long-term risk from exposure to plastics and other debris in the ocean. Worldwide, 62 of 123 (50.4%) of marine mammal species have been documented ingesting marine litter (Werner et al. 2016). Mortality has been documented | See Accidental releases: Fuel/fluids/hazmat for analysis. | See Accidental releases: Fuel/fluids/hazmat for analysis. | See Accidental releases: Fuel/fluids/hazmat for analysis. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | debris are expected to be low quantity, local, and low-impact events. Worldwide, 62 of 123 (50.4%) marine mammal species have been documented ingesting marine litter (Werner et al. 2016). Stranding data indicate potential debris induced mortality rates of 0 to 22%. Mortality has been documented in cases of debris interactions as well as blockage of the digestive tract, disease, injury, and malnutrition (Baulch and Perry 2014). However, it is difficult to link physiological effects to individuals to population-level impacts (Browne et al. 2015).<br>All vessels would adhere to federal, state, and local regulations regarding disposal of solid and liquid wastes. | in cases of debris interactions, as well as blockage of the digestive tract, disease, injury, and malnutrition (Baulch and Perry 2014). | | | |
| EMFs | Constructed and permitted OSW COP projects can generate EMF and substrate heating effects, altering the environment for marine mammals.<br>EMFs also emanate constantly from installed telecommunication and electrical power transmission cables. Marine mammals appear to have a detection threshold for magnetic intensity gradients (i.e., changes in magnetic field levels with distance) of 0.1% of the Earth's magnetic field or about 0.05 µT (Kirschvink 1990) and are thus likely to be very sensitive to minor changes in magnetic fields (Walker et al. 2003). There is a potential for animals to react to local variations of the geomagnetic field caused by power cable EMFs. Depending on the magnitude and persistence of the confounding magnetic field, such an effect could cause a trivial temporary change in swim direction or a longer detour during the animal's migration (Gill et al. 2005). Such an effect on marine mammals is more likely to occur with DC cables than with AC cables (Normandeau Associates, Inc. et al. 2011). However, there are numerous transmission cables installed across the seafloor, and no impacts on marine mammals have been demonstrated from this source of EMF. | During operation, future new cables would produce EMF.<br>Submarine power cables in the marine mammal GAA are assumed to be installed with appropriate shielding and at a sufficient burial depth to reduce potential EMF to low levels. EMF of any two sources would not overlap. Although the EMF would exist as long as a cable was in operation, impacts, if any, would likely be difficult to detect, if they occur at all. Marine mammals have the potential to react to submarine cable EMF; however, no effects from the numerous submarine cables have been observed. Further, this IPF would be limited to extremely small portions of the areas used by migrating marine mammals. As such, exposure to this IPF would be low, and as a result, impacts on marine mammals would not be expected. | **Offshore:** Under the No Action Alternative, up to 13,469 miles of cable would be added in the GAA, producing EMF in the immediate vicinity of each cable during operations. BOEM anticipates that the proposed offshore energy projects would use HVAC transmission, but HVDC designs are possible and could occur.<br>EMF effects on marine mammals from these future projects would vary in extent and magnitude depending on overall cable length, the proportion of buried vs. exposed cable segments, and project-specific transmission design (e.g., HVAC or HVDC, transmission voltage, etc.). However, measurable EMF effects are generally limited to within inches to tens of feet of cable corridors, and standard design guidance for OSW energy transmission cable installation (i.e., avoiding cable crossings and maintaining a minimum separation) would limit additive EMF effects from adjacent cables. BOEM would additionally require these future submarine power cables to have appropriate shielding and be at a sufficient burial depth to minimize potential EMF effects from cable operations.<br>At least seven existing submarine power and communications cables are present in the vicinity of the RI/MA WEA. These cables would presumably continue to operate and generate EMF effects under the No Action Alternative. While the type and capacity of | **Offshore:** Exponent (2023) modeled EMF levels that could be generated by the RWEC, OSS-link cable, and IACs. They estimated induced magnetic field levels ranging from 147 to 1,071 mG on the bed surface above the buried and exposed RWEC and OSS-link cable and 57 to 522 mG above the IACs (see the EMF summary table in Sections 3.6.2.4.2 and 3.6.2.7.2). Induced field strength would decrease rapidly with distance from the source, dropping below 100 mG within 3.3 feet of the seafloor directly above the cables. Induced magnetic field strength would fall effectively to 0 mG within 25 feet of the centerline of each cable segment. The only exception would occur at the RWEC landing location, where the two cable corridors would approach to within 10 feet. Measurable magnetic field effects would extend between 25 to 50 feet from the outer edge of the combined cable path.<br>The magnetic field effects generated by exposed segments of the IAC, RWEC, and OSS-link cable are comparable in magnitude to the Earth's natural magnetic field, which is on the order of 517 mG within the RWF. Background magnetic field conditions would fluctuate by 1 to 10 mG from the natural field effects produced by waves and currents. The maximum induced electrical field experienced by any organism close to the exposed cable would be no greater than 0.7 mV/m | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, EMF effects on marine mammals would be **negligible** adverse under Alternative G.<br>Due to the reduced total length of IAC under Alternative G as compared to the Proposed Action, the EMF effects under Alternative G would be similar in nature but proportionally less than under the Proposed Action.<br>Cumulative EMF effects on marine mammals resulting from Alternative G combined with existing, planned, and reasonably foreseeable activities would be **negligible** adverse due to the localized nature of effects and limited anticipated exposure. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | those cables is not specified, the associated baseline EMF effects can be inferred from available literature. Electrical telecommunications cables are likely to induce a weak EMF on the order of 1 to 6.3 µV/m within 3.3 feet (1 m) of the cable path (Gill et al. 2005). Fiber-optic communications cables with optical repeaters would not produce EMF effects. Additionally, literature suggests that most marine species cannot sense low-intensity electric or magnetic fields generated by the HVAC power transmission cables commonly used in OSW energy projects (Gill et al. 2005; Kilfoyle et al. 2018). EMF effects from continued operations of existing submarine power cables would produce similar **negligible** adverse effects on marine mammals for the duration of cable operations because of the localized nature of the effects and limited anticipated exposure. | (Exponent 2023). BOEM has conducted literature reviews and analyses of potential EMF effects from offshore renewable energy projects (CSA Ocean Sciences Inc. and Exponent 2019; Inspire Environmental 2019; Normandeau et al. 2011). These and other available reviews and studies (Gill et al. 2005; Kilfoyle et al. 2018) suggest that most marine species cannot sense low-intensity electric or magnetic fields generated by the HVAC power transmission cables commonly used in OSW energy projects. Normandeau et al. (2011) concluded that marine mammals are unlikely to detect magnetic field intensities below 50 mG, suggesting that these species would be insensitive to EMF effects from Project electrical cables. Project-related EMFs would drop below this threshold and would become undetectable within 3.3 feet (1 m) of the seafloor, except for RWEC cable segments lying on the bed surface. The area exposed to magnetic field effects greater than 50 mG would be small, extending less than 5 feet above the bed surface immediately over the exposed cable segment. The 50-mG detection threshold is theoretical and an order of magnitude lower than the lowest observed magnetic field strength resulting in observed behavioral responses (Normandeau et al. 2011). These factors indicate that the likelihood of marine mammals encountering detectable EMF effects is low, and any exposure would be below levels associated with measurable biological effects.<br>Therefore, EMF effects on marine mammals would be **negligible** adverse under the Proposed Action and Alternatives C through F.<br>Due to the reduced total length of IAC under Alternatives C through F as compared to the Proposed Action, the EMF effects under Alternatives C through F would be similar in nature but proportionally less than under the Proposed Action. Due to the higher capacity of the turbines in Alternative F, there is potential for greater operational noise impacts around each individual turbine, although specifics of these impacts are not certain. | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | BOEM anticipates that most planned facilities would use HVAC transmission, but some could use HVDC. BOEM would require all future projects to use cable designs and EPMs to minimize EMF impacts on the environment. While the range of EMF impacts would vary by project, they are expected to be similar in magnitude to those described for the Proposed Action. Standard design practices for offshore energy cables would avoid cable crossings and maintain a minimum separation of several hundred feet between parallel cable paths where practicable (CSRIC 2014; Sharples 2011; TÜV SÜD PMSS 2014). This would minimize additive EMF effects from multiple cables. On this basis, cumulative EMF effects on marine mammals resulting from the Proposed Action and Alternatives C through F combined with existing, planned, and reasonably foreseeable activities would be **negligible** adverse due to the localized nature of effects and limited anticipated exposure. | |
| Bycatch | Bycatch is a significant population stressor for smaller cetaceans and pinnipeds. NOAA examined the bycatch of 10 species of cetaceans and pinnipeds from the Mid-Atlantic bottom trawl fishery. Mean annual serious injury and mortality estimates for eight of the 10 species were below their potential biological removal (PBR) levels. Bycatch occurs in various gillnet and trawl fisheries in New England and the Mid-Atlantic Coast, with hotspots driven by marine mammal density and fishing intensity (Lewison et al. 2014; NMFS 2018a). | No future activities were identified within the marine mammal GAA other than ongoing activities. | A range of monitoring activities have been proposed to evaluate the short-term and long-term effects of existing and planned OSW development on biological resources and are also likely for future wind energy projects on the OCS. Some of these monitoring activities are likely to affect marine mammals through the potential for bycatch and/or injury by sample collection gear. Biological monitoring uses the same types of methods and equipment employed in commercial fisheries, meaning that impacts would be similar in nature but reduced in extent in comparison impacts from current and likely future fishing activity. Monitoring activities are commonly conducted by commercial fishers under contract who would otherwise be engaged in fishing activity. As such, research and monitoring activities related to OSW would not necessarily result in an increase in bycatch-related impacts on marine mammals, although the distribution of those impacts could change. Therefore, any bycatch-related impacts on marine mammals would be **negligible** to **minor** adverse and short term in duration. | Revolution Wind is proposing to implement the FRMP as part of the Proposed Action and Alternatives C through F (Revolution Wind and Inspire Environmental 2022). The FRMP employs a variety of survey methods to evaluate the effect of RWF construction and operation on benthic habitat structure and composition and on marine species. The following survey methods could impact marine mammals:<br>Ventless trap surveys to evaluate changes in the distribution and abundance of lobster and Jonah crab in the RWF and adjacent reference areas and Jonah crab, lobster, whelk (Buccinidae), and finfish along the RWEC corridor and adjacent reference areas; these areas would be surveyed 12 times per month for 7 months each for 2 years prior to and at least 2 years following completion of Project construction (4 years total)<br>Otter trawl surveys to assess abundance and distribution of target fish and invertebrate species within the RWF could impact a variety of invertebrate species as bycatch, four times per year for 2 years prior to and at least 2 | Similar impacts to Alternatives B through F. Therefore, impacts on marine mammals are anticipated to be **negligible** adverse. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | years following completion of Project construction.<br>These surveys involve similar methods to and would complement other survey efforts conducted by various state, federal, and university entities supporting regional fisheries research and management.<br>Survey fisheries gear (otter trawl surveys, ventless traps, and the anchoring lines and buoys used to secure acoustic telemetry equipment) could pose an entanglement risk to marine mammals. Post-ROD ventless trap surveys would employ ropeless gear retrieval technologies that are consistent with recommendations from NMFS. This would eliminate static vertical lines and surface buoys that are a primary source of gear-related entanglement risk for marine mammals. For trawl surveys, large whale species have the speed and maneuverability to avoid oncoming mobile gear (NMFS 2016), and due to the few proposed trawl surveys and short tow times, impacts on marine mammals are anticipated to be **negligible** adverse.<br>Acoustic telemetry receiver systems pose a negligible risk of harm to marine mammals. Based on the type of equipment and the fact that a small number of receivers deployed (up to 19 total) would be distributed over a large area, BOEM considers the effects of this Project element on marine mammals to be negligible. Similarly, moored and autonomous PAM systems would use the best available technology to reduce any potential risks of entanglement. PAM system deployment would avoid and minimize impacts. Therefore, the effects of this type of survey equipment on marine mammals would be **negligible** adverse. | |
| Light | Constructed and permitted OSW COP projects are introducing 83 lighted structures into the GAA, as well as lighted vessels. Light sources include marine vessels; offshore buoys and towers; and onshore structures, such as buildings and ports. Onshore structures emit a great deal of light on an ongoing basis, greater than offshore structures. Marine | Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore. | **Offshore:** The addition of up to 3,088 new offshore structures in the GAA with long-term hazard and aviation lighting, as well as lighting associated with construction vessels, would increase artificial lighting. Orr et al. (2013) concluded that the operational lighting effects from wind farm facilities to marine mammal distribution, behavior, and habitat | **Offshore:** Construction of the RWF and RWEC would introduce mobile and intermittent artificial light sources on construction vessels. The RWF would also introduce stationary artificial light sources in the form of navigation, safety, and work lighting. Revolution Wind would follow BOEM (2021) guidance for construction and structural | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, BOEM anticipates that short- to long-term lighting effects from RWF and RWEC construction, operations, and decommissioning on marine mammals would be **negligible** adverse for Alternative G. The effects of this IPF would be similar under |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | vessels have an array of lights, including navigational lights and deck lights. There is little downward-focused lighting and therefore only a small fraction of the emitted light enters the water. Light can attract finfish and invertebrates, potentially affecting distributions in a highly localized area. Light could also disrupt natural cycles (e.g., spawning), possibly leading to short-term impacts. | | use were uncertain but likely negligible if recommended design and operating practices are implemented. BOEM (2021) would require wind farm developers to comply with current design guidance for avoiding and minimizing artificial lighting effects. On this basis, BOEM anticipates artificial lighting impacts from future wind farm development and other offshore activities would result in **negligible** adverse effects on marine mammals for the duration of the offshore activity. | lighting and would use only the minimum type and amount of lighting required by regulation (see Table F-1 in Appendix F). Therefore, BOEM anticipates that short- to long-term lighting effects from RWF and RWEC construction, operations, and decommissioning on marine mammals would be **negligible** adverse for the Proposed Action. The effects of this IPF would be similar under Alternatives C through F but reduced in extent and to the duration of construction activities.<br>The Proposed Action when combined with planned future activities would develop up to 3,183 offshore WTGs and OSS foundations in the GAA. The construction and O&M of these structures would introduce new short-term and long-term sources of artificial light to the offshore environment in the form of vessel lighting and navigation and safety lighting on the structures, respectively. Given the minimal and localized nature of anticipated lighting effects, the cumulative effects from the Proposed Action and Alternatives C through F and existing and planned future activities on marine mammals would be **negligible** adverse, mostly attributable to existing, ongoing activities. | Alternatives C through F but reduced in extent and to the duration of construction activities.<br>Alternative G, when combined with planned future activities, would develop up to 3,155 offshore WTGs and OSS foundations in the GAA. Cumulative effects from Alternative G and existing and planned future activities on marine mammals would be **negligible** adverse, mostly attributable to existing, ongoing activities. |
| New cable emplacement/ maintenance | Constructed and permitted OSW COP projects are introducing an estimated 498 miles of new offshore cable in the GAA. This and other non-OSW cable maintenance activities can disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances would be local and generally limited to the emplacement corridor. Data are not available regarding marine mammal avoidance of localized turbidity plumes; however, Todd et al. (2015) suggest that since some marine mammals often live in turbid waters and some species of mysticetes and sirenians employ feeding methods that create sediment plumes, some species of marine mammals have a tolerance for increased turbidity. Similarly, McConnell et al. (1999) documented movements and foraging of grey seals in the North Sea. One tracked individual was blind in both eyes but otherwise healthy. Despite being blind, | The FCC has two pending submarine telecommunication cable applications in the North Atlantic. The impact on water quality from accidental sediment suspension during cable emplacement is temporary and short term. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any negative impacts would be temporary and short term. Turbidity associated with increased sedimentation could result in temporary, short-term impacts on some marine mammal prey species (see Table E2-4). | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | observed movements were typical of the other study individuals, indicating that visual cues are not essential for grey seal foraging and movement (McConnell et al. 1999). If elevated turbidity caused any behavioral responses such as avoiding the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be temporary and short term. Turbidity associated with increased sedimentation could result in temporary, short-term impacts on marine mammal prey species (see Table E2-4). | | | | |
| Noise: Aircraft | Aircraft routinely travel in the marine mammal GAA. With the possible exception of rescue operations, no ongoing aircraft flights would occur at altitudes that would elicit a response from marine mammals. If flights are at a sufficiently low altitude, marine mammals could respond with behavioral changes, including short surface durations, abrupt dives, and percussive behaviors (i.e., breaching and tail slapping) (Patenaude et al. 2002). These brief responses would be expected to dissipate once the aircraft has left the area. Similarly, aircraft have the potential to disturb hauled out seals if aircraft overflights occur within 2,000 feet (610 m) of a haul out area (Efroymson et al. 2000). However, this disturbance would be temporary, short term, and result in minimal energy expenditure. These brief responses would be expected to dissipate once the aircraft has left the area. | Future low-altitude aircraft activities such as surveys and navy training operations could result in short-term responses of marine mammals to aircraft noise. If flights are at a sufficiently low altitude, marine mammals could respond with behavior changes, including short surface durations, abrupt dives, and percussive behaviors (i.e., breaching and tail slapping) (Patenaude et al. 2002). These brief responses would be expected to dissipate once the aircraft has left the area. | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |
| Noise: G&G | Noise from G&G surveys associated with permitted OSW COP projects may occur in the GAA. Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities have the potential to result in high-intensity, high-consequence impacts, including auditory injuries, stress, disturbance, and behavioral responses, if present within the ensonified area (NOAA 2018). Survey protocols and underwater noise mitigation procedures are typically implemented to decrease the potential for any marine mammal to be | Same as ongoing activities, with the addition of possible future oil and gas exploration surveys. | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | within the area where sound levels are above relevant harassment thresholds associated with an operating sound source to reduce the potential for behavioral responses and injury (PTS/TTS) close to the sound source. The magnitude of effects, if any, is intrinsically related to many factors, including acoustic signal characteristics, behavioral state (e.g., migrating), biological condition, distance from the source, duration and level of the sound exposure as well as environmental and physical conditions that affect acoustic propagation (NOAA 2018). | | | | |
| Noise: Turbines | Noise from turbine operation associated with permitted and built OSW COP projects occurs in the GAA. Marine mammals would be able to hear the continuous underwater noise of operational WTGs. As measured at the BIWF, this low frequency noise barely exceeds ambient levels at 164 feet (50 m) from the WTG base. Based on the results of Thomsen et al. (2015) and Kraus et al. (2016), sound pressure levels would be expected to be at or below ambient levels at relatively short distances from the WTG foundations. | This sub-IPF does not apply to future non-OSW development. | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |
| Noise: Pile driving | Noise from pile driving associated with permitted OSW COP projects is occurring during installation of foundations for offshore structures. Noise from pile driving also occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seafloor can result in high-intensity, low-exposure level, long-term but localized, intermittent risk to marine mammals. Impacts would be localized in nearshore waters. Pile-driving activities could negatively affect marine mammals during foraging, orientation, migration, predator detection, social interactions, or other activities (Southall et al. 2007). Noise exposure associated with pile-driving activities can interfere with these functions and have the potential to cause a range of responses, including insignificant behavioral changes, avoidance of the ensonified area, PTS, harassment, and ear injury, depending on the intensity and duration of the exposure. | No future activities were identified within the marine mammal GAA other than ongoing activities. | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |

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| | BOEM assumes that all ongoing and potential future activities would be conducted in accordance with a project-specific IHA to minimize impacts on marine mammals. | | | | |
| Noise: Cable laying/trenching | N/A | Cable laying impacts resulting from future non-OSW activities would be identical to those described for future OSW projects. | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |
| Noise: Vessels | Ongoing OSW and non-OSW activities that contribute to this sub-IPF include permitted and built OSW COP projects, commercial shipping, recreational, and fishing vessels; scientific and academic research vessels; and other construction vessels. The frequency range for vessel noise falls within marine mammals' known range of hearing and would be audible. Noise from vessels presents a long-term and widespread impact on marine mammals across most oceanic regions. While vessel noise could have some effect on marine mammal behavior, it would be expected to be limited to brief startle and temporary stress response. Results from studies on acoustic impacts from vessel noise on odontocetes indicate that small vessels at a speed of 5 knots in shallow coastal water can reduce the communication range for bottlenose dolphins within 164 feet (50 m) of the vessel by 26% (Jensen et al. 2009). Pilot whales in a quieter deep-water habitat could experience a 50% reduction in communication range from a similar size boat and speed (Jensen et al. 2009). Since lower frequencies propagate farther away from the sound source compared to higher frequencies, low-frequency cetaceans are at a greater risk of experiencing Level B harassment produced by vessel traffic. | Any offshore projects that require the use of ocean vessels could result in long term but infrequent impacts on marine mammals, including temporary startle responses, masking of biologically relevant sounds, physiological stress, and behavioral changes. However, BOEM expects that these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of marine mammals and no stock or population-level effects would be expected. | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |
| Port utilization: Expansion | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing | Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia | The development of an OSW industry on the Mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Port improvements could lead to an increase in vessel traffic during construction (see Section | Several regional ports could be used during Project construction, including ports in Baltimore, MD; New Bedford, MA; New London, CT; Norfolk, VA; Paulsboro, NJ; and Providence, RI, as well as Europe. The development of an OSW industry on the Mid- | Similar impacts to the Proposed Action and Alternatives C through F. Therefore, port utilization impacts associated with the Project would be **negligible** adverse under all Project alternatives. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | continual upgrades and maintenance. Port expansion activities are localized to nearshore habitats and are expected to result in temporary, short-term impacts, if any, on marine mammals. Vessel noise could affect marine mammals, but the response would be expect to be temporary and short term (see Vessels: Noise sub-IPF above). The impacts on water quality from sediment suspension during port expansion activities is temporary, short term and would be similar to those described under the New cable emplacement/maintenance IPF above. | to Maine is that port activity would increase modestly. The ability of ports to receive the increase in larger ships would require port modifications. Future channel-deepening activities are being undertaken to accommodate deeper draft vessels for the Panama Canal locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strike could also occur (see the Traffic: Vessel collisions sub-IPF below). | 3.16), O&M, and decommissioning. The resulting change in vessel traffic in the GAA cannot be predicted because, while some ports have been identified as possibilities for expansion, no specific project plans have been proposed. Therefore, impacts would be **negligible** adverse. Any future port expansion and associated increase in vessel traffic would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential effects on marine mammals regionwide. | Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects, but no specific improvements are included in the Proposed Action and Alternatives C through F. Any future port expansion would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential environmental effects. However, these localized habitat impacts are unlikely to affect marine mammals within the GAA. Therefore, port utilization impacts associated with the Project would be **negligible** adverse under all Project alternatives.<br>Future actions, should they occur, could involve activities like dredging, increases in vessel activity and underwater noise, and the expansion or development of new structures. These activities could lead to adverse effects on coastal and estuarine habitats used by marine mammals and their prey species. These projects could result in cumulative effects on marine mammals, but the extent and significance of these effects cannot be evaluated because no project proposals have been developed. No port improvements have been proposed as part of the Proposed Action and Alternatives C through F and therefore cumulative impacts would be **negligible** adverse. The environmental effects resulting from any future port expansions would be evaluated in independent NEPA analysis, ESA and MMPA compliance documents, and other regulatory approvals for each project. | No port improvements have been proposed as part of Alternative G, and therefore cumulative impacts would be **negligible** adverse. The environmental effects resulting from any future port expansions would be evaluated in independent NEPA analysis, ESA and MMPA compliance documents, and other regulatory approvals for each project. |
| Presence of structures: Entanglement or ingestion of lost fishing gear | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. There are also more than 130 artificial reefs in the Mid-Atlantic region. This sub-IPF could result in long-term, high-intensity impacts but with low exposure due to localized and geographic spacing of artificial reefs. Currently bridge foundations and the BIWF could be considered artificial reefs and could have higher levels of recreational fishing, which increases the chances of marine mammals encountering lost fishing gear, resulting in possible ingestions, entanglement, injury, or death of individuals (Moore and van der Hoop 2012), if present | No future activities were identified within the marine mammal GAA other than ongoing activities. | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | nearshore where these structures are located. There are very few, if any, areas within the OCS GAA for marine mammals that would serve to concentrate recreational fishing and increase the likelihood that marine mammals would encounter lost fishing gear. | | | | |
| Presence of structures: Habitat conversion and prey aggregation | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. There are also more than 130 artificial reefs in the Mid-Atlantic region. Hard-bottom (scour control and rock mattresses) and vertical structures (bridge foundations and BIWF WTGs) in a soft-bottom habitat can create artificial reefs, thus inducing the reef effect (NMFS 2015; Taormina et al. 2018). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for seals and small odontocetes compared to the surrounding soft bottoms. | The presence of structures associated with non-OSW development in nearshore coastal waters has the potential to provide habitat for seals and small odontocetes as well as preferred prey species. This reef effect has the potential to result in long-term, low-intensity benefits. Bridge foundations would continue to provide foraging opportunities for seals and small odontocetes with measurable benefits to some individuals. Hard-bottom (scour control and rock mattresses used to bury the offshore export cables) and vertical structures (i.e., WTG and ESP foundations) in a soft-bottom habitat can create artificial reefs, thus inducing the reef effect (Causon and Gill 2018; Taormina et al. 2018). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for marine mammals compared to the surrounding soft bottoms. | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |
| Presence of structures: Avoidance/Displacement | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. The presence of structures changes the offshore environment, and their presence could affect marine mammal behavior; however, the likelihood and significance of these effects are difficult to determine. Based on available science, the physical presence of the monopile foundations is unlikely to pose a barrier to the movement of large marine mammals, and even less likely to impede the movement of smaller marine mammals. | Not contemplated for non-OSW facility sources. | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |
| Presence of structures: Behavioral disruption (breeding and migration) | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. The presence of structures changes the offshore environment, and their presence could affect marine mammal behavior; however, the likelihood and significance of | Not contemplated for non-OSW facility sources. | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have |

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| | these effects are difficult to determine. Based on available science, structures could cause localized changes to prey distribution but do not suggest a major change in prey availability. Impacts to movement or displacement are described in other cells. | | | effect on marine mammals and are not analyzed. | no measurable effect on marine mammals and are not analyzed. |
| Presence of structures: Displacement into higher risk areas (vessels and fishing) | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. The presence of structures changes the offshore environment, and their presence could affect marine mammal behavior; however, the likelihood and significance of these effects are difficult to determine. Some research has suggested that wind farm operations may lead to long-term displacement of species such as harbor porpoise, but the evidence is mixed, and observed changes in abundance could be more indicative of general population trends than an actual wind farm effect (Nabe-Nielsen et al. 2011; Tielmann and Carstensen 2012; Vallejo et al. 2017). | Not contemplated for non-OSW facility sources. | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |
| Traffic: Vessel collisions | Current OSW and non-OSW activities that are contributing to this sub-IPF include permitted and built OSW COP projects, port traffic levels, fairways, traffic separation schemes, commercial vessel traffic, recreational and fishing activity, and scientific and academic vessel traffic. Vessel strike is relatively common with cetaceans (Kraus et al. 2005) and one of the primary causes of death to NARWs, with as many as 75% of known anthropogenic mortalities of NARWs likely resulting from collisions with large ships along the U.S. and Canadian eastern seaboard (Kite-Powell et al. 2007). Marine mammals are more vulnerable to vessel strike when they are within the draft of the vessel and beneath the surface and not detectable by visual observers. Some conditions that make marine mammals less detectable include weather conditions with poor visibility (e.g., fog, rain, wave height) or nighttime operations. Vessels operating at speeds exceeding 10 knots have been associated with the highest risk for vessel strikes of NARWs (Vanderlaan and Taggart 2007). Reported vessel collisions with whales show that serious injury rarely occurs | Vessel traffic associated with non-OSW development has the potential to result in an increased collision risk. While these impacts would be high consequence, the patchy distribution of marine mammals makes stock or population-level effects unlikely (Navy 2018). | See Section 3.15.2.2.2 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat and are not analyzed. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | at speeds below 10 knots (Laist et al. 2001). Data show that the probability of a vessel strike increases with the velocity of a vessel (Pace and Silber 2005; Vanderlaan and Taggart 2007). | | | | |
| Sediment deposition and burial | The USACE and/or private ports could undertake dredging projects periodically. Installation of permitted OSW COP projects can also result in fine sediment deposition. Where dredged materials are disposed, marine species could be affected. However, such areas are typically recolonized naturally in the short term. Most species in the GAA are adapted to the turbidity and periodic sediment deposition that occur naturally in the GAA. | No future activities were identified within the GAA for marine mammals other than ongoing activities. | Seafloor disturbance during the installation of transmission cables, sea-to-shore transition construction, and dredging activities would result in elevated suspended sediment concentrations in the water column. Based on modeled and observed TSS impacts for the Proposed Action and other regional wind farm projects (Elliot et al. 2017; RPS 2022; Vinhateiro et al. 2018), and maximum water column TSS concentrations could range from several hundred to several thousand mg/L in proximity to the disturbance and would dissipate below 100 mg/L, usually within minutes to hours of the disturbance, depending on the types of sediments affected. In locations with predominantly sand or coarser sediments, water column effects would be limited to short-term TSS pulses below 100 mg/L extending a few hundred feet downcurrent within approximately 20 feet of the seafloor and dissipating to background conditions within approximately 1 to 2 hours after disturbance.<br>Available information on marine mammal sensitivity to TSS indicates that water quality impacts would have negligible effects on marine mammals. First, periodic TSS concentrations on the order of 100 mg/L at or near the seafloor are within the range of baseline variability. Marine mammals that forage on or near the seafloor are unlikely to be affected by a short-term increase in TSS that is comparable to existing conditions. For example, researchers have observed that visually impaired grey and harbor seals are able to navigate and locate prey just as effectively as their fully sighted counterparts (McConnell et al. 1999; Newby et al. 1970; Todd et al. 2015), indicating that short-term visual impairment would have no measurable effect on foraging ability. While research on TSS sensitivity in dolphins and large whales is generally lacking, these species developed the ability to echolocate by evolving in | RPS (2022) modeled the magnitude and extent of anticipated TSS concentrations resulting from RWF and RWEC construction. Maximum water column TSS concentrations could exceed 500 mg/L in proximity to the disturbance. The majority of water column effects would be limited to short-term TSS pulses below 100 mg/L, occurring in plumes extending approximately 6 to 20 feet off the seafloor and 580 to 4,134 feet downcurrent. Dredging used to level the seafloor and achieve greater burial depths for RWEC installation would produce TSS plumes with concentrations up to 100 mg/L extending from the seafloor to the surface extending from 3,067 to 5,838 feet downcurrent. In most locations, TSS concentrations would dissipate to background conditions within approximately 1 to 2 hours after disturbance; however, in selected locations—specifically at the sea-to-shore transition construction area—TSS concentrations greater than 100 mg/L could linger for up to 36 hours. These modeled estimates are similar to those developed for BIWF construction. The observed extent of TSS impacts at the BIWF turned out to be considerably lower than the modeled estimates (Elliot et al. 2017), indicating that the potential impacts described here are likely conservative. Both the modeled TSS effects, which are conservatively high, and the observed TSS effects were short term and within the range of baseline variability.<br>Based on available information (see No Action Alternative at left) a short-term reduction in visibility would have no meaningful effects on communication, foraging, and predator avoidance, particularly given that measurable TSS impacts would be limited to within 10 to 12 feet of the seafloor in the open ocean waters where marine mammals are most likely to occur. | Similar impacts to the Proposed Action and Alternatives C through F. Therefore marine mammal exposure to water quality effects resulting from construction of all Project alternatives, including Alternative G, would be **negligible** adverse because of the limited sensitivity of marine mammals to TSS and the temporary nature of the impact. Alternative G would result in a shorter overall length of IAC installation, proportionally reducing the extent and duration of suspended sediment impacts relative to the Proposed Action. Those species that are exposed to elevated TSS would unlikely experience measurable effects on behavior, foraging success, or communication.<br>Sediment deposition and burial effects on marine mammals resulting from Project O&M and decommissioning under Alternative G would be temporary **negligible** adverse.<br>BOEM estimates a cumulative total of up to 105,390 acres of seafloor disturbance for Alternative G plus all other future OSW projects in the GAA. As discussed above, TSS effects on marine mammals are likely to be negligible adverse because of limited potential exposure to elevated TSS. No population-level effects on marine mammals are expected from reduced water quality. Therefore, Alternative G when combined with past, present, and reasonably foreseeable activities would result in **negligible** adverse cumulative effects on marine mammals. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | environments having variable and often low visibility (Tyack and Miller 2002). This suggests that a short-term reduction in visibility would have no effect on communication, foraging success, and predator avoidance and would not result in displacement or other observable changes in behavior.<br><br>These factors indicate that marine mammal exposure to water quality effects resulting from construction of future OSW farms would be limited. Those species that are exposed to elevated TSS would be unlikely to experience measurable effects on behavior, foraging success, or communication. On this basis, water quality effects on marine mammals resulting from future OSW farm construction would be **negligible** adverse and short term in duration. | These factors indicate that marine mammal exposure to water quality effects resulting from construction of all Project alternatives would be **negligible** adverse under the Proposed Action and Alternatives C through F because of the limited sensitivity of marine mammals to TSS and the temporary nature of the impact. Alternatives C through F would result in a shorter overall length of IAC installation, proportionally reducing the extent and duration of suspended sediment impacts relative to the Proposed Action. Those species that are exposed to elevated TSS would be unlikely to experience measurable effects on behavior, foraging success, or communication.<br><br>Seafloor disturbance during O&M activities would be limited under all Project alternatives, but reduced in extent under Alternatives C through F. As noted above, the cables are unlikely to require repair or maintenance, but up to 10% of cable protection could need to be replaced over the life of the Project. Replacement of the cable protection could result in localized, temporary increases in TSS. However, consistent with impacts of cable installation, suspended sediment plumes would be limited to within 10 to 12 feet of the seafloor in the open ocean waters where marine mammals are most likely to occur. Potential effects of removal of the cable during decommissioning would be similar in nature to those anticipated for cable installation or replacement of cable protection. Thus, sediment deposition and burial effects on marine mammals resulting from Project O&M and decommissioning under the Proposed Action and Alternatives C through F would be temporary **negligible** adverse.<br><br>BOEM estimates a cumulative total of up to 105,390 acres of seafloor disturbance for the Proposed Action and Alternatives C through F plus all other future OSW projects in the GAA. As discussed above, TSS effects on marine mammals are likely to be negligible adverse because of limited potential exposure to elevated TSS. No population-level effects on marine mammals are expected from reduced | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | water quality. Therefore, the Proposed Action and Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in **negligible** adverse cumulative effects on marine mammals. | |
| Climate change: Warming and sea level rise, storm severity/ frequency | Increased storm frequency could result in increased energetic costs for marine mammals and reduced fitness, particularly for juveniles, calves, and pups. | No future activities were identified within the GAA for marine mammals other than ongoing activities. | See Section 3.15.2.2.2 for analysis. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. |
| Climate change: Ocean acidification | This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine ecosystems by contributing to reduced growth or decline of invertebrates that have calcareous shells. | No future activities were identified within the marine mammal GAA other than ongoing activities. | See Section 3.15.2.2.2 for analysis. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. |
| Climate change: Warming and sea level rise, altered habitat/ecology | This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine mammals as a result of changes in distribution, reduced breeding and/or foraging habitat availability, and disruptions in migration. | No future activities were identified within the marine mammal GAA other than ongoing activities. | See Section 3.15.2.2.2 for analysis. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. |
| Climate change: Warming and sea level rise, altered migration patterns | This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine mammal habitat use and migratory patterns. For example, the NARW appears to be migrating differently and feeding in different areas in response to changes in prey densities related to climate change (MacLeod 2009; Nunny and Simmonds 2019; Record et al. 2019). | No future activities were identified within the marine mammal GAA other than ongoing activities. | See Section 3.15.2.2.2 for analysis. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. |
| Climate change: Warming and sea level rise, increased disease frequency | Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the frequencies of various diseases of marine mammals, such as Phocine distemper. Climate change is clearly influencing infectious disease dynamics in the marine environment; however, no studies have shown a definitive causal relationship between any components of climate change and increases in infectious disease among marine mammals. This is due in large part to a lack of sufficient data and the likely indirect nature of climate change's impact on these diseases. Climate change could affect the incidence or prevalence of infection, the | No future activities were identified within the marine mammal GAA other than ongoing activities. | See Section 3.15.2.2.2 for analysis. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | frequency or magnitude of epizootics, and/or the severity or presence of clinical disease in infected individuals. There are a number of potential proposed mechanisms by which this might occur (see summary in Burge et al. 2014). | | | | |
| Climate change: Warming and sea level rise, storm severity/frequency, sediment erosion, deposition | Increased storm frequency could result in increased energetic costs for marine mammals, reduced fitness, particularly for juveniles, calves, and pups. Erosion could impact seal haul outs, reducing their habitat availability, especially as sea walls and other obstructions are added, blocking seals access to shore. | No future activities were identified within the marine mammal GAA other than ongoing activities. | See Section 3.15.2.2.2 for analysis of impacts. | See Sections 3.15.2.3 and 3.15.2.4 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. | See Section 3.15.2.5 and Section 3.15.2.1, Table 3.15-4 for analysis of impacts. |

*Includes all constructed and permitted COP projects within the marine mammals GAA: Block Island, SFWF, Vineyard Wind 1, and Coastal Virginia Offshore Wind.

## Sea Turtles

**Table E2-6. Summary of Activities and the Associated Impact-Producing Factors for Sea Turtles**

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/hazmat | Constructed and permitted OSW COP projects can accidentally release an estimated 900,000 gallons of fuel, oils, or other hazardous materials in the GAA. See Table E1-4 for a quantitative analysis of these risks. Ongoing releases are frequent and chronic. Sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality (Shigenaka et al. 2010) or sublethal effects on individual fitness, including adrenal effects, dehydration, hematological effects, increased disease incidence, liver effects, poor body condition, skin effects, skeletomuscular effects, and several other health effects that can be attributed to oil exposure (Bembenek-Bailey et al. 2019; Camacho et al. 2013; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Additionally, accidental releases could result in impacts on sea turtles due to effects on prey species (see Table E2-4). All vessels would comply with USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills. | Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. Sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality (Shigenaka 2010; Wallace et al. 2010) or sublethal effects on individual fitness, including adrenal effects, dehydration, hematological effects, increased disease incidence, liver effects, poor body condition, skin effects, skeletomuscular effects, and several other health effects that can be attributed to oil exposure (Bembenek-Bailey et al. 2019; Camacho et al. 2013; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Additionally, accidental releases could result in impacts on sea turtles due to effects on prey species (see Table E2-4). | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Trash and debris | Constructed and permitted OSW COP projects can potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris in the GAA. Trash and debris could also be accidentally discharged through fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey activities; cable, line, and pipeline laying; and debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Direct ingestion of plastic fragments is well documented and has been observed in all species of sea turtles (Bugoni et al. 2001; Hoarau et al. 2014; Nelms et al. 2016; Schuylar et al. 2014). In addition to plastic debris, ingestion of tar, paper, Styrofoam™, wood, reed, feathers, hooks, lines, and net fragments have also been documented (Thomás et al. 2002). Ingestion can also occur when individuals mistake debris for potential prey items (Gregory 2009; Hoarau et al. 2014; Thomás et al. 2002). Potential ingestion of marine debris varies among species and life history stages due to differing feeding strategies (Nelms et al. 2016). Ingestion of plastics and other marine debris can result in both lethal and sublethal impacts on sea turtles, with sublethal effects more difficult to detect (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). Long-term sublethal effects could include dietary dilution, chemical contamination, depressed immune system function, and poor body condition as well as reduced growth rates, fecundity, and reproductive success. However, these effects are cryptic, and clear causal links are difficult to identify (Nelms et al. 2016).<br>All vessels would adhere to federal, state, and local regulations regarding disposal of solid and liquid wastes. | Trash and debris could be accidentally discharged through fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey activities; cable, line, and pipeline laying; and debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Direct and indirect ingestion of plastic fragments and other marine debris is well documented and has been observed in all species of sea turtles (Bugoni et al. 2001; Gregory 2009; Hoarau et al. 2014; Nelms et al. 2016; Schuylar et al. 2014; Thomás et al. 2002). Ingestion can result in both lethal and sublethal impacts on sea turtles, with sublethal effects more difficult to detect (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). However, these effects are cryptic, and clear causal links are difficult to identify (Nelms et al. 2016). | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Anchoring | Constructed and permitted OSW COP projects are introducing an estimated 944 acres of anchoring in the GAA. Vessel anchoring related to other ongoing military use and survey, commercial, and recreational activities also | Impacts from anchoring could occur on a semiregular basis over the next 30 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel | Future OSW projects could disturb up to 8,427 acres of seafloor from anchoring/mooring activities and the installation of associated undersea cables during OSW energy development, causing an increase in suspended | Sea turtles near the Project would likely be foraging, and prey items could include benthic species affected by vessel anchoring and cable emplacement/maintenance. The associated disturbance would be temporary; however, | Project construction and installation of Alternative G would have similar impacts to the Proposed Action and Alternatives C through F. Therefore, impact of Project activities associated |

| **Associated IPF: Sub-IPFs** | **Ongoing Activities*** | **Future Non–Offshore Wind Activities Intensity/Extent** | **Future Offshore Wind Activities Intensity/Extent** | **Proposed Action and Alternatives C through F** | **Alternative G (Preferred Alternative)** |
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| | continues to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. | traffic. These impacts would include increased turbidity levels and potential for contact causing mortality of sea turtles. All impacts would be localized; turbidity would be temporary; impacts from contact would be recovered in the short term. | sediment. This disturbance would be both localized and temporary in duration. Entanglement risks to sea turtles from vessel anchoring and cable emplacement are not anticipated. Only larger construction and O&M vessels would anchor to the seafloor, using large heavy anchor chains. No lines or rigging are anticipated for cable installation, and transmission cables and jet plow umbilicals are large in diameter, relatively inflexible, and under constant tension. The likelihood of sea turtle entanglement under these conditions is discountable.<br>In general, impacts to benthic habitats are unlikely to directly affect sea turtles but could indirectly affect these species through impacts on their prey. As discussed in Section 3.6, BOEM anticipates that impacts to benthic habitats and invertebrates would likely range from minor to moderate adverse. Certain sea turtle species, such as loggerheads, that feed on benthic invertebrates could experience short-term reductions in prey availability that are limited in extent, potentially offset by long-term increases in prey abundance from maturing reef effects. Thus, effects of anchoring and new cable emplacement/maintenance on sea turtles under the No Action Alternative would be **negligible** adverse. | some benthic habitat conversion would also occur, as described in Section 3.6. Project construction and installation would temporarily affect available foraging habitat until preconstruction species assemblages are recolonized and recovered. Benthic communities that inhabit dynamic bed (i.e., soft-bottom) habitats typically recover rapidly from construction-related disturbance, usually within 1 year (Dernie et al. 2003; UKBERR 2008), while some organisms associated with complex benthic habitat, like sponges and hydroids, could take a decade or longer to fully recover (Auster and Langton 1999; Collie et al. 2005; Lukens and Selberg 2004; Tamsett et al. 2010). The affected area is also subject to periodic bed disturbance by commercial fishing (CH2M HILL 2018), indicating that construction-related bed disturbance is not expected to measurably alter environmental baseline conditions. Because impacts to foraging habitat are mostly temporary and localized, the impact of Project activities associated with seafloor disturbance on sea turtles would be **negligible** adverse under the Proposed Action and Alternatives C through F but incrementally reduced under Alternatives C through F (a comparison of the benthic habitat disturbance footprints under the different configurations of Alternatives C through E and the Proposed Action is provided in Table 3.6-8, Table 3.6-9, and Table 3.6-10 in Section 3.6).<br>Entanglement risks to sea turtles from vessel anchoring and cable emplacement are not anticipated. Only larger construction and O&M vessels would anchor to the seafloor, using large heavy anchor chains. Per the COP, no divers would be used and no lines or rigging are anticipated for cable installation and maintenance. Transmission cables and jet plow umbilicals are large in diameter, relatively inflexible, and under constant tension throughout installation.<br>Potential anchoring impacts during O&M and decommissioning would be similar to the construction phase but reduced due to fewer anchored vessels. As stated in Section 3.5.2 of the COP, the Project does not anticipate that the IAC, OSS-link cable, and RWEC would | with seafloor disturbance on sea turtles under Alternative G would be **negligible** adverse but incrementally reduced relative to the proposed action and configurations of Alternatives D through F that have more proposed WTGs. A comparison of the benthic habitat disturbance footprints under the different configurations of alternatives and the Proposed Action is provided in Table 3.6-8, Table 3.6-9, and Table 3.6-10 in Section 3.6.<br>Alternative G would incrementally reduce the extent of O&M- and decommissioning-related impacts on sea turtles resulting from Project construction and would therefore be **negligible** adverse because of the temporary and localized nature of the potential impacts.<br>BOEM estimates a cumulative total of 10,520 acres of anchoring and mooring-related disturbance and 104,781 acres of cabling-related disturbance for Alternative G combined with all other future OSW projects within the GAA. Although increases in foraging effort or displacement due to turbidity could occur to individual sea turtles, these temporary effects are not anticipated to lead to population-level effects on sea turtle populations. Vessel anchoring and cable emplacement during construction, O&M, and decommissioning are not anticipated to involve equipment, lines, or rigging that could pose a potential entanglement risk to sea turtles. Therefore, Alternative G when combined with past, present, and reasonably foreseeable projects would result in **negligible** adverse cumulative impacts to sea turtles. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | require significant maintenance. The cables themselves are unlikely to require repair, but up to 10% of cable protection could need to be replaced over the life of the Project. Effects to sea turtles from cable protection maintenance would result primarily from underwater noise, disturbance, and collision risk associated with O&M vessel activity.<br>The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Alternatives C through F would result in a reduced total length of IAC and a reduced extent of anchoring impacts relative to the Proposed Action. This would incrementally reduce the extent of O&M- and decommissioning-related impacts on sea turtles resulting from Project construction and would therefore be **negligible** adverse under the Proposed Action and Alternatives C through F because of the temporary and localized nature of the potential impacts.<br>BOEM estimates a cumulative total of 5,803 acres of anchoring and mooring-related disturbance and 25,082 acres of cabling-related disturbance for the Proposed Action combined with all other future OSW projects within the GAA. Impacts from Alternatives C through F would be reduced in extent than the Proposed Action. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated sea turtle forage species would be expected to fully recover within 18 to 24 months, whereas impacts on complex benthic habitats could take a decade or more to fully recover. While increases in foraging effort or displacement due to turbidity could occur to individual sea turtles, these temporary effects are not anticipated to lead to population-level effects on sea turtle populations. Vessel anchoring and cable emplacement during construction, O&M, and decommissioning are not anticipated to involve equipment, lines, or rigging that could pose a potential entanglement risk to sea turtles. Therefore, the Proposed Action and Alternatives C through F when combined with past, present, and reasonably foreseeable projects would | |

| **Associated IPF: Sub-IPFs** | **Ongoing Activities*** | **Future Non–Offshore Wind Activities Intensity/Extent** | **Future Offshore Wind Activities Intensity/Extent** | **Proposed Action and Alternatives C through F** | **Alternative G (Preferred Alternative)** |
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| | | | | result in **negligible** adverse cumulative impacts to sea turtles. | |
| Bycatch | Impacts from bycatch are a primary threat to sea turtles (NOAA 2018). A reduction in bycatch has been achieved by the requirement for the use of bycatch mitigation measures. A comparison pre- versus post-regulation mean annual bycatch data for Mid-Atlantic fisheries (otter trawl, gillnet, scallop trawl, scallop dredge, Virginia pound net) showed sea turtle bycatch was reduced from 2,400 incidents to 1,700 and mortality was reduced from 1,000 to 470 based on data over the period 1990 to 2007 (Finkbeiner et al. 2011). In the Atlantic, bycatch occurs in various gillnet and trawl fisheries in New England and the Mid-Atlantic Coast, with hotspots driven by marine mammal density and fishing intensity (Lewison et al. 2014; NMFS 2018a). | No future activities were identified within the GAA for this resource other than ongoing activities | A range of monitoring activities has been proposed to evaluate the short-term and long-term effects of existing and planned OSW development on biological resources and are also likely for future wind energy projects on the OCS. Some of these monitoring activities are likely to affect sea turtles through the potential for bycatch and/or injury by sample collection gear. Biological monitoring uses the same types of methods and equipment employed in commercial fisheries, meaning that impacts to sea turtles would be similar in nature but reduced in extent in comparison to impacts from current and likely future fishing activity. Monitoring activities are commonly conducted by commercial fishers under contract who would otherwise be engaged in fishing activity. As such, research and monitoring activities related to OSW would not necessarily result in an increase in bycatch-related impacts on sea turtles, although the distribution of those impacts could change. Therefore, any bycatch-related impacts on invertebrates would be **negligible to minor** adverse and short term in duration. | Revolution Wind is proposing to implement the FRMP as part of the Proposed Action and Alternatives C through F (Revolution Wind and Inspire Environmental 2022). The FRMP employs a variety of survey methods to evaluate the effect of RWF construction and operation on benthic habitat structure and composition and on marine species. The following survey methods could impact sea turtles:<br>Ventless trap surveys to evaluate changes in the distribution and abundance of lobster and Jonah crab in the RWF and adjacent reference areas and Jonah crab, lobster, whelk (Buccinidae), and finfish along the RWEC corridor and adjacent reference areas; these areas would be surveyed 12 times per month for 7 months each for 2 years prior to and at least 2 years following completion of Project construction (4 years total)<br>Otter trawl surveys to assess abundance and distribution of target fish and invertebrate species within the RWF trawls could impact a variety of invertebrate species as bycatch and would occur four times per year for 2 years prior to and at least 2 years following completion of Project construction.<br>These surveys involve similar methods to and would complement other survey efforts conducted by various state, federal, and university entities supporting regional fisheries research and management.<br>Survey fisheries gear (otter trawls, ventless traps, and the anchoring lines and buoys used to secure acoustic telemetry equipment) could pose an entanglement risk to sea turtles. However, this risk must be considered in the context of ongoing commercial fisheries activity. The FRMP would contract commercial fishing vessels to conduct surveys, using commonly available commercial fishing gear. These contract vessels would likely be engaged in the commercial fishery if not involved in the FRMP, at least at an equivalent, if not greater, level of fishing effort. Therefore, the FRMP would not be likely to measurably change the quantity of | Similar impacts to the Proposed Action and Alternatives C through F. Therefore, the anticipated impacts of the FRMP on sea turtles are anticipated to be **negligible** adverse.<br>Acoustic telemetry receiver systems pose a negligible risk of harm to sea turtles. Based on the type of equipment, deployment near the seafloor, and the small number of receivers deployed (up to 19 in total) over a large area, BOEM considers the effects of this Project element on sea turtles to be **negligible** adverse. Similarly, moored and autonomous PAM systems would use the best available technology to avoid and minimize impacts on the environment. Based on their size and configuration of their mooring systems, PAM buoys pose an insignificant entanglement risk to sea turtles. Therefore, the effects of this type of survey equipment on sea turtles would likewise be **negligible** adverse under Alternative G. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | fishing gear on the Mid-Atlantic OCS or the amount of fishing effort that sea turtles are exposed to by gear type. Moreover, the FRMP would employ several risk-reduction measures. Post-ROD ventless trap surveys would employ ropeless gear retrieval technologies that are consistent with recommendations from NMFS. This would eliminate static vertical lines and surface buoys that are a primary source of gear-related entanglement risk for sea turtles. All trap and pot gear would be stored dry between surveys to minimize the time that gear is in the water.<br>When considered in combination, the anticipated impacts of the FRMP on sea turtles are anticipated to be **negligible** adverse.<br>Acoustic telemetry receiver systems pose a negligible risk of harm to sea turtles. Based on the type of equipment, deployment near the seafloor, and the small number of receivers deployed (up to 19 in total) over a large area, BOEM considers the effects of this Project element on sea turtles to be **negligible** adverse. Similarly, moored and autonomous PAM systems would use the best available technology to avoid and minimize impacts on the environment. Based on their size and configuration of their mooring systems, PAM buoys pose an insignificant entanglement risk to sea turtles. Therefore, the effects of this type of survey equipment on sea turtles would likewise be **negligible** adverse under the Proposed Action and Alternatives C through F. | |
| EMFs | Constructed and permitted OSW COP projects can generate EMF and substrate heating effects, altering the environment for sea turtles.<br>EMFs also emanate constantly from installed telecommunication and electrical power transmission cables. Sea turtles appear to have a detection threshold of magnetosensitivity and behavioral responses to field intensities ranging from 0.0047 to 4000 µT for loggerhead turtles, and 29.3 to 200 µT for green turtles, with other species likely similar due to anatomical, behavioral, and life history similarities (Normandeau et al. 2011). Juvenile or adult sea turtles foraging on benthic organisms could be | During operations, future new cables would produce EMF. Submarine power cables in the GAA for sea turtles are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels (BOEM 2007: Section 5.2.7). EMF of any two sources would not overlap. Although the EMF would exist as long as a cable was in operation, impacts, if any, would likely be difficult to detect, if they occur at all. Further, this IPF would be limited to extremely small portions of the areas used by resident or migrating sea turtles. As such, exposure to this IPF | Under the No Action Alternative, the future development of planned wind energy projects would result in up to 13,469 miles of new submarine electrical transmission cables in the GAA for sea turtles. Each cable would generate EMF effects within the immediate proximity. The available evidence indicates that sea turtles are magnetosensitive and orient to the Earth's magnetic field for navigation. Although they could be able to detect magnetic fields as low as 0.05 mG, they are unlikely to detect magnetic fields below 50 mG (Normandeau et al. 2011; Snoek et al. 2016). Potential EMF effects would be reduced by cable shielding and burial to an appropriate depth (typically 4–6 feet). Standard | **Offshore:** There would be no EMF produced during construction of the offshore Project structures.<br>The Project would generate EMF along the length of the IACs and offshore RWEC for the life of the Project until decommissioning. These effects would be most intense at locations where the RWEC cannot be buried and is laid on the bed surface covered by a stone or concrete armoring blanket. Approximately 8.8 miles of the RWEC cable, 0.9 mile of the OSS-link, and 15.5 miles of the IAC could be unburied and would require surface armoring. Exponent (2023) modeled EMF levels that could be generated by the RWEC, OSS-link cable, and IAC. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore there would be no EMF produced during construction of the offshore Project structures.<br>Given the limited extent of measurable magnetic field levels and limited potential for mobile species like sea turtles to encounter field levels above detectable thresholds, the effects of Project-related EMF exposure on sea turtles would be **negligible** adverse for the life of the Project. Impacts would be reduced in extent as compared to the Proposed |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | able to detect magnetic fields while they are foraging on the bottom near the cables and up to potentially 82 feet (25 m) in the water column above the cable. Juvenile and adult sea turtles could detect the EMF over relatively small areas near cables (e.g., when resting on the bottom or foraging on benthic organisms near cables or concrete mattresses). There are no data on impacts on sea turtles from EMFs generated by underwater cables, although anthropogenic magnetic fields can influence migratory deviations (Luschi et al. 2007; Snoek et al. 2016). However, any potential impacts from AC cables on turtle navigation or orientation would likely be undetectable under natural conditions and thus would be insignificant (Normandeau et al. 2011). | would be low, and as a result, impacts on sea turtles would not be expected. | design guidance for OSW energy transmission cable installation avoids cable crossings where practicable and recommends maintaining a minimum separation of at least several hundred feet between Project features and existing transmission and communication cables to avoid damaging existing infrastructure and for safety during installation (CSRIC 2014; Sharples 2011; TÜV SÜD PMSS 2014). This separation distance would also avoid additive EMF effects from adjacent cables. Although artificial EMF effects on sea turtles are not well studied, the affected areas would be localized around unburied cable segments and limited to within 3 to 7.5 m of the cable surface (CSA Ocean Sciences Inc. and Exponent 2019). Deviations in migration therefore would have a negligible impact on energy expenditure in sea turtles. EMF effects from future OSW development would similarly be **negligible** adverse because of the limited anticipated exposure. | It estimated induced magnetic field levels ranging from 147 to 1,071 mG on the bed surface above the buried and exposed RWEC and OSS-link cable and 57 to 522 mG above the IAC (see Section 3.6). Induced field strength would decrease rapidly with distance from the source, dropping below 100 mG within 3.3 feet of the seafloor directly above the cable. Induced magnetic field strength would fall effectively to 0 mG within 25 feet of the centerline of each cable segment. The only exception would occur at the RWEC landing location, where the two cable corridors would approach to within 10 feet. Measurable magnetic field effects would extend between 25 to 50 feet from the outer edge of the combined cable path.<br>BOEM has conducted literature reviews and analyses of potential EMF effects from offshore renewable energy projects (CSA Ocean Sciences Inc. 2023; Inspire Environmental 2019; Normandeau et al. 2011). These and other available reviews and studies (Gill et al. 2005; Kilfoyle et al. 2018) suggest that most marine species cannot sense very low-intensity electric or magnetic fields at the typical AC power transmission frequencies associated with offshore renewable energy projects. Normandeau et al. (2011) indicate that sea turtles are magnetosensitive and orient to the Earth's magnetic field for navigation, but they are unlikely to detect magnetic fields below 50 mG. The majority of RWEC and IACs would be buried 4 to 6 feet below the bed surface, reducing the magnetic field in the water column below levels detectable to turtles. The transmission cables could produce magnetic field effects above the 50-mG threshold at selected locations where full burial is not possible; these areas would be localized and limited in extent. Magnetic field strength at these locations would decrease rapidly with distance from the cable and drop to 0 mG within 25 feet. Peak magnetic field strength is below the theoretical 50-mG detection limit along the majority of cable length, only exceeding this threshold above the short cable segments laid on the bed surface. Those EMF effects would dissipate below the 50 mG threshold 3.3 feet (1 m) of the seafloor, except | Action, and the total area exposed would vary depending on the configuration selected (see Tables 3.6-23, 3.6-24, and 3.6-25 in Section 3.6).<br>The potential effects of cable heat to the availability of turtle forage would be **negligible** adverse under Alternative G.<br>Project EMF effects would combine with those generated by the 13,469 miles of new and existing transmission cables from the other new OSW facilities planned on the Mid-Atlantic OCS as well as other existing transmission cables. This represents an extremely small percentage of the GAA for sea turtles and is unlikely to lead to biologically significant effects on sea turtle movement, migration, or foraging patterns.<br>Therefore, the cumulative impacts associated with Alternative G when combined with past, present, and reasonably foreseeable activities would represent a long-term **negligible** adverse impact on sea turtles. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | for RWEC cable segments lying on the bed surface. This indicates that turtles would only be able to detect induced magnetic fields within a few feet of cable segments lying on the bed surface. These cable segments would be relatively short (less than 100 feet long) and widely dispersed. Exponent (2023) concluded that the shielding provided by burial and the grounded metallic sheaths around the cables would effectively eliminate any induced electrical field effects detectable to turtles. Given the limited extent of measurable magnetic field levels and limited potential for mobile species like sea turtles to encounter field levels above detectable thresholds, the effects of Project-related EMF exposure on sea turtles would be **negligible** adverse for the life of the Project for the Proposed Action. Alternatives C through F would result in similar EMF impacts to those described for the Proposed Action, but those impacts would be reduced in extent and the total area exposed would vary depending on the alternative and configuration selected (see Tables 3.6-23, 3.6-24, and 3.6-25 in Section 3.6).<br><br>Heat from the buried RWEC and IACs could affect some benthic organisms that represent forage for turtles, but little is known about the potential change to substrate temperatures that transmission cables might have on the benthos (Taormina et al. 2018). Benthic effects are not expected to impact leatherback turtles as benthic prey are not typically included in their diet. Effects to algal cover (green sea turtle forage) and crustaceans, gastropods, crabs, and bivalves (loggerhead sea turtle forage) could conceivably affect sea turtle foraging opportunities. However, because cables would be buried to a depth of 4 to 6 feet and/or covered with concrete protection, changes in temperature of the substrate at the surface of the seafloor is not anticipated to increase markedly. The potential effects of cable heat to the availability of turtle forage would be **negligible** adverse under the Proposed Action and Alternatives C through F.<br><br>Project EMF effects would combine with those generated by the 10,024 miles of new and existing transmission cables from the other new OSW facilities planned on the Mid-Atlantic OCS | |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | as well as other existing transmission cables. Submarine power cables would be installed with appropriate shielding and at a burial depth to reduce potential EMF at the substrate surface. The RWEC and IACs would maintain a minimum separation of at least several hundred feet from other known cables to avoid inadvertent damage during installation and additive EMF effects from adjacent cables (CSRIC 2014; Sharples 2011; TÜV SÜD PMSS 2014). Additionally, exposure to detectable levels of EMF would be limited to within 25 feet of the small number of areas where cable segments cannot be buried to the anticipated depth. This represents an extremely small percentage of the GAA for sea turtles and is unlikely to lead to biologically significant effects on sea turtle movement, migration, or foraging patterns.<br>Therefore, the cumulative impacts associated with the Proposed Action and Alternatives C through F when combined with past, present, and reasonably foreseeable activities would represent a long-term **negligible** adverse impact on sea turtles. | |
| Light: Vessels | Constructed and permitted OSW COP projects are introducing 83 lighted structures into the GAA, as well as lighted vessels. Ocean vessels such as ongoing commercial vessel traffic, recreational and fishing activity, and scientific and academic research traffic have an array of lights, including navigational, deck, and interior lights. Such lights have some limited potential to attract sea turtles, although the impacts, if any, are expected to be localized and temporary. | Construction, operations, and decommissioning vessels associated with non-OSW activities produce temporary and localized light sources that could result in the attraction or avoidance behavior of sea turtles. These short-term impacts are expected to be of low intensity and occur infrequently. | **Offshore:** Nighttime lighting associated with offshore structures and vessels could represent a source of attraction, avoidance, or other behavioral responses in sea turtles. Although responses to light have been studied in various species and life stages of sea turtles in nesting beach environments, the effects of offshore lighting remain uncertain. Shoreline development is the predominant existing artificial lighting source in the nearshore component of the GAA, whereas vessels, mainly fishing vessels, are the predominant artificial lighting source offshore. Future wind energy development would contribute additional light sources to the offshore component of the GAA, including a temporary increase in light from vessels used during construction and the long-term use of navigational lighting on new WTGs and OSSs. An estimated 3,088 foundations are forecasted for future wind energy construction. Each structure would have minimal white flashing navigational lighting as well as red flashing FAA hazard lights in accordance with BOEM's (2021) | **Offshore:** Lights would be required on vessels and heavy equipment during construction. Most scientific studies on lighting effects on sea turtles were conducted at nesting sites, which do not occur in the RWF and RWEC. Gless et al. (2008) reported that previous studies showed that loggerhead turtles were attracted to lights from longline fishing vessels. Gless et al. (2008) conducted a laboratory study to see if juvenile leatherbacks responded to lights in the same way as loggerheads. Their study showed that leatherbacks either failed to orient or oriented at an angle away from the lights and concluded that there is no convincing evidence that marine turtles are attracted to vessel lights. Limpus (2006) indicates that navigation/anchor lights on top of vessel masts are not impactful but that bright deck lights should be shielded if possible to reduce impacts to sea turtles. Project EPMs (see Table F-1 in Appendix F) stipulate that construction vessel lightingwould be limited to the minimum necessary to ensure safety and to comply with applicable regulations. Additionally, BOEM (2021) has | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, temporary construction lighting and operational lighting effects on sea turtles would be **negligible** adverse.<br>BOEM estimates a cumulative total of 3,155 offshore WTGs and OSS foundations for Alternative G plus all other future OSW projects in the GAA. All future wind farm projects would be expected to follow BOEM design guidance for lighting of offshore structures and avoiding and minimizing artificial lighting impacts from offshore energy facilities and associated construction vessels (BOEM 2021; Orr et al. 2013). Adherence to these measures should effectively avoid adverse effects on aquatic organisms. BOEM would require all future offshore energy projects to comply with this guidance. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | lighting and marking guidelines. Although the potential effects of offshore lighting on juvenile and adult sea turtles is uncertain, WTG lighting is anticipated to have a **negligible** adverse effect on sea turtles based on the lack of observed effects on sea turtles from decades of oil and gas platform operations in the Gulf of Mexico, which can have considerably more lighting than offshore WTGs (BOEM 2021). | issued design guidance for avoiding and minimizing artificial lighting impacts from offshore energy facilities and associated construction vessels and has concluded that adherence to these measures should effectively avoid adverse effects on sea turtles. Considering the EPMs and the fact that construction vessel activity is unlikely to measurably alter baseline vessel light levels, temporary construction lighting effects on sea turtles would be **negligible** adverse.<br>The RWF would include a variety of operational lighting, including navigational lighting for mariners, obstruction lighting for aviators, and vessel/work lighting for O&M (BOEM 2021). Orr et al. (2013) indicated that lights on wind generators flash intermittently for navigation or safety purposes and do not present a continuous light source. Limpus (2006) suggested that intermittent flashing lights with a very short “on” pulse and long “off” interval are nondisruptive to marine turtle behavior, irrespective of the color. Limpus (2006) also indicated that navigation/anchor lights on top of vessel masts are unlikely to adversely affect sea turtles but that bright deck lights should be shielded if possible to reduce impacts to sea turtles.<br>Sea turtles’ typical behavior of remaining predominantly submerged would additionally limit the exposure of individuals to operational lighting. BOEM (2021) has issued design guidance for avoiding and minimizing artificial lighting impacts from offshore energy facilities and has concluded that adherence to these measures should effectively avoid adverse effects on fish. RWF adherence to design guidelines would ensure operational lighting effects on sea turtles would be minimal, temporary, and therefore **negligible** adverse.<br>The Proposed Action would result in negligible incremental impacts to sea turtles through the installation of 102 lighted structures (100 WTGs and two OSSs). This represents approximately 3% of the projected increase in offshore lighting projected under the No Action Alternative. BOEM estimates a cumulative total of 3,110 offshore WTGs and OSS foundations for the Proposed Action plus all other future OSW | Nighttime lighting associated with offshore structures and vessels could represent a source of attraction, avoidance, or other behavioral responses in sea turtles. However, BOEM assumes that all OSW projects would be sited offshore, away from nesting beaches, and would not disorient nesting females or hatchling sea turtles.<br>Because other planned and potential future OSW energy projects would be expected to adhere to the same measures to avoid adverse lighting impacts, Alternative G when combined with past, present, and reasonably foreseeable activities would also represent a **negligible** adverse cumulative impact on sea turtles. |

| **Associated IPF: Sub-IPFs** | **Ongoing Activities*** | **Future Non–Offshore Wind Activities Intensity/Extent** | **Future Offshore Wind Activities Intensity/Extent** | **Proposed Action and Alternatives C through F** | **Alternative G (Preferred Alternative)** |
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| | | | | projects in the GAA. All future wind farm projects would be expected to follow BOEM design guidance for lighting of offshore structures and avoiding and minimizing artificial lighting impacts from offshore energy facilities and associated construction vessels (BOEM 2021; Orr et al. 2013). Adherence to these measures should effectively avoid adverse effects on aquatic organisms. BOEM would require all future offshore energy projects to comply with this guidance. Nighttime lighting associated with offshore structures and vessels could represent a source of attraction, avoidance, or other behavioral responses in sea turtles. However, BOEM assumes that all OSW projects would be sited offshore, away from nesting beaches, and would not disorient nesting females or hatchling sea turtles.<br>Because other planned and potential future OSW energy projects would be expected to adhere to the same measures to avoid adverse lighting impacts, the Proposed Action when combined with past, present, and reasonably foreseeable activities would also represent a **negligible** adverse cumulative impact on sea turtles.<br>Alternatives C through F would include the same, or similar, extent of light emissions as those described for the Proposed Action but would be reduced based on the reduction in the number of WTGs and other operational lighting elements, resulting in a **negligible** adverse impact. Project lighting represents no more than a 3% projected increase in offshore lighting compared to the No Action Alternative. BOEM estimates a cumulative total of 3,066 to 3,103 offshore WTGs and OSS foundations for Alternatives C through F plus all other future OSW projects in the GAA. Thus, the impacts of operational lighting are also considered **negligible** adverse. | |
| Light: Structures | Constructed and permitted OSW COP projects are introducing 83 lighted structures into the GAA. Artificial lighting on nesting beaches or in nearshore habitats has the potential to result in disorientation to nesting females and hatchling turtles. Artificial lighting on the OCS does not appear to have the same potential for effects. | Non-OSW activities would not be expected to appreciably contribute to this sub-IPF. As such, no impact on sea turtles would be expected. | See Light: Vessels above for offshore and onshore analysis. | See Light: Vessels above for offshore and onshore analysis. | See Light: Vessels above for offshore and onshore analysis. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | Decades of oil and gas platform operations in the Gulf of Mexico, which can have considerably more lighting than offshore WTGs, has not resulted in any known impacts on sea turtles (BOEM 2021). | | | | |
| New cable emplacement/ maintenance | Constructed and permitted OSW COP projects are introducing an estimated 498 miles of new offshore cable in the GAA. This and other non-OSW cable maintenance activities can disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances would be local and generally limited to the emplacement corridor. Data are not available regarding effects of suspended sediments on adult and juvenile sea turtles, although elevated suspended sediments could cause individuals to alter normal movements and behaviors. However, these changes are expected to be too small to be detected (NOAA 2020b). Sea turtles would be expected to swim away from the sediment plume. Elevated turbidity is most likely to affect sea turtles if a plume causes a barrier to normal behaviors, but no impacts would be expected due to swimming through the plume (NOAA 2020b). Turbidity associated with increased sedimentation could result in short-term, temporary impacts on sea turtle prey species (see Table E2-4). | The FCC has two pending submarine telecommunication cable applications in the North Atlantic. The impact on water quality from accidental sediment suspension during cable emplacement is short term and temporary. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be short term and temporary. Turbidity associated with increased sedimentation could result in short-term, temporary impacts on some sea turtle prey species (see Table E2-4). | See Anchoring above for offshore and onshore analysis. | See Anchoring above for offshore and onshore analysis. | See Anchoring above for offshore and onshore analysis. |
| Noise: Aircraft | Aircraft routinely travel in the GAA for sea turtles. With the possible exception of rescue operations, no ongoing aircraft flights would occur at altitudes that would elicit a response from sea turtles. If flights are at a sufficiently low altitude, sea turtles could respond with a startle response (diving or swimming away), altered submergence patterns, and a temporary stress response (NSF and USGS 2011; Samuel et al. 2005). These brief responses would be expected to dissipate once the aircraft has left the area. | Future low-altitude aircraft activities such as surveys and navy training operations could result in short-term responses of sea turtles to aircraft noise. If flights are at a sufficiently low altitude, sea turtles could respond with a startle response (diving or swimming away), altered submergence patterns, and a temporary stress response (NSF and USGS 2011; Samuel et al. 2005). These brief responses would be expected to dissipate once the aircraft has left the area. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1. Table 3.19-2 for analysis. |
| Noise: G&G | Noise from G&G surveys associated with permitted OSW COP projects may occur in the GAA. Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities have the potential to result in some impacts, including potential auditory | Same as ongoing activities, with the addition of possible future oil and gas exploration surveys. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | injuries, short-term disturbance, behavioral responses, and short-term displacement of feeding or migrating sea turtles, if present within the ensonified area (NSF and USGS 2011). The potential for PTS and TTS is considered possible in proximity to G&G surveys using air guns, but impacts are unlikely as turtles would be expected to avoid such exposure and survey vessels would pass quickly (NSF and USGS 2011). No significant impacts would be expected at the population level. | | | | |
| Noise: HRG | Noise from HRG surveys associated with permitted OSW COP projects may occur in the GAA. Possibly included in site characterization surveys and scientific surveys are high-resolution geophysical (HRG) surveys. HRG surveys could be conducted using one or two air guns as the acoustic source, but they generally use electromechanical sources such as side-scan sonars, shallow- and medium-penetration sub-bottom profilers, and single- or multibeam echosounders. Non-air un HRG sources are often used in combination in order to acquire necessary data during a single deployment. HRG surveys are sometimes conducted using autonomous underwater vehicles equipped with multiple acoustic sources (NMFS 2018b). HRG surveys are typically on a time scale of weeks and higher frequency HRG survey noise resulting from cable route surveys could be less intense than G&G noise from site investigation surveys in WEAs. Impacts include potential auditory injuries, short-term disturbance, behavioral responses, and short-term displacement of feeding or migrating sea turtles, if present within the ensonified area (NSF and USGS 2011). These impacts would be negligible as turtles would be expected to avoid exposure and survey vessels would pass quickly (NSF and USGS 2011). No significant impacts would be expected at the population level. | Same as ongoing activities, with the addition of possible future oil and gas exploration surveys. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Noise: Turbines | Noise from turbine operation associated with permitted and built OSW COP projects occurs in the GAA. Available evidence suggests that typical underwater noise levels from operating WTGs would be below current cumulative injury and behavioral effect thresholds for sea turtles. Operating turbines were determined to produce | This sub-IPF does not apply to future non-OSW development. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1 Table 3.19-2 for analysis. | See Sections 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | underwater noise on the order of 110 to 125 $dB_{RMS}$, occasionally reaching as high as 128 $dB_{RMS}$ in the 10-Hz to 8-kHz range (Tougaard et al. 2020). As measured at the BIWF, low-frequency operational noise barely exceeds ambient levels at 164 feet (50 m) from the WTG base (Miller and Potty 2017). Operational noise impacts would be expected to be negligible. | | | | |
| Noise: Pile driving | Noise from pile driving associated with permitted OSW COP projects is occurring during installation of foundations for offshore structures. Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seafloor can result in high-intensity, low-exposure levels and long-term but localized intermittent risk to sea turtles. Impacts, potentially including behavioral responses, masking, TTS, and PTS, would be localized in nearshore waters. Data regarding threshold levels for impacts on sea turtles from sound exposure during pile driving are very limited, and no regulatory threshold criteria have been established for sea turtles. Based on current literature, the following thresholds are used to assess impacts to turtles:<br>Potential mortal injury: 210 dB cumulative SPL or greater than 207 $dB_{PEAK}$ SPL (Popper et al. 2014)<br>Potential mortal injury: 204 $dB_{SEL}$, 232 $dB_{PEAK}$ (PTS), 189 $dB_{SEL}$, 226 $dB_{PEAK}$ (TTS) (Navy 2017)<br>Behavioral harassment: 175 dB referenced to 1 µPa rms (Navy 2017) | No future activities were identified within the GAA for sea turtles other than ongoing activities. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Noise: Cable laying/trenching | N/A | Cable laying impacts resulting from future non-OSW activities would be identical to those described for future OSW projects. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Noise: Vessels | Ongoing OSW and non-OSW activities that contribute to this sub-IPF include permitted and built OSW COP projects, commercial shipping, recreational, and fishing vessels; scientific and academic research vessels; and other construction vessels. The frequency range for vessel noise (10 to 1000 Hz) (MMS 2007) overlaps with sea turtles' known hearing range (less than 1,000 Hz with maximum | See Section 3.16. Any offshore projects that require the use of ocean vessels could result in long-term but infrequent impacts on sea turtles, including temporary startle responses, masking of biologically relevant sounds, physiological stress, and behavioral changes, especially their submergence patterns (NSF and USGS 2011; Samuel et | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | sensitivity between 200 to 700 Hz (Bartol 1994) and would therefore be audible. However, Hazel et al. (2007) suggest that sea turtles' ability to detect approaching vessels is primarily vision-dependent, not acoustic. Sea turtles could respond to vessel approach and/or noise with a startle response (diving or swimming away) and a temporary stress response (NSF and USGS 2011). Samuel et al. (2005) indicated that vessel noise could have an effect on sea turtle behavior, especially their submergence patterns. | al. 2005). However, BOEM expects that these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of sea turtles, and no stock or population-level effects would be expected. | | | |
| Port utilization: Expansion | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Port expansion activities are localized to nearshore habitats and are expected to result in short-term, temporary impacts, if any, on sea turtles. Vessel noise could affect sea turtles, but response would be expected to be short- term and temporary (see the Vessels: Noise sub-IPF above). The impact on water quality from sediment suspension during port expansion activities is short term, temporary, and would be similar to those described under the New cable emplacement/maintenance IPF above. | Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia to Maine is that port activity would increase modestly. The ability of ports to receive the increase in larger ships would require port modifications. Future channel-deepening activities are being undertaken to accommodate deeper draft vessels for the Panama Canal locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strikes could also occur (see the Traffic: Vessel collisions sub-IPF below). | The development of an OSW industry on the Mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Port improvements could lead to an increase in vessel traffic during construction (see Section 3.16), O&M, and decommissioning. The resulting change in vessel traffic in the GAA cannot be predicted because, while some ports have been identified as possibilities for expansion, no specific project plans have been proposed. Therefore, impacts would be **negligible** adverse. Any future port expansion and associated increase in vessel traffic would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential effects on sea turtles regionwide. | **Offshore:** Several regional ports could be used during Project construction, including ports in Baltimore, MD; New Bedford, MA; New London, CT; Norfolk, VA; Paulsboro, NJ; and Providence, RI, as well as Europe. The development of an OSW industry on the Mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects, but no specific improvements are included in the Proposed Action and Alternatives C through F. Therefore, impacts would be **negligible** adverse. Any future port expansion would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential environmental effects.<br><br>Future actions, should they occur, could involve activities like dredging and the expansion or development of new structures that could lead to adverse effects on coastal and estuarine habitats used by sea turtles and their prey species. These projects could result in cumulative effects on sea turtles, but the extent and significance of these effects cannot be evaluated because no project proposals have been developed. Therefore, impacts would be **negligible** adverse. However, the environmental effects resulting from any future port expansions would be evaluated in independent NEPA analysis, ESA compliance documents, and other regulatory approvals for each project. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, impacts would be **negligible** adverse. Any future port expansion would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential environmental effects. |
| | | | | **Onshore:** Onshore Project activities would not result in impacts to marine resources regardless of alternative. Therefore, onshore activities and facilities would have no measurable effect on sea turtles and would therefore be **negligible** adverse. | **Onshore:** Onshore Project activities would not result in impacts to marine resources regardless of alternative. Therefore, onshore activities and facilities would have no measurable effect on sea turtles and would therefore be **negligible** adverse. |

| **Associated IPF: Sub-IPFs** | **Ongoing Activities*** | **Future Non–Offshore Wind Activities Intensity/Extent** | **Future Offshore Wind Activities Intensity/Extent** | **Proposed Action and Alternatives C through F** | **Alternative G (Preferred Alternative)** |
|---|---|---|---|---|---|
| Presence of structures: Entanglement or ingestion of lost fishing gear | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. The Mid-Atlantic region also has more than 130 artificial reefs. Currently, bridge foundations and the BIWF could be considered artificial reefs and could have higher levels of recreational fishing, which increases the chances of sea turtles encountering lost fishing gear, resulting in possible ingestions, entanglement, injury, or death of individuals (Berreiros and Raykov 2014; Gregory 2009; Vegter et al. 2014) if present where these structures are located. At the scale of the GAA for sea turtles, there are very few areas that would serve to concentrate recreational fishing and increase the likelihood that sea turtles would encounter lost fishing gear. | No future activities were identified within the GAA for sea turtles other than ongoing activities. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Presence of structures: Habitat conversion and prey aggregation | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. The Mid-Atlantic region also has more than 130 artificial reefs. Hard-bottom (scour control and rock mattresses) and vertical structures (bridge foundations and BIWF WTGs) in a soft-bottom habitat can create artificial reefs, thus inducing the reef effect (NMFS 2015; Taormina et al. 2018). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for sea turtles compared to the surrounding soft bottoms. | The presence of structures associated with non-OSW development in nearshore coastal waters has the potential to provide habitat for sea turtles as well as preferred prey species. This reef effect has the potential to result in long-term, low-intensity beneficial impacts. Bridge foundations would continue to provide foraging opportunities for sea turtles, with measurable benefits to some individuals. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Presence of structures: Avoidance/Displacement | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Given that sea turtles are highly mobile and the structures are only 36 to 45 feet in diameter and would be separated by approximately 1 mile, the structural alterations of the water column are unlikely to pose a direct barrier to foraging, migration, or other behaviors of sea turtles. | Not contemplated for non-OSW facility sources. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Presence of structures: Behavioral disruption (breeding and migration) | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Given that sea turtles are highly mobile and the structures are only 36 to 45 feet in diameter and would be separated by approximately 1 mile, the structural alterations of the water column are unlikely to | Not contemplated for non-OSW facility sources. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | pose a direct barrier to foraging, migration, or other behaviors of sea turtles. | | | | |
| Presence of structures: Displacement into higher risk areas (vessels and fishing) | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Given that sea turtles are highly mobile and the structures are only 36 to 45 feet in diameter and would be separated by approximately 1 mile, the structural alterations of the water column are unlikely to pose a direct barrier to foraging, migration, or other behaviors of sea turtles. | Not contemplated for non-OSW facility sources. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Sediment deposition and burial | Ongoing sediment dredging for navigation purposes results in fine sediment deposition. Installation of permitted OSW COP projects can also result in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local and limited to the emplacement corridor.<br>Data are not available regarding effects of suspended sediments on adult and juvenile sea turtles, although elevated suspended sediments could cause individuals to alter normal movements and behaviors. However, these changes are expected to be too small to be detected (NOAA 2020b). Sea turtles would be expected to swim away from the sediment plume. Elevated turbidity is most likely to affect sea turtles if a plume causes a barrier to normal behaviors, but no impacts would be expected due to swimming through the plume (NOAA 2020b). Turbidity associated with increased sedimentation could result in short-term, temporary impacts on sea turtle prey species. | The impact on water quality from sediment suspension during cable emplacement is short term and temporary. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be short term and temporary. Turbidity associated with increased sedimentation could result in short-term, temporary impacts on some sea turtle prey species. | As previously noted, up to 13,469 miles of cable would be added in the GAA. Cable placement and other related construction activities would disturb the seafloor, creating plumes of fine sediment that would disperse and resettle in the vicinity. Data are not available regarding impacts of suspended sediments on adult and juvenile sea turtles, although elevated suspended sediments could cause individuals to alter normal movements and behaviors. However, these changes would be limited in extent, short term in duration, and likely too small to be detected (NOAA 2020b). Seafloor disturbance during construction of future OSW projects could affect foraging success for some prey species; however, given that impacts would be short term and generally localized to the cable corridor, no population-level effects on sea turtles would be expected. Overall, anticipated effects from sediment deposition and burial on sea turtles would be **negligible** adverse. | **Offshore:** Construction of the RWF and offshore RWEC is expected to result in elevated levels of suspended sediment in the immediate proximity of bed-disturbing activities like pile driving, placement of scour protection, and trenching and burial of the RWEC and IAC. The majority of water column effects would be limited to short-term TSS pulses below 100 mg/L. Higher TSS concentrations exceeding 100 mg/L would occur in areas where seafloor sediments have a greater proportion of mud and silt. TSS plumes caused by construction disturbance would dissipate quickly, with concentrations above 100 mg/L lasting no longer than 6 hours at any location (RPS 2022). A summary of the anticipated extent of water column TSS and substrate burial effects is provided in Section 3.6. These effects would be short term because TSS levels are predicted to return to normal within minutes to hours of activity completion, depending on the magnitude of disturbance and sediments disturbed.<br>Direct physical effects from TSS exposure are unlikely because sea turtles breathe air and do not share the physiological sensitivities of susceptible organisms like fish and invertebrates. Turtles could alter their behavior in response to elevated suspended sediment levels (e.g., moving away from an affected area). They could also experience behavioral stressors (e.g., reduced ability to forage and avoid predators). However, turtles are highly mobile and can avoid short-term suspended sediment impacts that are limited in severity and range. Given the anticipated extent of potential suspended sediment impacts expected to result from the Project, sea turtle | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, effects to sea turtles from elevated suspended sediment levels would be **negligible** adverse. Alternative G would result in similar impacts to sediment deposition and burial to the Proposed Action but reduced in extent and therefore **negligible**. Many sea turtle species routinely inhabit nearshore and estuarine environments with periodically high natural turbidity levels; therefore, short-term exposure to elevated suspended sediment is unlikely to measurably inhibit foraging (Michel et al. 2013). As discussed in Section 3.6, habitat disturbance and resettled sediment are natural ecosystem processes, and impacts on prey and foraging success for sea turtles would also be **negligible** adverse for Alternative G.<br>Sediment deposition and burial effects on sea turtles resulting from Alternative G Project O&M and decommissioning would be temporary **negligible** adverse.<br>BOEM estimates a cumulative total of up to 104,781 acres of seafloor disturbance for the Alternative G plus all other future OSW projects in the GAA. Alternative G would result in impacts similar to the Proposed Action, but the magnitude of those impacts would be reduced based on the smaller footprint proposed for this |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | mobility to avoid exposure, and low sea turtle sensitivity to this stressor, effects to sea turtles from elevated suspended sediment levels would be **negligible** adverse. Alternatives C through F would result in similar impacts to sediment deposition and burial to the Proposed Action but reduced in extent and therefore **negligible**. Many sea turtle species routinely inhabit nearshore and estuarine environments with periodically high natural turbidity levels; therefore, short-term exposure to elevated suspended sediment is unlikely to measurably inhibit foraging (Michel et al. 2013). As discussed in Section 3.6, habitat disturbance and resettled sediment are natural ecosystem processes, and impacts on prey and foraging success for sea turtles would also be **negligible** adverse for the Proposed Action and Alternatives C through F.<br>Seafloor disturbance during O&M activities would be limited. As noted previously, the cables are unlikely to require repair or maintenance, but up to 10% of cable protection could need to be replaced over the life of the Project. Replacement of the cable protection could result in localized, temporary increases in TSS. However, consistent with impacts of cable installation, suspended sediment plumes would be limited to within 10 to 12 feet of the seafloor in the open ocean waters where marine mammals are most likely to occur. Potential effects of removal of the cable during decommissioning would be similar in nature to those anticipated for cable installation or replacement of cable protection. Those species that are exposed to elevated TSS would be unlikely to experience measurable effects on behavior, foraging success, or mobility. Sediment deposition and burial effects on sea turtles resulting from the Proposed Action and Alternatives C through F Project O&M and decommissioning would be temporary **negligible** adverse.<br>BOEM estimates a cumulative total of up to 30,885 acres of seafloor disturbance for the Proposed Action plus all other future OSW projects in the GAA. Alternatives C through F would result in impacts similar to the Proposed Action, but the magnitude of those impacts would be reduced based on the smaller | alternative. As discussed earlier, TSS effects on sea turtles are likely to be negligible adverse because of limited potential exposure to elevated TSS. No population-level effects on sea turtles are expected from reduced water quality. Therefore, Alternative G when combined with past, present, and reasonably foreseeable activities would result in **negligible** adverse cumulative effects on sea turtles. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | footprint proposed for these alternatives. As discussed above, TSS effects on sea turtles are likely to be negligible adverse because of limited potential exposure to elevated TSS. No population-level effects on sea turtles are expected from reduced water quality. Therefore, the Proposed Action and Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in **negligible** adverse cumulative effects on sea turtles. | |
| Traffic: Vessel collisions | Current OSW and non-OSW activities contributing to this sub-IPF include permitted and built OSW COP projects, port traffic levels, fairways, traffic separation schemes, commercial vessel traffic, recreational and fishing activity, and scientific and academic vessel traffic. Propeller and collision injuries from boats and ships are common in sea turtles. Vessel strike is an increasing concern for sea turtles, especially in the southeastern United States, where development along the coasts is likely to result in increased recreational boat traffic. In the United States, the percentage of strandings of loggerhead sea turtles that were attributed to vessel strikes increased from approximately 10% in the 1980s to a record high of 20.5% in 2004 (NMFS and USFWS 2007). Sea turtles are most susceptible to vessel collisions in coastal waters, where they forage from May through November. Vessel speed could exceed 10 knots in such waters, and evidence suggests that they cannot reliably avoid being struck by vessels exceeding 2 knots (Hazel et al. 2007). | Vessel traffic associated with non-OSW development has the potential to result in an increased collision risk. While these impacts would be high consequence, the patchy distribution of sea turtles makes stock or population-level effects unlikely (Navy 2018). | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Climate change: Warming and sea level rise, storm severity/frequency | Increased storm frequency could lead to long-term, high-consequence impacts on sea turtle onshore beach nesting habitat, including changes to nesting periods, changes in sex ratios of nestlings, and drowned nests as well as loss or degradation of nesting beaches. Offshore impacts, including sedimentation of nearshore hard-bottom habitats, have the potential to result in long-term, high-consequence changes to foraging habitat availability for green turtles. | No future activities were identified within the GAA for sea turtles other than ongoing activities. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Climate change: Ocean acidification | This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine ecosystems by contributing to reduced growth | No future activities were identified within the GAA for sea turtles other than ongoing activities. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | or the decline of invertebrates that have calcareous shells. | | | | |
| Climate change: Warming and sea level rise, altered habitat/ecology | This sub-IPF has the potential to lead to long-term, high-consequence impacts on sea turtles by influencing distributions of sea turtles and/or prey resources. This sub-IPF has the potential to lead to long-term, high-consequence impacts on sea turtle breeding, foraging, and sheltering habitat use. | No future activities were identified within the GAA for sea turtles other than ongoing activities. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Climate change: Warming and sea level rise, altered migration patterns | This sub-IPF has the potential to lead to long-term, high-consequence impacts on sea turtle habitat use and migratory patterns. | No future activities were identified within the GAA for sea turtles other than ongoing activities. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Climate change: Warming and sea level rise, disease frequency | Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the frequencies of various diseases of sea turtles such as fibropapillomatosis. | No future activities were identified within the GAA for sea turtles other than ongoing activities. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Climate change: Warming and sea level rise, protective measures (barriers, sea walls) | The proliferation of coastline protections have the potential to result in long-term, high-consequence impacts on sea turtle nesting by eliminating or precluding access to potentially suitable nesting habitat or access to potentially suitable habitat. | No future activities were identified within the GAA for sea turtles other than ongoing activities. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |
| Climate change: Warming and sea level rise; storm severity, frequency, sediment erosion, deposition | Sediment erosion and/or deposition in coastal waters has the potential to result in long-term, high-consequence impacts on green sea turtle foraging habitat. Additionally, sediment erosion has the potential to result in the degradation or loss of potentially suitable nesting habitat. | No future activities were identified within the GAA for sea turtles other than ongoing activities. | See Section 3.19.2.2.2 for analysis. | See Sections 3.19.2.3 and 3.19.2.4 and Section 3.19.2.1, Table 3.19-2 for analysis. | See Section 3.19.2.5 and Section 3.19.2.1, Table 3.19-2 for analysis. |

* Includes all constructed and permitted COP projects within the sea turtles GAA: Block Island, SFWF, Vineyard Wind 1, and Coastal Virginia Offshore Wind.

## Demographics, Employment, and Economics

**Table E2-7. Summary of Activities and the Associated Impact-Producing Factors for Demographics, Employment, and Economics**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Energy generation/ security | Constructed and permitted OSW COP projects are slated to provide up to 972 MW of power. In 2017, Massachusetts energy production totaled 125.2 trillion British thermal units (Btu), of which 72.4 trillion Btu was from renewable sources, including geothermal, | Ongoing development of onshore solar and wind energy would provide diversified, small-scale energy generation. State and regional energy markets would require additional peaker plants and energy storage to meet the electricity needs when utility scale renewables are not producing. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | hydroelectric, wind, solar, and biomass (U.S. Energy Information Administration 2018).<br>In 2019, Rhode Island energy production totaled 8.8 trillion Btu from renewable resources, including biofuels, wood and waste, and noncombustible renewables. In the same year, Connecticut energy production totaled 211.9 trillion Btu, of which 37.2 trillion Btu was from renewable sources (U.S. Energy Information Administration 2021). | | | | |
| Light: Structures | Constructed and permitted OSW COP projects are introducing 83 lighted structures into the GAA. Offshore buoys and towers also emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis. These light sources may be visible at night and could impact employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit. | Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| Light: Vessels | OSW and non-OSW ocean vessels have an array of lights, including navigational lights and deck lights. These light sources may be visible at night and could impact employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit. | Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| New cable emplacement/ maintenance | Constructed and permitted OSW COP projects are introducing an estimated 498 miles of new offshore cable in the GAA. This and other non-OSW cable maintenance activities can disturb the seafloor and cause temporary increases in suspended sediment; these disturbances could cause a disruption to commercial fishing or for-hire recreational fishing businesses but would be limited to emplacement corridors. In the GAA for demographics, employment, and economics there are six existing power cables. | The FCC has two pending submarine telecommunication cable applications in the North Atlantic. Future new cables would disturb the seafloor and cause temporary increases in suspended sediment, resulting in infrequent, localized, short-term impacts over the next 35 years. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| Port utilization: Expansion | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The | Ports would need to perform maintenance and upgrade facilities over the next 35 years to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | New Bedford Marine Commerce Terminal was upgraded by the port specifically to support the construction of OSW energy facilities. | | | | |
| Port utilization: Maintenance/ Dredging | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities The major ports in the United States are seeing increased vessel visits, as vessel size also increases. As ports expand, maintenance dredging of shipping channels is expected to increase. | Ports would need to perform maintenance and upgrades over the next 35 years to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| Presence of structures: Allisions | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. To the extent that the impacts of future OSW activities result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. However, WTG spacing and orientation measures, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction related to OSW energy development, would help ensure that fishing businesses could continue to operate with minimal disruption. | Vessel allisions with non-OSW stationary objects should not increase meaningfully without a substantial increase in vessel congestion. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| Presence of structures: Entanglement, gear loss, gear damage | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Such loss and damage are direct costs for gear owners and are expected to continue at or near current levels. | Reasonably foreseeable activities (non–OSW) would not result in additional offshore structures. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| Presence of structures: Fish aggregation | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these locations, which could be known as fish | Reasonably foreseeable activities (non–OSW) would not result in additional offshore structures. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | aggregating devices (FADs). Recreational and commercial fishing can occur near the FADs, although recreational fishing is more popular because commercial mobile fishing gear is more likely to snag on FADs. | | | | |
| Presence of structures: Habitat conversion | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Structures, including foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented species thus benefit on a constant basis. Structure-oriented fishes are attracted to these locations, which could be known as FADs. Recreational and commercial fishing can occur near the FADs, although recreational fishing is more popular because commercial mobile fishing gear is more likely to snag on FADs. | Reasonably foreseeable activities (non–OSW) would not result in additional offshore structures. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| Presence of structures: Navigation hazard | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure because vessels need to avoid both the structure and each other. To the extent that the impacts of future OSW activities result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. However, WTG spacing and orientation measures, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction related to OSW energy development, would help ensure that fishing businesses could continue to operate with minimal disruption. | Vessel traffic, overall, is not expected to meaningfully increase over the next 35 years. The presence of navigation hazards is expected to continue at or near current levels. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| Presence of structures: Space use conflicts | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. To the extent that the impacts of future OSW activities result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel | Reasonably foreseeable activities (non–OSW) would not result in additional offshore structures. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | crewmembers and seafood processor workers, could be adversely affected. However, WTG spacing and orientation measures, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction related to OSW energy development, would help ensure that fishing businesses could continue to operate with minimal disruption. | | | | |
| Presence of structures: Viewshed | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. These structures are visible from certain views and could impact employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit. | Reasonably foreseeable activities (non–OSW) would not result in additional offshore structures. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| Traffic: Vessels | Constructed and permitted OSW COP projects are using vessels to support construction and O&M activities. Ports and marine traffic related to shipping, fishing, and recreation are important to the region's economy. Vessel traffic related to OSW energy project construction can cause congestion and delays, thereby increasing vessel fuel costs (i.e., for vessels forced to wait for port traffic to pass) and decreasing productivity for commercial shipping businesses. | New vessel traffic near the GAA would be generated by proposed barge routes and dredging demolition sites over the next 35 years. Marine commerce and related industries would continue to be important to the economy. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| Traffic: Vessel collisions | The region's substantial OSW and non-OSW marine traffic could result in occasional vessel collisions, which would result in costs to the vessels involved. The likelihood of collisions is expected to continue at or near current rates. | No substantial changes are anticipated. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| Traffic: Vehicle | Onshore OSW and non-OSW development activities support local population growth, employment, and economies. Disturbances can cause temporary, localized traffic delays and restricted access to adjacent properties. | Onshore development projects would be ongoing in accordance with local government land use plans and regulations. | See Section 3.11.2.2.2 for analysis. | See Sections 3.11.2.3 and 3.11.2.4 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. | See Section 3.11.2.5 and Section 3.11.2.1, Table 3.11-5 for analysis of impacts. |
| Climate change | Climate models predict climate change if current trends continue. Climate change has adverse implications for demographics and the economic health of coastal communities, due in part to the costs of resultant damage to property and infrastructure, fisheries and other natural resources, increased disease frequency, and sedimentation, among other factors. | Onshore projects that reduce air emissions could contribute to the effort to limit climate change. Onshore solar and wind energy projects, although producing less energy than potential OSW developments, would also provide incremental reductions. | Because future OSW energy facilities would produce less GHG emissions than fossil fuel–combusting power generation facilities with similar capacities, these facilities would reduce the adverse effects of climate change on the demographic and economic health of coastal communities in the GAA. These beneficial impacts would be long term, but they would be **negligible** adverse given the magnitude of global GHG emissions and their adverse | During operations, the Proposed Action would have a beneficial impact to demographic, employment, or economic conditions in the GAA by contributing to a broader combination of actions to reduce future impacts from climate change over the long term. These beneficial impacts would be long term, but they would be **negligible** adverse given the magnitude of global GHG emissions and their adverse demographic, | Similar impacts to the Proposed Action and Alternatives C through F: long term beneficial **negligible** during operations and cumulatively long term **major** adverse for all design configurations analyzed. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | demographic, employment, and economic impacts. | employment, and economic impacts for all design configurations analyzed under the Proposed Action. Collectively, the Proposed Action when combined with past, present, and reasonably foreseeable projects would have long-term **major** adverse impacts on demographic, employment, and economic conditions in the GAA, primarily through the associated risks of flooding, extreme heat, and storm damage.<br>Alternatives C through F would be similar to that for the Proposed Action: long term beneficial **negligible** during operations and cumulatively long term **major** adverse for all design configurations analyzed. | |

* Includes all constructed and permitted COP projects within the demographics, employment, and economics GAA: Block Island, SFWF, Vineyard Wind 1, and Coastal Virginia Offshore Wind.

## Environmental Justice

No IPFs with solely negligible impacts were identified.

**Table E2-8. Summary of Activities and the Associated Impact-Producing Factors for Environmental Justice**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/hazmat | Constructed and permitted OSW COP projects can accidentally release an estimated 900,000 gallons of fuel, oils, or other hazardous materials in the GAA. Accidental releases of fuels and fluids occur during vessel usage for dredge material ocean disposal; fisheries use; marine transportation; military use; survey activities; and cable, line, and pipeline laying. According to the Department of Energy, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution Federation Limited (2021), which collects data on oil spills from tankers and other sources. From 1990 to 1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and into the offshore was < 70,000 barrels. Impacts on water quality would be expected to brief and | Future accidental releases from offshore vessel usage, spills, and consumption would likely continue a similar trend to ongoing uses. Impacts are unlikely to affect water quality. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | localized from accidental releases. All vessels would comply with USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills. | | | | |
| Discharges | Discharges impact water quality by introducing nutrients, chemicals, and sediments to the water. Constructed and permitted OSW COP projects can potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris in the GAA. There are regulatory requirements related to prevention and control of discharges, the prevention and control of accidental spills, and the prevention and control of nonindigenous species. | Increased coastal development is causing increased nutrient pollution in communities. In addition, ocean disposal activity in the North and Mid-Atlantic is expected to gradually decrease or remain stable. Impacts of ocean disposal on water quality are minimized because the EPA has established dredge spoil criteria and regulates the disposal permits issued by the USACE.<br>The impact on water quality from sediment suspension during these future activities would be short term and localized. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| Air emissions: Construction/ Decommissioning | Ongoing population growth and new development within the GAA is likely to increase traffic, with a resulting increase in emissions from motor vehicles. Some new industrial development could result in emissions-producing uses. At the same time, many industrial waterfront areas near environmental justice communities are losing industrial uses and converting to more commercial or residential uses.<br>Construction of permitted OSW projects in the GAA is estimated to generate 124,277 tons of $NO_X$, 2,684 tons of $SO_2$, 5,795 tons of $PM_{10}$, and 7,709,706 metric tons of $CO_2e$. Operation of permitted and built OSW projects in the GAA is estimated to generate 2,940 tons of $NO_X$, 44 tons of $SO_2$, 110 tons of $PM_{10}$, and 700,114 metric tons of $CO_2e$. These volumes represent a negligible increase to county emissions; additionally, only a portion of the generated emissions would actually reach nearby counties and would depend on wind conditions at the time the emissions are generated. | New development could include emissions-producing industry and new development that would increase emissions from motor vehicles. Some historically industrial waterfront locations would continue to lose industrial uses, with no new industrial development to replace it. Cities such as New Bedford are promoting start-up space and commercial uses to reuse industrial space. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| Air emissions: O&M | Ongoing population growth and new development within the GAA is likely to increase traffic, with a resulting increase in emissions from motor vehicles. Some new industrial development could result in emissions-producing uses. At the same time, many industrial waterfront areas near | New development could include emissions-producing industry and new development that would increase emissions from motor vehicles. Some historically industrial waterfront locations would continue to lose industrial uses, with no new industrial development to replace it. Cities such as New | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | environmental justice communities are losing industrial uses and converting to more commercial or residential uses.<br>For permitted OSW projects in the GAA, see Air emissions: construction/ decommissioning. | Bedford are promoting start-up space and commercial uses to reuse industrial space. | | | |
| Light: Structures | Constructed and permitted OSW COP projects are introducing 83 lighted structures into the GAA. Offshore buoys and towers also emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis. These light sources may be visible at night and could impact employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit. | Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| New cable emplacement/maintenance | Constructed and permitted OSW COP projects are introducing an estimated 498 miles of new offshore cable in the GAA. This and other non-OSW cable maintenance activities can disturb the seafloor and cause temporary increases in suspended sediment; these disturbances could cause a disruption to commercial fishing or for-hire recreational fishing businesses but would be limited to emplacement corridors. | The FCC has two pending submarine telecommunication cable applications in the North Atlantic. Future new cables would disturb the seafloor and cause temporary increases in suspended sediment, resulting in infrequent, localized, and short-term impacts over the next 35 years. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| Noise: O&M | Offshore O&M of constructed and permitted OSW COP projects generates negligible amounts of noise. | There are no reasonably foreseeable offshore facilities that would generate noise from O&M. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| Noise: Pile driving | Noise from pile driving associated with permitted OSW COP projects is occurring during installation of foundations for offshore structures. Noise from pile driving also occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area. | No future activities were identified within the GAA other than ongoing activities. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| Noise: Trenching | Noise from trenching/cable laying associated with permitted OSW COP projects may occur in the GAA. Infrequent trenching for other pipeline and cable laying activities also emits noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise are typically less prominent | Periodic trenching would be needed over the next 35 years for repair or new installation of underground infrastructure. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | than the impacts of the physical disturbance and sediment suspension. | | | | |
| Noise: Vessels | OSW and non-OSW Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF consist of permitted and built OSW COP projects, commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels. | Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| Presence of structures: Entanglement, gear loss/damage | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Such loss and damage are direct costs for gear owners and are expected to continue at or near current levels. | Reasonably foreseeable activities (non–OSW) would not result in additional offshore structures. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| Presence of structures: Navigation hazard | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure because vessels need to avoid both the structure and each other. To the extent that the impacts of future OSW activities result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. However, WTG spacing and orientation measures, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction related to OSW energy development, would help ensure that fishing businesses could continue to operate with minimal disruption. | Vessel traffic is generally not expected to meaningfully increase over the next 35 years. The presence of navigation hazards is expected to continue at or near current levels. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| Presence of structures: Onshore construction | Onshore OSW and non-OSW development supports local population growth, employment, and economics. | Onshore development would continue in accordance with local government land use plans and regulations. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Presence of structures: Space use conflicts | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. To the extent that the impacts of future OSW activities result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. However, WTG spacing and orientation measures, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction related to OSW energy development, would help ensure that fishing businesses could continue to operate with minimal disruption. | Reasonably foreseeable activities (non–OSW) would not result in additional offshore structures. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| Presence of structures: Viewshed | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. These structures are visible from certain views and could impact employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit. | Reasonably foreseeable activities (non–OSW) would not result in additional offshore structures. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| Traffic: Vessels | Constructed and permitted OSW COP projects are using vessels to support construction and O&M activities. Ports and marine traffic related to shipping, fishing, and recreation are important to the region's economy. Vessel traffic related to OSW energy project construction can cause congestion and delays, thereby increasing vessel fuel costs (i.e., for vessels forced to wait for port traffic to pass) and decreasing productivity for commercial shipping businesses. | New vessel traffic near the GAA would be generated by proposed barge routes and dredging demolition sites over the next 35 years. Marine commerce and related industries would continue to be important to employment. | See Section 3.12.2.2.2 for analysis. | See Section 3.12.2.3 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |
| Climate change | Climate models predict climate change if current trends continue. Climate change has adverse implications for demographics and the economic health of coastal communities, due in part to the costs of resultant damage to property and infrastructure, fisheries, and other natural resources; increased disease frequency; and sedimentation, among other factors. Factors that make environmental justice populations particularly vulnerable to the adverse health, safety, and economic impacts of climate change-–related events such as heat waves, heavy flooding, and droughts include where they live, language | Onshore projects that reduce air emissions could contribute to the effort to limit climate change. Onshore solar and wind energy projects, although producing less energy than potential OSW developments, would also provide incremental reductions. | See Section 3.12.2.2.2 for analysis. | See Sections 3.12.2.3 and 3.12.2.4 and Section 3.12.2.1, Table 3.12-4 for analysis of impacts. | See Section 3.12.2.1, Table 3.12-4 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | barriers, their health, and their limited financial resources to cope with these effects (Cho 2020; EPA 2017). The frequency and intensity of climate-related events such as heat waves and heavy flooding are becoming more frequent and more intense across most land regions, and this trend is expected to continue (IPCC 2021). | | | | |

* Includes all constructed and permitted COP projects within the environmental justice GAA: Block Island, SFWF, Vineyard Wind 1, and Coastal Virginia Offshore Wind.

## Cultural Resources

No IPFs with solely negligible impacts were identified.

**Table E2-9**. **Summary of Activities and the Associated Impact-Producing Factors for Cultural Resources**

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/hazmat | Constructed and permitted OSW COP projects can accidentally release an estimated 900,000 gallons of fuel, oils, or other hazardous materials in the viewshed GAA. See Table E1-4 for water quality for a quantitative analysis of these risks. Accidental releases of fuel/fluids/hazmat occur during vessel use for recreational, fisheries, marine transportation, or military purposes and other ongoing activities. Both released fluids and cleanup activities that require the removal of contaminated soils and/or seafloor sediments can cause impacts on cultural resources because resources are impacted by the released chemicals as well as the ensuing cleanup activities. | Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases within the GAA for cultural resources, increasing the frequency of small releases. Although the majority of anticipated accidental releases would be small, resulting in small-scale impacts on cultural resources, a single, large-scale accidental release such as an oil spill, could have significant impacts on marine and coastal cultural resources. A large-scale release would require extensive cleanup activities to remove contaminated materials resulting in damage to or the complete removal of terrestrial and marine cultural resources. In addition, the accidentally released materials in deep water settings could settle on seafloor cultural resources such as wreck sites, accelerating their decomposition and/or covering them and making them inaccessible/unrecognizable to researchers, resulting in a significant loss of historic information. As a result, although considered unlikely, a large-scale accidental release and associated cleanup could result in permanent, geographically extensive, and large-scale impacts on cultural resources. | See Sections 3.10.2.2.2 and 3.10.2.2.3 for analysis. | See Sections 3.10.2.5 and 3.10.2.6 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Trash and debris | Constructed and permitted OSW COP projects can potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris in the GAA. Accidental releases of trash and debris also occur during vessel use for recreational, fisheries, marine transportation, or military purposes and other ongoing activities. While the released trash and debris can directly affect cultural resources, the majority of impacts associated with accidental releases occur during cleanup activities, especially if soil or sediment removed during cleanup affect known and undiscovered cultural resources. In addition, the presence of large amounts of trash on shorelines or the ocean surface can impact the cultural value of TCPs for stakeholders. State and federal laws prohibiting large releases of trash would limit the size of any individual release and ongoing local, state, and federal efforts to clean up trash on beaches and waterways would continue to mitigate the effects of small-scale accidental releases of trash. | Future activities with the potential to result in accidental releases consist of construction and operations of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications). Accidental releases would continue at current rates along the Northeast Atlantic Coast. | See Sections 3.10.2.2.2 and 3.10.2.2.3 for analysis. | See Sections 3.10.2.5 and 3.10.2.6 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |
| Anchoring | The use of OSW and non-OSW vessel anchoring and gear (i.e., wire ropes, cables, chains on the seafloor) that disturbs the seafloor, such as bottom trawls and anchors, by military, recreational, industrial, and commercial vessels can impact cultural resources by physically damaging marine cultural resources such as shipwrecks and debris fields. | Future activities with the potential to result in anchoring/gear utilization consist of construction and operations of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); military use; marine transportation; fisheries use and management; and oil and gas activities. These activities are likely to continue to occur at current rates along the entire coast of the eastern United States. | See Section 3.10.2.2.2 for analysis. | See Section 3.10.2.5 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |
| Light: Vessels | Light associated with military, commercial, or OSW and non-OSW construction vessel traffic can temporarily affect coastal historic structures and TCP resources when the addition of intrusive, modern lighting changes the physical environment (setting) of cultural resources. The impacts of construction and operations lighting would be limited to cultural resources on the shoreline for which a nighttime sky is a contributing element to historic integrity. This excludes resources that are closed at night, such as historic buildings, lighthouses, and battlefields, and resources that generate their own nighttime light, such | Future activities with the potential to result in vessel lighting impacts consist of construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. | See Section 3.10.2.2.4 for analysis. | See Section 3.10.2.6 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | as historic districts. Offshore construction activities that require increased vessel traffic, construction vessels stationed offshore, and construction area lighting for prolonged periods can cause more sustained and significant visual impacts on coastal historic structure and TCP resources. | | | | |
| Light: Structures | The construction of new OSW and non-OSW structures that introduce new light sources into the setting of historic architectural properties or TCPs can result in impacts, particularly if the historic and/or cultural significance of the resource is associated with uninterrupted nighttime skies or periods of darkness. Any tall structure (commercial building, radio antenna, large satellite dishes, etc.) requiring nighttime hazard lighting to prevent aircraft collision can cause these types of impacts. | Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore. | See Section 3.10.2.2.4 for analysis. | See Section 3.10.2.6 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |
| Presence of structures | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA, which are visible from some coastal locations in New York, Connecticut, Rhode Island, and Massachusetts. | Non-OSW structures that could be viewed would be limited to met towers. Marine activity would also occur within the marine viewshed of the GAA. | See Sections 3.10.2.2.2, 3.10.2.2.3, and 3.10.2.2.4 for analysis. | See Sections 3.10.2.5, 3.10.2.6, and 3.10.2.7 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |
| Presence of structures: Onshore construction | Onshore OSW and non-OSW construction activities can impact terrestrial cultural resources by damaging and/or removing resources. | Future activities that could result in terrestrial land disturbance impacts consist of onshore residential, commercial, industrial, and military development activities in and near Quonset Point, Rhode Island. Onshore construction would continue at current rates. | See Section 3.10.2.2.3 for analysis. | See Section 3.10.2.5 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |
| New cable emplacement/ maintenance | Current offshore construction activity is limited to submarine fiber-optic and electrical transmission cables, including six existing power cables in the GAA. Constructed and permitted OSW COP projects are also introducing an estimated 462 miles of new offshore cable in the GAA. Cable installation and maintenance from future OSW activities and other submarine cables could physically impact marine cultural resources. | Future activities with the potential to result in seafloor disturbances similar to offshore impacts consist of construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; and oil and gas activities. Such activities could cause impacts on submerged marine cultural resources, including shipwrecks and formerly subaerially exposed pre-contact Native American cultural sites. | See Sections 3.10.2.2.2 and 3.10.2.2.3 for analysis. | See Sections 3.10.2.5 and 3.10.2.6 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |
| Climate change: Warming and sea level rise, storm severity/frequency | Sea level rise and increased storm severity and frequency would result in impacts on archaeological, architectural, and TCP resources. Increased storm frequency and | Sea level rise and storm severity/frequency would increase due to the effects of climate change. | See Sections 3.10.2.2.2, 3.10.2.2.3, and 3.10.2.2.4 for analysis. | See Sections 3.10.2.5, 3.10.2.6, and 3.10.2.7 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | severity would also result in damage to and/or destruction of architectural properties. Sea level rise would increase erosion-related impacts on archaeological and architectural resources, while sea level rise would inundate archaeological, architectural, and TCP resources. | | | | |
| Climate change: Warming and sea level rise, altered habitat/ecology | Altered habitat/ecology related to warming seas and sea level rise would impact the ability of Native Americans and other communities to use maritime TCPs for traditional fishing, shell fishing, and fowling activities. | The rate of change to habitats/ecology would increase as a result of climate change. | See Sections 3.10.2.2.2, 3.10.2.2.3, and 3.10.2.2.4 for analysis. | See Sections 3.10.2.5, 3.10.2.6, and 3.10.2.7 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |
| Climate change: Warming and sea level rise, altered migration patterns | Altered migration patterns related to warming seas and sea level rise would impact the ability of Native Americans and other communities to use maritime TCPs for traditional fishing, shellfishing, and fowling activities. | The rate of change to migratory animal patterns would increase as a result of climate change. | See Sections 3.10.2.2.2, 3.10.2.2.3, and 3.10.2.2.4 for analysis. | See Sections 3.10.2.5, 3.10.2.6, and 3.10.2.7 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |
| Climate change: Warming and sea level rise, property/ infrastructure damage | Sea level rise and increased storm severity and frequency would result in impacts on archaeological, architectural, and TCP resources. Increased storm frequency and severity would result in damage to and/or destruction of architectural properties. Sea level rise would increase erosion-related impacts on archaeological and architectural resources, while sea level rise would inundate archaeological, architectural, and TCP resources. | The rate of property and infrastructure damage would increase as a result of climate change. | See Sections 3.10.2.2.2, 3.10.2.2.3, and 3.10.2.2.4 for analysis. | See Sections 3.10.2.5, 3.10.2.6, and 3.10.2.7 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |
| Climate change: Warming and sea level rise, protective measures (barriers, sea walls) | The installation of protective measures such as barriers and sea walls would impact cultural resources during associated ground-disturbing activities. Construction of these modern protective structures would alter the viewsheds from historic properties and/or TCPs, resulting in impacts on the historic and/or cultural significance of resources. | The installation of coastal protective measures would increase as a result of climate change. | See Sections 3.10.2.2.2, 3.10.2.2.3, and 3.10.2.2.4 for analysis. | See Sections 3.10.2.5, 3.10.2.6, and 3.10.2.7 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |
| Climate change: Warming and sea level rise, storm severity/frequency, sediment erosion, deposition | Sea level rise and increased storm severity and frequency would result in impacts on archaeological, architectural, and TCP resources. Increased storm frequency and severity would result in damage to and/or destruction of architectural properties. Sea level rise would increase erosion-related impacts on archaeological and architectural resources, while sea level rise would inundate | Sea level rise and storm severity/frequency would increase due to the effects of climate change. | See Sections 3.10.2.2.2, 3.10.2.2.3, and 3.10.2.2.4 for analysis. | See Sections 3.10.2.5, 3.10.2.6, and 3.10.2.7 and Section 3.10.2.1, Table 3.10-7 for analysis of impacts. | See Section 3.10.2.1, Table 3.10-7 for analysis of impacts. |

| Associated IPF: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | archaeological, architectural, and TCP resources. | | | | |

* Includes three constructed and permitted COP projects within the cultural resources viewshed GAA: Block Island, SFWF, and Vineyard Wind 1. The marine resources GAA only intersects SFWF, and the terrestrial GAA does not intersect any constructed and permitted COP projects.

## Recreation and Tourism

**Table E2-10. Summary of Activities and the Associated Impact-Producing Factors for Recreation and Tourism**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Anchoring | Constructed and permitted OSW COP projects are introducing an estimated 943 acres of anchoring in the GAA. Anchoring also occurs due to ongoing military, survey, commercial, and recreational activities. The presence of anchored vessels can increase navigation complexity for recreational vessels. Increased turbidity from anchoring can also briefly alter the behavior of species important to recreational fishing and sightseeing. However, impacts are anticipated to be temporary and localized. | Impacts from anchoring would continue and could increase due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Modest growth in vessel traffic could increase the temporary, localized impacts of navigational hazards, increased turbidity levels, and potential for direct contact causing mortality of benthic resources. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| Light: Vessels | Nighttime vessel activity associated with permitted and built OSW COP projects is occurring during installation and O&M of various project components (cables, substation etc.). This source, along with light associated with other military, commercial, or construction vessel traffic, can temporarily affect coastal viewsheds when the addition of intrusive, modern lighting changes the physical environment (setting). | Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| Light: Structures | Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis. Constructed and permitted OSW COP projects are also introducing 81 lighted structures into the GAA. Lighted structures can result in impacts to impact recreation and tourism if recreation decisions are influenced by lighting, particularly if the light source affects uninterrupted nighttime skies or periods of darkness. | Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| New cable emplacement/ maintenance | Constructed and permitted OSW COP projects are introducing an estimated 462 miles of new offshore cable in the GAA. This and other | Cable maintenance or replacement of existing cables in the GAA would occur infrequently and would generate short-term disturbances. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | sources of cable activities can reduce recreational opportunities if individuals prefer to avoid the noise and disruption caused by installation; these disturbances would be localized and limited to emplacement corridors. | | | | |
| Noise: O&M | Noise impacts are expected from OSW and non-OSW O&M activity. However, sound pressure levels would be at or below ambient levels at relatively short distances from WTG foundations. | Not applicable. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| Noise: Pile driving | Noise from pile driving associated with permitted OSW COP projects is occurring during installation of foundations for offshore structures. Noise from pile driving also occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area. | No future activities were identified within the recreation and tourism GAA other than ongoing activities. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts during offshore activities. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| Noise: Cable laying/trenching | Noise from trenching/cable laying associated with permitted OSW COP projects may occur in the GAA. Offshore trenching occurs periodically in connection with non-OSW cable installation or sand and gravel mining. These disturbances are temporary, local, and extend only a short distance beyond the work area. | No future activities were identified within the recreation and tourism GAA other than ongoing activities. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| Noise: Vessels | Vessel noise occurs offshore and more frequently near ports and docks. Ongoing OSW and non-OSW activities that contribute to this sub-IPF consist of permitted and construction OSW COP projects, commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels. | Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts during offshore activities. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| Port utilization: Expansion | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. The New Bedford Marine Commerce Terminal was upgraded by the port specifically to support the construction of OSW energy facilities. | Ports would need to perform maintenance and upgrade facilities over the next 35 years to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. | **Offshore:** Existing ports used for staging and construction of planned future projects could influence recreational opportunities or access. However, these ports are primarily industrial in character and are not intended to support recreational activity as a primary use. If used secondarily for recreation, any port improvements could result in short-term delays and crowding during construction but would result in increased berths and amenities for recreational vessels, improved | **Offshore:** Existing ports in the GAA that would be used for Project staging and construction consist of the Port of Montauk, Port Jefferson, Port of Providence, Port of Davisville at Quonset Point, Point of Galilee, Port of New London, and New Bedford Marine Commerce Terminal. However, these ports are primarily industrial in character and are not intended to service recreational activity. Therefore, the Proposed Action would have a long-term **negligible** adverse impact on recreation and | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, Alternative G would have a **negligible** adverse impact on recreation and tourism due to port utilization within the GAA. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | navigational channels, or opportunities to separate recreational boating from commercial shipping in the long term. Because impacts to offshore recreation and tourism related to current marine industrial activities at existing ports would not experience significant changes, regardless of OSW industry development (BOEM 2016), only **negligible** adverse impacts on recreation and tourism could occur. | tourism due to port utilization within the GAA. Impacts of Alternatives C through F would be similar to the Proposed Action.<br>As previously noted, existing ports used for O&M of the Project could influence recreational opportunities or access. However, these ports are primarily industrial in character and are not intended to support recreational activity as a primary use. Because impacts to offshore recreation and tourism related to current marine industrial activities at existing ports would not experience significant changes, regardless of OSW industry development (BOEM 2016), negligible adverse impacts on recreation and tourism could occur. Impacts during decommissioning would be similar to the impacts during construction and installation. Although Alternatives C through F would reduce the number of WTGs and associated IACs, the impact would be **negligible** adverse.<br>Port activity would result in increased short-term construction traffic and long-term operational traffic to the No Action Alternative, which could coincide with recreational activity in the vicinity, depending on transportation type (e.g., vessels, rail, or road vehicle). However, activities related to the Proposed Action at port facilities would occur within the boundaries of existing ports or other repurposed industrial facilities where recreational users would not be expected to occur. Project activities at ports would be similar to those already taking place at these facilities and would be consistent with state and local agency guidelines regarding land use, access, noise and air quality, and other impacts on nearby neighborhoods. Alternatives C through F would reduce the number of WTGs and associated IACs, but Project impacts on this IPF would be similar to the Proposed Action, Therefore, the Proposed Action and Alternatives C through F when combined with past, present, and reasonably foreseeable activities would have **negligible** adverse cumulative impacts on recreation and tourism. | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | **Onshore:** Impacts to onshore recreation and tourism related to current marine industrial activities at existing ports would not result in significant changes, regardless of OSW industry development (BOEM 2016). Therefore, impacts would be **negligible** adverse. | **Onshore:** The proposed O&M facility (located in the Port of Brooklyn, Port of Davisville at Quonset Point, Port of Galilee, Port Jefferson, or Port of Montauk) would be located within an existing industrial port. No new building construction would occur at the Port of Galilee or Port of Brooklyn; use of these ports is assumed to be limited to existing facilities maintained by the ports. However, a new building with up to 1,000 square feet of office space and up to 11,000 square feet of equipment storage space could be constructed at the Port of Davisville at Quonset Point or the Port of Montauk. A BOEM study suggests that impacts on recreation and tourism related to current marine industrial activities at existing ports would not experience significant long-term changes, regardless of OSW industry development (BOEM 2016). However, the study notes that although the Atlantic Coast already possesses the necessary infrastructure to support OSW, the industry is still evolving (BOEM 2016), and communication, flexibility, and scalability are needed to ensure port selection would not impact tourism or recreation. Based on BOEM's findings, **negligible** temporary adverse impacts to recreation or tourism activities from port use are anticipated during construction.<br>O&M facilities and activity would be indistinguishable from other industrial or commercial businesses and maritime activities that typically occur at proposed port locations. As these ports do not provide recreation as a primary service, O&M would have **negligibl**e adverse impacts on onshore recreation and tourism.<br>Project facilities and port activity would be indistinguishable from other industrial or commercial businesses and maritime activities that typically occur at proposed port locations. As these ports do not provide recreation as a primary service, the Proposed Action and Alternatives C through F when combined with past, present, and reasonably foreseeable projects would result in | **Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, Alternative G would have a **negligible** adverse impact on recreation and tourism due to port utilization within the GAA. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | temporary **negligible** adverse cumulative impacts to onshore recreation and tourism. | |
| Port utilization: Maintenance/ Dredging | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. Periodic maintenance is necessary for harbors within the GAA. | Ongoing maintenance and dredging of harbors within the GAA would continue as needed. No specific projects are known. | See Port Utilization: Expansion for analysis of offshore and onshore impacts. | See Port Utilization: Expansion for analysis of offshore and onshore impacts. | See Port Utilization: Expansion for analysis of offshore and onshore impacts. |
| Presence of structures: Allisions | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA. An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. The presence of OSW structures increases the GAA's navigational complexity, thereby increasing the risk of allision or collision. However, WTG spacing is anticipated to reduce, but not eliminate, navigational complexity during the operations phases of the projects. | Vessel allisions with non-OSW stationary objects should not increase meaningfully without a substantial increase in vessel congestion. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts during offshore activities. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| Presence of structures: Entanglement, gear loss, gear damage | Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Additionally, constructed and permitted OSW COP projects are introducing 81 structures into the GAA that can increase risk of entanglement by recreational fishermen. | No future activities were identified within the recreation and tourism GAA other than ongoing activities. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts during offshore activities. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| Presence of structures: Fish aggregation and habitat conversion | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA. Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these locations. Recreational and commercial fishing can occur near these aggregation locations, although recreational fishing is more popular because commercial mobile fishing gear is more likely to snag on structures. | Reasonably foreseeable activities (non–OSW) would not result in additional offshore structures. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts during offshore activities. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| Presence of structures: Navigation hazard | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA. Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure because vessels need to avoid both the structure and each other. The presence of OSW structures increases the GAA's | Vessel traffic, overall, is not expected to meaningfully increase over the next 35 years. The presence of navigation hazards is expected to continue at or near current levels. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts during offshore activities. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | navigational complexity, thereby increasing the risk of allision or collision. However, WTG spacing is anticipated to reduce, but not eliminate, navigational complexity during the operations phases of the projects. | | | | |
| Presence of structures: Space use conflicts | Currently, the offshore area is occupied by marine trade, stationary and mobile fishing, and survey activities. Constructed and permitted OSW COP projects are also introducing 81 structures into the GAA. The presence of OSW structures increases the GAA's navigational complexity. The attraction of artificial reef effects also increases vessel congestion and the risk of allision, collision, and spills near structures. However, WTG spacing is anticipated to reduce, but not eliminate, space-use conflicts during the operations phases of the projects. | Reasonably foreseeable activities (non–OSW) would not result in additional offshore structures. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts during offshore activities. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| Presence of structures: Viewshed | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA, which are visible from some coastal locations in New York, Connecticut, Rhode Island, and Massachusetts. | Non-OSW structures that could be viewed in conjunction with the offshore components of the Project would be limited to met towers. Marine activity would also occur within the marine viewshed. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |
| Traffic: Vessels | The GAA would continue to have numerous ports, and the extensive OSW and non-OSW marine traffic related to shipping, fishing, and recreation would continue to be important to the region's economy. | New vessel traffic in the GAA would be generated by proposed barge routes and dredging demolition sites over the next 35 years. Marine commerce and related industries would continue to be important to the economy. | See Section 3.18.2.2.2 for analysis. | See Section 3.18.2.3 and Section 3.18.2.1, Table 3.18-2 for analysis of impacts. | See Section 3.18.2.1, Table 3.18-2 for analysis of impacts. |

* Includes three constructed and permitted COP projects within the recreation and tourism GAA: Block Island, SFWF, and Vineyard Wind 1.

## Visual Resources

No IPFs with solely negligible impacts were identified.

**Table E2-11. Summary of Activities and the Associated Impact-Producing Factors for Visual Resources**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Light: Vessels | Nighttime vessel activity associated with permitted and built OSW COP projects is occurring during installation and O&M of various project components (cables, substation, etc.). This light source, along with light associated with other military, commercial, or construction vessel traffic, can | Future activities with the potential to result in vessel lighting impacts consist of construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries | See Section 3.20.2.2.2 for analysis. | See Section 3.20.2.3 and Section 3.20.2.1, Table 3.20-1 for analysis. | See Section 3.20.2.1, Table 3.20-1 for analysis. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | temporarily affect coastal viewsheds when the addition of intrusive, modern lighting changes the physical environment (setting). Offshore construction activities that require increased vessel traffic, construction vessels stationed offshore, and construction area lighting for prolonged periods can cause more sustained and significant visual impacts. | use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. | | | |
| Light: Structures | Constructed and permitted OSW COP projects are introducing 81 lighted structures into the GAA. The construction of new structures that introduce new light sources can result in impacts, particularly if the light source affects uninterrupted nighttime skies or periods of darkness. Any tall structure (e.g., commercial building, radio antenna, large satellite dish) requiring nighttime hazard lighting to prevent aircraft collision can cause these types of impacts. | Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore. | See Section 3.20.2.2.2 for analysis. | See Section 3.20.2.3 and Section 3.20.2.1, Table 3.20-1 for analysis. | See Section 3.20.2.1, Table 3.20-1 for analysis. |
| Presence of structures | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA, which are visible from some coastal locations in New York, Connecticut, Rhode Island, and Massachusetts. | Non-OSW structures that could be viewed would be limited to met towers. Marine activity would also occur within the viewshed of the GAA. | See Section 3.20.2.2.2 for analysis. | See Section 3.20.2.3 and Section 3.20.2.1, Table 3.20-1 for analysis. | See Section 3.20.2.1, Table 3.20-1 for analysis. |

* Includes three constructed and permitted COP projects within the visual resources GAA: Block Island, SFWF, and Vineyard Wind 1.

## Commercial Fisheries and For-Hire Recreational Fishing

No IPFs with solely negligible impacts were identified.

**Table E2-12. Summary of Activities and the Associated Impact-Producing Factors for Commercial Fisheries and For-Hire Recreational Fishing**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/hazmat | Constructed and permitted OSW COP projects can accidentally release an estimated 900,000 gallons of fuel, oils, or other hazardous materials in the GAA. See Table E1-4 for a quantitative analysis of these risks. Ongoing releases are frequent and chronic. Accidental releases and discharges of fuels and fluids that reduce water quality could have a physiological or behavioral impact on some species targeted by commercial and for-hire recreational fisheries in the GAA. | Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Section 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | However, all vessels would comply with USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills. | | | | |
| Accidental releases: Trash and debris | Constructed and permitted OSW COP projects can potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris in the GAA. Trash and debris could also be accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, and lines and pipeline laying. Accidental releases of trash and debris are expected to be low probability events. | No future activities were identified within the GAA other than ongoing activities. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Section 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| Anchoring | Constructed and permitted OSW COP projects are introducing an estimated 944 acres of anchoring in the GAA. Impacts from anchoring also occur due to other ongoing military, survey, commercial, and recreational activities. The short-term, localized impact to this resource is the presence of a navigational hazard (anchored vessel) to fishing vessels. | Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Anchoring could pose a temporary (hours to days), localized (within a few hundred meters of the anchored vessel) navigational hazard to fishing vessels. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| Light | Impacts include light associated with military, commercial, or OSW and non-OSW construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis. Light can attract finfish and invertebrates, potentially affecting distributions in a highly localized area. Light may also disrupt natural cycles, e.g., spawning, possibly leading to short-term impacts. | Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| New cable emplacement/ maintenance | Constructed and permitted OSW COP projects are introducing an estimated 498 miles of new offshore cable in the GAA. This and other non-OSW cable activities can disturb the seafloor, increase suspended sediment, and cause temporary displacement of fishing vessels. These disturbances would be local and limited to the emplacement corridor. | Future new cables and cable maintenance would occasionally disturb the seafloor and cause temporary displacement in fishing vessels and increases in suspended sediment, resulting in local, short-term impacts. If the cable routes enter the GAA for this resource, short-term disruption of fishing activities would be expected. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Noise: Construction, trenching, O&M | Noise from onshore construction associated with permitted OSW COP projects is occurring during installation of various project components (cables, substation etc.). Other noise from construction occurs frequently in coastal habitats in populated areas in New England and the Mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Infrequent offshore trenching could occur in connection with cable installation. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Low levels of elevated noise from operational WTGs likely have low to no impacts on fish and no impacts at a fishery level.<br>Noise is also created by O&M of marine minerals extraction, which has small local impacts on fish, but likely no impacts at a fishery level. | Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the GAA for this resource. Noise from dredging and sand and gravel mining could occur. New or expanded marine minerals extraction could increase noise during their O&M over the next 35 years. Impacts from construction, operations, and maintenance would likely be small and local on fish and not seen at a fishery level. Periodic trenching would be needed for repair or new installation of underground infrastructure. These disturbances would be temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on commercial fish species are typically less prominent than the impacts of the physical disturbance and sediment suspension. Therefore, fishery-level impacts are unlikely. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| Noise: G&G | Noise from G&G and scientific surveys associated with permitted OSW COP projects may occur in the GAA. Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb fish and invertebrates in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions. | Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 35 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seafloor, potentially resulting in injury or mortality to finfish and invertebrates in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less intense sound waves more similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| Noise: Pile driving | Noise from pile driving associated with permitted OSW COP projects is occurring during installation of foundations for offshore structures. Noise from pile driving also occurs periodically in nearshore areas when ports or marinas, piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or the seafloor can cause | No future activities were identified within the GAA other than ongoing activities. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | injury and/or mortality to finfish and invertebrates in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area, leading to temporary, local impacts on commercial fisheries and for-hire recreational fishing. The extent depends on pile size, hammer energy, and local acoustic conditions. | | | | |
| Noise: Vessels | Vessel noise is anticipated to continue at levels similar to current levels. While OSW and non-OSW vessel noise could have some impact on behavior, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this sub-IPF consist of permitted and construction OSW COP projects, commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. | Planned new barge route and dredging disposal sites would generate vessel noise when implemented. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| Port utilization: Expansion | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 35 years. | Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Port utilization is expected to increase over the next 35 years, with increased activity during construction. The ability of ports to receive the increase in vessel traffic could require port modifications, such as channel deepening, leading to local impacts on fish populations.<br>Port expansions could also increase vessel traffic and competition for dockside services, which could affect fishing vessels. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| Presence of structures: Navigation hazard and allisions | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Other structures that pose potential navigation hazards consist of buoys and shoreline developments such as docks and ports. An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. Two types of allisions occur: drift and powered. A drift allision generally occurs when a vessel is powered down due to operator choice or power failure. A powered allision generally occurs when an operator fails to adequately | No known reasonably foreseeable structures are proposed to be located in the GAA that could affect commercial fisheries. Vessel allisions with non-OSW stationary objects should not increase meaningfully without a substantial increase in vessel congestion. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | control their vessel movements or is distracted. The presence of OSW structures increases the GAA's navigational complexity, thereby increasing the risk of allision or collision. However, WTG spacing is anticipated to reduce, but not eliminate, navigational complexity during the operations phases of the projects. | | | | |
| Presence of structures: Entanglement, gear loss, gear damage | Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Additionally, constructed and permitted OSW COP projects are introducing 83 structures into the GAA that can increase risk of entanglement. The lost gear, moved by currents, can disturb habitats and potentially harm individuals, creating small, localized, short-term impacts on fish, but likely no impacts at a fishery level. | No future activities were identified within the GAA other than ongoing activities. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| Presence of structures: Habitat conversion and fish aggregation | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly sandy seascape. A large portion is homogeneous sandy seascape, but there is some other hard and/or complex habitat. Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitats to the new hard-structure habitat. Structure-oriented fishes are attracted to these locations. These impacts are local and can be short term to permanent. Fish aggregation could be considered adverse, beneficial, or neither. Commercial and for-hire recreational fishing can occur near these structures. For-hire recreational fishing is more popular because commercial mobile fishing gear is more likely to snag on structures. | New cables, installed incrementally in the GAA over the next 20 to 35 years, would likely require hard protection atop portions of the route (see the New cable emplacement/maintenance IPF above). Any new towers, buoys, or piers would also create uncommon relief in a mostly flat seascape. Structure-oriented species could be attracted to these locations. Structure-oriented species would benefit (Claisse et al. 2014; Smith et al. 2016). This could lead to more and larger structure-oriented fish communities and larger predators opportunistically feeding on the communities as well as increased private and for-hire recreational fishing opportunities. Soft bottom is the dominant habitat type in the region, and species that rely on this habitat would not likely experience population-level impacts (Greene et al. 2010; Guida et al. 2017). These impacts are expected to be local and could be long term. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| Presence of structures: Migration disturbances | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Human structures in the marine environment (e.g., shipwrecks, artificial reefs, buoys, and oil platforms) can attract finfish and invertebrates that approach the structures during their migrations. This could slow | The infrequent installation of future new structures in the marine environment over the next 35 years could attract finfish and invertebrates that approach the structures during their migrations. This could tend to slow migrations. However, temperature is expected to be a bigger driver of habitat | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | species migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement than structure (Secor et al. 2018). There is no evidence to suggest that structures pose a barrier to migratory animals. | occupation and species movement (Secor et al. 2018). Migratory animals would likely be able to proceed from structures unimpeded. Therefore, fishery-level impacts are not anticipated. | | | |
| Presence of structures: Space use conflicts | Currently, the offshore area is occupied by marine trade, stationary and mobile fishing, and survey activities. Constructed and permitted OSW COP projects are also introducing 83 structures into the GAA. The presence of OSW structures increases the GAA's navigational complexity. The attraction of artificial reef effects also increases vessel congestion and the risk of allision, collision, and spills near structures. However, WTG spacing is anticipated to reduce, but not eliminate, space-use conflicts during the operations phases of the projects. | No known reasonably foreseeable structures are proposed for location in the GAA that could affect commercial fisheries and for-hire recreational fishing. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| Presence of structures: Cable infrastructure | The existing offshore cable infrastructure supports the economy by transmitting electric power and communications between the mainland and islands. Seven submarine cable corridors cross cumulative lease areas. Shoreline developments are ongoing and consist of docks; ports; and other commercial, industrial, and residential structures. Additionally, constructed and permitted OSW COP projects are introducing an estimated 462 miles of new offshore cable in the GAA. Increased presence of cables and cable protection may increase the risk of gear loss or entanglement. | No future activities were identified within the GAA for this resource other than ongoing activities. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| Traffic: Vessels and vessel collisions | The GAA would continue to have numerous ports, and the extensive OSW and non-OSW marine traffic related to shipping, fishing, and recreation would continue to be important to the region's economy. The region's substantial marine traffic could result in occasional collisions. Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, then navigation is more complex as the vessels need to avoid both the structure and each other. The risk for collisions is ongoing but infrequent. | New vessel traffic in the GAA would consistently be generated by proposed barge routes and dredging demolition sites. Marine commerce and related industries would continue to be important to the regional economy. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Climate change | Impacts to commercial fisheries and for-hire recreational fishing are expected to result from climate change events such as increased magnitude or frequency of storms, shoreline changes, ocean acidification, and water temperature changes. Risks to fisheries associated with these events include habitat/distribution shifts, disease incidence, and risk of invasive species. If these risk factors result in a decrease in catch and/or an increase in fishing costs (e.g., transiting time), the profitability of businesses engaged in commercial fisheries and for-hire recreational fishing would be adversely affected. While climate change is predicted to have adverse impacts on the distribution and/or productivity of some stocks targeted by commercial fisheries and for-hire recreational fishing, other stocks could be beneficially affected.<br>The economies of communities reliant on marine species that are vulnerable to the effects of climate change could be adversely affected. If the distribution of important stocks changes, it could affect where commercial and for-hire recreational fisheries are located. Furthermore, coastal communities with fishing businesses that have infrastructure near the shore could be adversely affected by sea level rise. | No future activities were identified within the GAA for this resource other than ongoing activities. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |
| Fisheries management activities | Commercial and recreational regulations for finfish and shellfish implemented and enforced by NMFS and coastal states affect how the commercial and for-hire recreational fisheries operate. Commercial and recreational for-hire fisheries are managed by FMPs, which are established to manage fisheries to avoid overfishing through catch quotas, special management areas, and closed area regulations. These can reduce or increase the size of available landings to commercial and for-hire recreational fisheries. For example, ongoing fishing restrictions designed to rebuild depleted stocks in the Northeast Multispecies (large-mesh) fishery would continue to reduce landings in that fishery. | Reasonably foreseeable fishery management actions include measures to reduce the risk of interactions between fishing gear and the NARW by 60% (McCreary and Brooks 2019). This would likely have a **major** adverse impact on fishing effort in the lobster and Jonah crab fisheries in the GAA for this resource. As discussed in Karp et al. (2019), changing climate and ocean conditions and the resultant effects on species distributions and productivity can have significant effects on management decisions, such as allocation, spatiotemporal closures, stock status determinations, and catch limits. | See Section 3.9.2.2.2 for analysis of offshore impacts. | See Sections 3.9.2.3 and 3.9.2.4 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. | See Sections 3.9.2.5 and Section 3.9.2.1, Table 3.9-23 for analysis of offshore impacts. |

* Includes all constructed and permitted COP projects within the commercial fisheries and for-hire recreational fishing GAA: Block Island, SFWF, Vineyard Wind 1, and Coastal Virginia Offshore Wind.

## Land Use and Coastal Infrastructure

**Table E2-13. Summary of Activities and the Associated Impact-Producing Factors for Land Use and Coastal Infrastructure**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases: Fuel/fluids/hazmat | Various ongoing OSW and non-OSW onshore and coastal construction projects include the use of vehicles and equipment that contain fuel, fluids, and hazardous materials that could be released. These impacts, however, would generally be localized and short term. | Ongoing onshore construction projects involving vehicles and equipment that use fuel, fluids, or hazardous materials could result in an accidental release. Intensity and extent would vary, depending on the size, location, and materials involved in the release. | See Section 3.14.2.2.2 for analysis. | See Sections 3.14.2.3 and 3.14.2.1, Table 3.14-1 for analysis of impacts. | See Section 3.14.2.1, Table 3.14-1 for analysis of impacts. |
| EMFs | Constructed and permitted OSW COP projects can generate EMF and substrate heating effects. EMFs also continuously emanate from existing telecommunication and electrical power transmission cables. New cables generating EMFs are infrequently installed in the GAA. The extent of impacts is likely less than 50 feet (15.2 m) from the cable, and the intensity of impacts on coastal habitats is likely undetectable. | No future activities were identified within the GAA for land use and coastal infrastructures other than ongoing activities. | The onshore transmission lines used to connect power generated by future OSW projects to the electrical grid would generate detectable EMF effects within a short distance of cable corridors. Most, if not all, future onshore transmission cables would run belowground in buried cable ducts, reducing EMF exposure relative to aboveground electrical infrastructure. Based on modeled EMF levels for currently planned projects (Exponent 2018, 2020), typical EMF levels at approximately 3 feet (1 meter) immediately above the buried cable would range from 73 to 300 mG. Field strength would diminish rapidly with distance, decreasing to near 0 mG within 25 to 50 feet of the cable centerline. These potential effects must be placed in context with typical levels of EMF exposure experienced in everyday life. The National Institutes of Health (NIH 2002) determined that approximately 95% of the U.S. population has an average daily EMF exposure of approximately 4 mG from electrical systems and devices at home and work. Localized EMF levels in proximity to electrical power infrastructure are considerably higher. Typical magnetic fields within 50 feet of power distribution lines range from 10 to 20 mG for main feeders and 3 to 10 mG for laterals under typical loads, reaching as high as 40 to 70 mG under peak loads depending on the amount of current being carried (NIH 2002).<br>Anticipated onshore EMF from OSW energy transmission cables would be comparable to, if not lower than, baseline EMF levels | **Offshore:** There would be no EMF produced during construction of the offshore Project structures.<br>Offshore elements of the Proposed Action such as the WTGs, IAC, and OSS-link cable would generate EMF during operation. The cables produce a magnetic field, both perpendicularly and in a lateral direction around the cables. The calculated magnetic field at a height of 3.3 feet (1 m) above the seafloor is highest directly above the buried cables (IACs, 17 mG; RWECs, 41 mG; and RWEC landfall cables, 39 mG) and decreases rapidly with distance. EMF is reduced to less than 6 mG within 30 feet of the IACs, RWECs, and RWEC landfall cables. All calculated field levels are well below the ICNIRP reference level of 2,000 mG and the ICES exposure reference level of 9,040 mG for exposure of the general public. Therefore, effects would be **negligible** adverse. Impacts would be lower, but still similar, for Alternatives C through F due to the reduction of the number of WTGs and possible reduction of miles of IAC.<br>Reasonably foreseeable future actions would also generate offshore EMF due to the use of similar Project components. However, it is anticipated that reasonably foreseeable future actions would also use similar construction and operations techniques, which includes shielding and protecting cables that are laid directly on the seafloor. Shielded electrical transmission cables do not directly emit electrical fields into surrounding areas but are surrounded by magnetic fields that can cause induced electrical fields in | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. There would be no EMF produced during construction of the offshore Project structures.<br>Operational effects would be **negligible** adverse. Impacts would be lower, but still similar, for Alternative G due to the reduction of the number of WTGs and possible reduction of miles of IAC.<br>Due to the rapid dissipation of EMFs surrounding the cables and incorporation of protection measures, there would be a **negligible** adverse cumulative impact on land use and coastal infrastructure for Alternative G. Impacts would be lower, but still similar, for Alternative G due to the reduction of the number of WTGs and possible reduction of miles of IAC. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
| --- | --- | --- | --- | --- | --- |
| | | | generated by existing aboveground electrical infrastructure. Future OSW projects would likely generate EMF levels similar to those for the Project. International Commission on Non-Ionizing Radiation Protection (ICNIRP) and International Committee on Electromagnetic Safety (ICES) guidance set exposure levels between 2,000 and 9,040 mG for the general population, although exact levels vary from state to state. The addition of wind energy transmission cables would result in slightly elevated onshore EMF levels. However, EMF levels decrease very rapidly with distance from the cables. For an 880-MW transmission cable, peak EMF would be 73 mG at the cable but would decrease to 2 mG at 25 feet from the cable. This is well below international EMF standards. The presence of slightly elevated levels of EMF from future OSW activities would have no effect on land use and coastal infrastructure because elevated EMF would not alter land use patterns, change land uses, or have any other effect on land use and coastal infrastructure. On this basis, the effects of EMF on land use under the No Action Alternative would be long term **negligible** adverse, as there would be no effect on land use and coastal infrastructure. | moving water. Due to the rapid dissipation of EMFs surrounding the cables and incorporation of protection measures, there would be a **negligible** adverse cumulative impact on land use and coastal infrastructure for the Proposed Action and Alternatives C through F. Impacts would be lower, but still similar, for Alternatives C through F due to the reduction of the number of WTGs and possible reduction of miles of IAC. | |
| | | | | **Onshore:** There would be no EMF produced during construction of the onshore Project structures.<br>Between the TJBs and OnSS, the onshore transmission cables would be installed in a double-circuit underground duct bank. Modeling of the magnetic field levels associated with the operation of these cables calculates the magnetic field at peak loading directly over the duct banks at 73 mG or lower for the maximum 880-MW capacity of the RWF. This is well below the ICNRIP reference level of 2,000 mG and the ICES exposure reference level of 9,040 mG for the general public (Exponent 2020). Lower magnetic fields would be produced if the power generated by the RWF is less than 880 MW.<br>Based on modeled EMF levels for the Proposed Action (Exponent 2020), typical EMF levels at approximately 3 feet (1 m) immediately above the buried cable would be a maximum of 73 mG. Field strength would diminish rapidly with distance, decreasing to near 0 mG within 25 to 50 feet of the cable centerline. These potential effects must be placed in context with typical levels of EMF exposure experienced in everyday life. The NIH (2002) determined that approximately 95% of the U.S. population has an average daily EMF exposure of approximately 4 mG from electrical systems and devices at home and work. Localized EMF levels in proximity to electrical power infrastructure are considerably higher. Typical magnetic fields within 50 feet of power distribution lines range from 10 to 20 mG for main feeders and | **Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. There would be no EMF produced during construction of the Alternative G onshore Project structures.<br>There would be no impact on land use and coastal infrastructure due to EMFs from O&M of onshore Project facilities. Decommissioning would result in no EMF impacts, similar to construction. Therefore, there would be a **negligible** adverse EMF impact on land use and coastal infrastructure from O&M and decommissioning of onshore elements of Alternative G.<br>Reasonably foreseeable future actions would likely generate EMF levels similar to those for the Proposed Action. On this basis, the cumulative effects of EMF on land use under Alternative G would be **negligible** adverse as there would be no effect on land use and coastal infrastructure and Alternative G has identical onshore facilities and activities. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | 3 to 10 mG for laterals under typical loads, reaching as high as 40 to 70 mG under peak loads, depending on the amount of current being carried (NIH 2002). Therefore, the relative level of EMF from the onshore duct bank would be low compared to other electrical infrastructure.<br>The underground transmission cables onshore would not be a direct source of any electric field aboveground due to cable construction, duct bank, and burial underground (VHB 2023b). As EMFs would remain well below established thresholds and there would be no direct source of aboveground EMFs, it is anticipated that there would be no impact on land use and coastal infrastructure due to EMFs from O&M of onshore Project facilities. Decommissioning would result in no EMF impacts, similar to construction. Therefore, there would be a **negligible** adverse EMF impact on land use and coastal infrastructure from O&M and decommissioning of onshore elements of the Proposed Action and Alternatives C through F.<br>Reasonably foreseeable future actions would likely generate EMF levels similar to those for the Proposed Action. On this basis, the cumulative effects of EMF on land use under all Project alternatives would be **negligible** adverse as there would be no effect on land use and coastal infrastructure and the Proposed Action and Alternatives C through F have identical onshore facilities and activities. | |
| Light: Structures | Various OSW and non-OSW ongoing onshore and coastal construction projects have nighttime activities, as well as existing structures, facilities, and vehicles, that would use nighttime lighting. All construction and operational impacts from land disturbance would be regulated through local land use and zoning regulations and would therefore comply with applicable laws. | Ongoing onshore construction projects involving nighttime activity could generate nighttime lighting. Intensity and extent would vary, depending on the location, type, direction, and duration of nighttime lighting. | See Section 3.14.2.2.2 for analysis. | See Section 3.14.2.3 and Section 3.14.2.1, Table 3.14-1 for analysis of impacts. | See Section 3.14.2.1, Table 3.14-1 for analysis of impacts. |
| New cable emplacement/maintenance | Onshore OSW and non-OSW-related buried transmission cables are present in the area near the Project onshore and offshore improvements. Onshore activities would only | No known proposed onshore structures are reasonably foreseeable and proposed to be located in the GAA for land use and coastal infrastructure. | See Section 3.14.2.2.2 for analysis of onshore impacts. Offshore cable activities would not impact onshore land use or infrastructure. | See Section 3.14.2.3 and Section 3.14.2.1, Table 3.14-1 for analysis of onshore impacts. Offshore cable activities would not impact onshore land use or infrastructure. | See Section 3.14.2.1, Table 3.14-1 for analysis of onshore impacts. Offshore cable activities would not impact onshore land use or infrastructure. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | occur where permitted by local land use authorities, which would avoid long-term land use conflicts. | | | | |
| Noise | Noise from activities associated with permitted OSW COP projects and other non-OSW projects may occur in the GAA. Ongoing noise from construction occurs frequently near the shores of populated areas in New England and the Mid-Atlantic region but infrequently offshore. Noise from construction near shorelines is expected to gradually increase over the next 30 years in line with human population growth along the coast of the GAA. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. | No future activities were identified within the GAA other than ongoing activities. | See Section 3.14.2.2.2 for analysis. | See Section 3.14.2.3 and Section 3.14.2.1, Table 3.14-1 for analysis of impacts. | See Section 3.14.2.1, Table 3.14-1 for analysis of impacts. |
| Port utilization: Expansion | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. The MCT at the Port of New Bedford is a completed facility developed by the port specifically to support the construction of OSW facilities. | Ports would need to perform maintenance and upgrade facilities to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. | Various ports would be improved to support future OSW projects (see EIS Appendix E). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. Therefore, ports would experience long-term beneficial impacts such as greater economic activity and increased employment due to demand for vessel maintenance services and related supplies; vessel berthing, loading and unloading; warehousing and fabrication facilities for OSW components; and other business activity related to OSW. State and local agencies would be responsible for minimizing the potential adverse impacts of these future port expansions by managing port resources and traffic control to ensure continued access to ports and adjacent land uses. There could be increased traffic and noise associated with increased port use that could impact land uses by increasing congestion and noise. However, all traffic, noise, and other adverse impacts would be under regulatory thresholds as ports would be required to comply with local land use and zoning regulations. On this basis, the effects of port utilization on land use under | **Offshore:** Land uses impacted by the construction of offshore components would include chosen port facilities used for shipping, storing, and fabricating Project components and for crew transfer, cargo logistics, and storage. Revolution Wind would use one or more ports to offload shipments of components, prepare them for installation, and load components onto vessels for delivery and installation. Selected ports could require improvements or upgrades to meet Project needs (see Table 3.3.10-1 of the COP), but no specific port improvements have been proposed as part of the Proposed Action. The COP states that to the extent that upgrades or modifications at an existing port facility could occur, Revolution Wind expects that those upgrades or modifications would serve to support the U.S. OSW industry in general. This is especially true as a number of states continue to procure, support, and fund such development. Thus, whether or not upgrades are required, port facilities are expected to serve multiple OSW projects and potentially also OSW-related and other maritime industries.<br>BOEM (2016) analyzed potential impacts to ports that could require upgrades to accommodate OSW projects or that are in the process of completing upgrades in | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Alternative G would slightly reduce impacts to port utilization due to reduction of the number of WTGs and possible reduction of miles of IAC. However, impacts would be similar to the Proposed Action: long term **minor** beneficial and a **negligible** adverse. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | the No Action Alternative would be long term **negligible** adverse. | anticipation of increased port use associated with OSW projects. BOEM noted that land use and transportation impacts primarily include land-based space conflicts with current or planned uses of adjacent areas and landside traffic delays or conflicts associated with construction. BOEM (2016) also identified potential water-based space conflicts with other uses of port waterways such as dredging, pile driving, and fill placement. The ports under consideration for construction staging are industrial in character, designated by local zoning and land use plans for heavy industrial activity, and typically adjacent to other industrial or commercial land uses and major transportation corridors. Therefore, it is expected that port improvements or upgrades would be subject to local zoning and land use regulations and that any upgrades to ports would undergo independent permitting and regulatory compliance processes.<br><br>The development of an OSW industry on the Mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects; however, no specific port improvements are identified as part of the Project. All future port improvements would be subject to independent environmental permitting and regulatory review and would be consistent with local land use and zoning regulations. As such, any future port improvements supporting OSW development would be consistent with, and therefore would not hinder, other nearby land use or use of coastal infrastructure. Overall, construction and installation of offshore components would have minor beneficial impacts to land use and coastal infrastructure by supporting designated uses at ports and supporting port improvements and/or redevelopment. Improvements such as road widening and signalization would provide transportation flow benefits over the long term. Because port expansion and upgrades are not part of the Proposed Action and would undergo separate permitting and regulatory review, | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | there would be a negligible adverse port utilization impact on land use and coastal infrastructure from construction and installation of offshore elements of the Proposed Action. Alternatives C through F would slightly reduce impacts to port utilization due to reduction of the number of WTGs and possible reduction of miles of IAC. However, impacts would be similar to the Proposed Action: **negligible** adverse.<br>Offshore O&M facilities would include the RWEC, IAC, OSS interconnection cable, and OSS electrical components. While these offshore components would tie into onshore Project components that could affect land use, the offshore activities and facilities themselves would not directly impact land use. Offshore facilities that tie into onshore facilities could result in increased activity within any of the listed onshore port areas zoned for business and industrial uses. However, this would reinforce the designated land use and provide a source of investment in the coastal infrastructure. Activities at ports, as in the preceding paragraph, would be consistent with the existing and designated uses at other ports and would comply with local zoning and land use regulations. Therefore, there would be a long-term **minor** beneficial and a **negligible** adverse port utilization impact on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action. Impacts would be similar for Alternatives C through F, although slightly reduced, so the impact determination would be the same as the Proposed Action.<br>Port upgrades and vessel activity associated with the Proposed Action could result in incremental impacts through an increase in economic and employment opportunities as well as reduced port access, increased delays and congestion, or increased collision risk. Project port activity and upgrades (via dredging and in-water work) could also coincide with other forecasted projects. Quonset Point is scheduled to undergo remediation at the former NIKE Battery PR-58 and Disaster Village Training Area in 2021. | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | In late 2020, the Rhode Island congressional delegation and the general treasurer joined the Rhode Island Department of Environmental Management in launching a $5.2 million project to make improvements at the Port of Galilee. The project would be located at the North Bulkhead section of the port where heavy-duty commercial fishing piers would be demolished and replaced, bulkhead asphalt repaired, and electrical supply upgraded (Block Island Times 2020). If the Port of Galilee is chosen to support Revolution Wind O&M activities, there would be no Project-related upgrades at the Port of Galilee. Port Jefferson has completed a master plan and an upper port revitalization plan, which is a blight study and urban renewal plan pursuant to New York State law. It involved rezoning certain areas and supporting major housing and mixed-use projects within the town (Village of Port Jefferson 2019). No specific non-Project improvements are proposed for Montauk Harbor, but NYSERDA issued an OSW master plan that notes Montauk Harbor as having the potential to be used or developed into facilities capable of supporting OSW projects (NYSERDA 2017).<br>Port activities could be delayed or area transportation routes could experience longer delays as a result of the overlap in construction activities. All activities would, however, be in accordance with land use goals and plans and would be subject to local land use and zoning regulations. Construction and operations improvements associated with the Project and other OSW energy development would occur within the boundaries of existing port facilities or repurposed industrial facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for development of waterfront infrastructure as well as economic opportunities (see Section 3.11). State and local agencies would also be responsible for minimizing the impacts of these future development plans by ensuring continued access to ports and adjacent land | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | uses and minimizing or avoiding noise, air quality, and other impacts on nearby neighborhoods. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Proposed Action would have **negligible** adverse cumulative impacts on land use and coastal infrastructure. Alternatives C through F would slightly reduce impacts to port utilization, but impacts would remain the same as the Proposed Action: **negligible** adverse. | |
| | | | | **Onshore:** The Project is evaluating the use of the Port of Davisville at Quonset Point, Port of Galilee, Port Jefferson, and Port of Montauk to support O&M of the Project (see Table 3.3-24 in the COP). O&M buildings at or near some or all of these ports would be used for wind farm monitoring and equipment storage for multiple OSW projects—the RWF, SFWF, and Sunrise Wind Farm—and as such have utility that is independent of the Project. If the Port of Galilee or Port of Brooklyn are chosen as O&M facility locations, use of these ports would be limited to existing facilities maintained by these ports. Use of the other ports listed above would include using existing facilities as well as constructing additional facilities to support the RWF and other wind farms.<br>An existing upland building, called the Research Way O&M Building, is located approximately 6 miles from Port Jefferson at 22 Research Way in Setauket-East Setauket, New York. It is located within an office park that also hosts technology companies and health care providers among other businesses. The building was recently purchased by Northeast Offshore, LLC, and internal upgrades to establish office and warehouse space are planned. The planned work requires no governmental authorizations other than local building permits and would consist entirely of interior renovations to create workspaces. No external modifications or expansions are planned other than any necessary repairs to maintain the existing external appearance. | **Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. Construction and installation of Alternative G onshore components would be identical to the Proposed Action and would have **minor** beneficial impacts to land use and coastal infrastructure. There would be a long-term **minor** beneficial and a **negligible** adverse port utilization impact on land use and coastal infrastructure from O&M and decommissioning of onshore elements of Alternative G.<br>Development of an OSW industry on the Mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on port utilization for Alternative G. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | The only other external planned work being discussed is maintenance of the parking lot, landscaping, and, potentially, signage. The Research Way facility would also be capable of serving multiple projects as well as general Orsted and Eversource business needs. A new building with up to 1,000 square feet of office space and up to 6,000 square feet of equipment storage would be constructed at the Port of Montauk. This facility could also serve as an O&M base for multiple OSW projects.<br>The ports under consideration for construction staging are industrial in character, designated by local zoning and land use plans for heavy industrial activity, and typically adjacent to other industrial or commercial land uses and major transportation corridors.<br>Activities associated with onshore construction of the Project would generate noise, vibration, and vehicular traffic and would temporarily alter views at one or more ports listed in Table 3.3.10-1 of the COP. Port improvements would result in combustion emissions from construction vehicles and equipment and could result in fugitive particulate emissions from soil movement. These impacts would be typical for construction in and operation of industrial ports. Noise, vibration, vehicular traffic increases, and vehicular emission generation would be short term. Potential landside transportation impacts would be minimized through construction hour restrictions, improvements such as road widening and signalization, and appropriate route selection (BOEM 2016). Activity and development from the Project would not occur at levels above those typically experienced or expected at these facilities, would not hinder other nearby land use or use of coastal infrastructure, and would comply with local land use and zoning regulations. Overall, construction and installation of onshore components would have **minor** beneficial impacts to land use and coastal infrastructure by supporting designated uses at ports and port improvements and/or | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | redevelopment. Improvements such as road widening and signalization would provide transportation flow benefits over the long term. the Proposed Action and Alternatives C through F include identical onshore facilities and activities and impacts.<br><br>Project O&M would involve routine daily activities at O&M facilities that are consistent with the zoned uses for those specific parcels. O&M facilities would include offices, warehouses, and associated accessory uses, which are consistent with the range of land uses associated with the ports listed in Table 3.3.10-1 of the COP. The increased activity within any of the listed port areas zoned for business and industrial uses would reinforce the designated land use and provide a source of investment in the coastal infrastructure. O&M activities would be limited to temporary, periodic use of vehicles and equipment; associated impacts would be consistent with zoned and designated uses for commercial and industrial port facilities. The presence of O&M facilities and related O&M activities would contribute to the economic vitality of ports. O&M of onshore components would therefore have minor beneficial impacts to land use and coastal infrastructure by supporting designated uses at ports and supporting port improvements and/or redevelopment that would benefit other projects and port uses beyond those necessary for the Project (see Section 3.11). Therefore, there would be a long-term **minor** beneficial and a **negligible** adverse port utilization impact on land use and coastal infrastructure from O&M and decommissioning of onshore elements of the Proposed Action and Alternatives C through F.<br><br>Development of an OSW industry on the Mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Potential future activities could include upgrades to port facilities that would have long-term beneficial impacts to other users over a long time period. All future port improvements would be subject to | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | independent environmental permitting and regulatory review and are not part of the Project. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on port utilization for the Proposed Action and Alternatives C through F. | |
| Presence of structures: Viewshed | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA, which are visible from some coastal locations in New York, Connecticut, Rhode Island, and Massachusetts. | Non-OSW structures that could be viewed in conjunction with the offshore components would be limited to met towers. Marine activity would also occur within the offshore viewshed. | Future OSW activities would add 3,088 additional structures within the GAA. Future OSW activities would also result in onshore placement of structures. Structures would be built in accordance with state and local land use, zoning, and building regulations and therefore would have minimal land use and coastal infrastructure impacts. While the presence of additional onshore structures could impact land uses by reducing the amount of land available for other uses and generating short-term construction impacts, all structures would be built in accordance with state and local zoning and building regulations and would therefore have a minimal impact on land use and coastal infrastructure. On this basis, the effects of the presence of structures on land use under the No Action Alternative would be long term **negligible** adverse. | **Offshore:** The installation and operation of up to 102 offshore structures for the Proposed Action and construction of the IAC, OSS-link cable, and RWEC would not result in any impacts to land use and coastal infrastructure because these impacts would occur offshore and would not overlap with onshore land uses. Therefore, there would be a **negligible** adverse impact from the presence of structures on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action and Alternatives C through F.<br>Similarly, when considered in combination with past, present, and other reasonably foreseeable projects, the Proposed Action would have no effect on land use and coastal infrastructure; therefore, the cumulative impact would be **negligible** adverse. Alternatives C through F would result in incrementally smaller impacts, but not measurably reduce land use and coastal infrastructure impacts compared to the Proposed Action. | **Offshore:** The installation and operation of up to 67 offshore structures for Alternative G and construction of the IAC, OSS-link cable, and RWEC would not result in any impacts to land use and coastal infrastructure because these impacts would occur offshore and would not overlap with onshore land uses. Therefore, there would be a **negligible** adverse impact from the presence of structures on land use and coastal infrastructure from O&M and decommissioning of offshore elements of Alternative G.<br>Similarly, when considered in combination with past, present, and other reasonably foreseeable projects, Alternative G would have no effect on land use and coastal infrastructure; therefore, the cumulative impact would be **negligible** adverse. |
| | | | | **Onshore:** Onshore structures that would be constructed as part of the Project include the onshore transmission cable, ICF, and OnSS.<br>The OnSS would require temporary disturbance (construction footprint) of up to 7.1 acres to facilitate construction. This includes an operational footprint of 3.8 acres. The ICF would require a temporary construction footprint of approximately 4.0 acres, which includes the 1.6-acre operational footprint.<br>The ICF would be constructed adjacent to the existing Davisville Substation, in the zoned Quonset Business Park District. Installation of | Similar impacts to the Proposed Action and Alternatives C through F.<br>Therefore, the presence of structures would result in a **negligible** adverse impact on land use and coastal infrastructure. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | the ICF could increase visibility of the existing substation to nearby residences along Camp Avenue. However, construction would take place adjacent to the existing Davisville Substation, in lots surrounded by mature trees.<br>Construction activities associated with onshore facilities is expected to take approximately 1 year and includes clearing and grading, excavating, installing foundations, and constructing the facility. There are no nighttime visually sensitive areas (public parks, beaches, or other public recreational facilities) near the OnSS and ICF that would be impacted by nighttime construction lighting (see Section 3.20). The visual impacts of the ICF would be minimized through the installation of vegetation to provide year-round screening from nearby Camp Avenue, Circuit Drive, and Roger Williams Way; appropriate substation siting; low-profile design; and minimal lighting, all of which would be directed downward (VHB 2023c). As designed, the interconnection facility would generate sound below existing, ambient sound levels (VHB 2023b). According to federal, state, and local noise standards, there would be no impact as a result of the operation of the ICF. All Project-related construction would take place within areas zoned for industrial and commercial development and would be subject to land use and zoning regulations that limit impacts.<br>Therefore, the presence of structures would result in a **negligible** adverse impact on land use and coastal infrastructure from construction and installation of onshore elements of all Project alternatives.<br>O&M activities would include periodic inspections and repairs at the ICF and cable access manholes, which would require minimal use of worker vehicles and construction equipment. Periodic maintenance and repairs would have temporary impacts on access to adjacent land uses. All onshore structures that are part of the Proposed Action and Alternatives C through F and any necessary modifications to structures would be consistent with land | |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| | | | | use and zoning regulations. Therefore, the impact from the presence of structures on land use and coastal infrastructure would be **negligible** adverse.<br>Reasonably foreseeable future actions would have similar impacts to the Proposed Action and Alternatives C through F in terms of the presence of structures. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on land use and coastal infrastructure for all Project alternatives. | |

* Includes all constructed and permitted COP projects within the land use and coastal infrastructure GAA: Block Island, SFWF, Vineyard Wind 1, and Coastal Virginia Offshore Wind.

## Navigation and Vessel Traffic

No IPFs with solely negligible impacts were identified.

**Table E2-14**. **Summary of Activities and the Associated Impact-Producing Factors for Navigation and Vessel Traffic**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
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| Anchoring | Constructed and permitted OSW COP projects are introducing an estimated 943 acres of anchoring in the GAA. Larger commercial vessels (specifically tankers) also sometimes anchor outside of major ports to transfer their cargo to smaller vessels for transport into port, an operation known as lightering. These anchors have deeper ground penetration and are under higher stresses. Smaller vessels (commercial fishing or recreational vessels) would anchor for fishing and other recreational activities. These activities cause temporary to short-term impacts on navigation in the immediate anchorage area. All vessels could anchor in an emergency scenario (such as power loss) if they lose power to prevent them from drifting and creating navigational hazards for other vessels or drifting into structures. | Lightering and anchoring operations are expected to continue at or near current levels, with the expectation of a moderate increase commensurate with any increase in tankers visiting ports. Deep draft vessel visits to major port visits are expected to increase as well, increasing the potential for an emergency need to anchor and creating navigational hazards for other vessels. Recreational activity and commercial fishing activity would likely stay largely the same related to this IPF. | See Section 3.16.2.2.2 for analysis. | See Sections 3.16.2.3 and 3.16.2.4 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. | See Sections 3.16.2.5 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. |
| Port utilization: Expansion | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing | Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host | See Section 3.16.2.2.2 for analysis. | See Sections 3.16.2.3 and 3.16.2.4 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. | See Sections 3.16.2.5 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators. | larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators. | | | |
| Presence of structures: Allisions | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA. An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. There are two types of allisions that occur: drift and powered. A drift allision generally occurs when a vessel is powered down due to operator choice or power failure. A powered allision generally occurs when an operator fails to adequately control their vessel movements or is distracted. The presence of OSW structures increases the GAA's navigational complexity, thereby increasing the risk of allision or collision. However, WTG spacing is anticipated to reduce, but not eliminate, navigational complexity. | Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 35 years. Vessel allisions with non-OSW stationary objects should not increase meaningfully without a substantial increase in vessel congestion. | See Section 3.16.2.2.2 for analysis. | See Sections 3.16.2.3 and 3.16.2.4 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. | See Sections 3.16.2.5 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. |
| Presence of structures: Fish aggregation | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA. Items in the water, such as ghost fishing gear, buoys, and energy platform foundations can create an artificial reef effect, aggregating fish. Recreational and commercial fishing can occur near the artificial reefs. Recreational fishing is more popular than commercial fishing near artificial reefs because commercial mobile fishing gear can risk snagging on the artificial reef structure. | Fishing near artificial reefs is not expected to change meaningfully over the next 35 years. | See Section 3.16.2.2.2 for analysis. | See Sections 3.16.2.3 and 3.16.2.4 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. | See Sections 3.16.2.5 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. |
| Presence of structures: Navigation hazard | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA. Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, then navigation is made more complex as the vessels need to avoid both the structure and each other. The presence of OSW structures increases the GAA's navigational complexity, thereby increasing the risk of allision or collision. However, WTG spacing is | Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 35 years. Even with increased port visits by deep draft vessels, this is still a relatively small adjustment when considering the whole of New England vessel traffic. The presence of navigation hazards is expected to continue at or near current levels. | See Section 3.16.2.2.2 for analysis. | See Sections 3.16.2.3 and 3.16.2.4 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. | See Sections 3.16.2.5 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | anticipated to reduce, but not eliminate, navigational complexity during the operations phases of the projects. | | | | |
| Presence of structures: Space use conflicts | Currently, the offshore area is occupied by marine trade, stationary and mobile fishing, and survey activities. Constructed and permitted OSW COP projects are also introducing 81 structures into the GAA. The presence of OSW structures increases the GAA's navigational complexity. The attraction of artificial reef effects also increases vessel congestion and the risk of allision, collision, and spills near structures. However, WTG spacing is anticipated to reduce, but not eliminate, space-use conflicts during the operations phases of the projects. | Reasonably foreseeable activities (non–OSW) would not result in additional offshore structures. | See Section 3.16.2.2.2 for analysis. | See Sections 3.16.2.3 and 3.16.2.4 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. | See Sections 3.16.2.5 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. |
| New cable emplacement/ maintenance | Constructed and permitted OSW COP projects are introducing an estimated 462 miles of new offshore cable in the GAA. Within the GAA for navigation and vessel traffic, existing cables could also require access for maintenance activities. These cable activities could cause temporary increases in vessel traffic and navigational complexity. | The FCC has two pending submarine telecommunication cable applications in the North Atlantic. Future new cables would cause temporary increases in vessel traffic during installation or maintenance, resulting in infrequent, localized, short-term impacts over the next 35 years. Care would need to be taken by vessels that are crossing the cable routes during these activities. | See Section 3.16.2.2.2 for analysis. | See Sections 3.16.2.3 and 3.16.2.4 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. | See Sections 3.16.2.5 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. |
| Traffic: Aircraft, vessels, collisions | See Table E2-15 (Summary of Activities and the Associated Impact-Producing Factors for Other Marine Uses: Military and National Security Uses) for a discussion of search and rescue (SAR) aircraft and vessels with respect to traffic. SAR helicopters are the main aircraft that could be flying at low enough heights to risk interaction with WTGs. USCG SAR aircraft need to fly low enough that they can spot objects in the water.<br>See also the sub-IPF for Presence of structures: Navigation hazard | SAR operations could be expected to increase with any increase in vessel traffic. As noted in Table E2-15, no future non-OSW stationary structures were identified within the offshore GAA. Therefore, because vessel traffic volume associated with future non-OSW is not expected to increase appreciably, neither should SAR operations.<br>See also the sub-IPF for Presence of structures: Navigation hazard | See Section 3.16.2.2.2 for analysis. | See Sections 3.16.2.3 and 3.16.2.4 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. | See Sections 3.16.2.5 and Section 3.16.2.1, Table 3.16-3 for analysis of impacts. |

*Includes three constructed and permitted COP projects within the navigation and vessel traffic GAA: Block Island, SFWF, Vineyard Wind 1.

## Other Marine Uses: Military and National Security

**Table E2-15. Summary of Activities and the Associated Impact-Producing Factors for Other Marine Uses: Military and National Security Uses**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases and discharges | Accidental releases and discharges of fuels and fluids have the potential to occur during vessel usage for permitted and built OSW COP projects, dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities. | Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities. Impacts are unlikely to affect military and national security uses. | Fuels and oils would be required for construction, installation, O&M, and decommissioning of future OSW activities. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. OSRPs would be required for all future OSW projects, which includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. Releases during construction of future OSW activities during all phases of project construction would generally be localized and short term, resulting in little change to water quality. Therefore, this IPF would have a **negligible** adverse impact on military and national security uses because there would be no effect on this resource. | **Offshore:** Fuels and oils would be required for offshore construction and installation equipment, vessels, and infrastructure over the 18-month construction period. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. As described in Section 3.21.1.2, the likelihood of a spill due to construction and installation activities and weather events is low (once per 1,000 years). An OSRP has been prepared for the Project and includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. Therefore, this IPF would have a **negligible** adverse impact on military and national security uses. Alternatives C through F would reduce the number of WTGs and their associated IACs, which would have an associated reduction in associated vessel and equipment use. This decrease in WTGs would result in a reduction of possible accidental releases and discharges, but the level of impact would not measurably change relative to the Proposed Action. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, this IPF would have a negligible adverse impact on military and national security uses. Alternative G would result in fewer WTGs, which would result in a reduced number of vessels and associated equipment used in construction and operations, resulting in a reduction of possible accidental releases and discharges, but would not measurably change in relation to the Proposed Action. |
| Anchoring | Impacts from anchoring have the potential to occur due to permitted and built OSW COP projects, ongoing military use and survey, and commercial and recreational activities. The presence of anchored construction vessels could cause military vessels to change course or otherwise alter operations and could increase demand for SAR. | Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. | See Section 3.17.2.4.2 for analysis. | See Section 3.17.2.9 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| New cable emplacement/maintenance | Constructed and permitted OSW COP projects are introducing an estimated 163 miles of new offshore cable in the GAA. This and other ongoing cable maintenance activities can cause military vessels to change course or otherwise alter operations and could increase demand for SAR; these | Cable maintenance or replacement of existing cables in the GAA would occur infrequently, and would generate short-term disturbances. | See Section 3.17.2.4.2 for analysis. | See Section 3.17.2.9 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | disturbances would be local and limited to emplacement corridors. | | | | |
| Light | Constructed and permitted OSW COP projects are introducing 13 lighted structures into the GAA, as well as lighted vessels. Impacts from lighting on military and national security also include light associated with military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis. Impacts are expected to be minimal. | Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population growth and development over time. Light from onshore structures is expected to gradually increase in line with human population growth along the coast, with minimal offshore impacts. | See Section 3.17.2.4.2 for analysis. | See Section 3.17.2.9 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Noise | Noise impacts are expected from OSW and non-OSW construction and vessel traffic. Construction occurs frequently in nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this IPF consist of constructed and permitted OSW COP projects, commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels. | Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the GAA for this resource. Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain. | While future OSW activities without the Proposed Action would result in construction and decommissioning noise and limited operational noise, noise is not expected to impact military and national security as all noise would be lower than regulatory thresholds and would occur in geographic areas in which the military does not typically operate. Therefore, the effects of noise on military and national security under the No Action Alternative would be **negligible** adverse. | **Offshore:** While construction and installation, O&M and decommissioning of offshore elements of the Proposed Action would result in construction noise, noise is not expected to impact military and national security as all noise would be lower than regulatory thresholds. Alternatives C through F would reduce the number of WTGs and their associated IACs, which would have an associated reduction in noise associated with vessel and equipment use, but otherwise, the level of impact would not measurably change relative to the Proposed Action. Therefore, the effects of noise on military and national security under the Proposed Action and Alternatives C through F would be **negligible** adverse.<br>The Project combined with reasonably foreseeable future actions would result in an increase in construction and decommissioning noise in the RI/MA WEA. However, noise impacts would be distributed across a large geographic area and would not likely occur at the same time. Noise is not anticipated to impact military or national security. Therefore, because Project activities combined with reasonably foreseeable activities would result in a minimal increase in noise offshore that is not expected to impact military and national security uses, | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, the effects of noise on military and national security under Alternative G would be **negligible** adverse.<br>The Project combined with reasonably foreseeable future actions would result in an increase in construction and decommissioning noise in the RI/MA WEA. However, noise impacts would be distributed across a large geographic area and would not likely occur at the same time. Noise is not anticipated to impact military or national security. Therefore, because Project activities combined with reasonably foreseeable activities would result in a minimal increase in noise offshore that is not expected to impact military and national security uses, the cumulative impacts would be **negligible** adverse. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | the cumulative impacts would be **negligible** adverse. | |
| Port utilization | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in navigation patterns at nearby airports. The increased activity could cause potential conflicts with military aircraft and vessels. | Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, changes in port usage by some fishing or recreational vessel operators, and changes in navigation patterns. | There could be a very minimal increase in vessel use at ports associated with the No Action Alternative. The number of construction vessels would increase due to future OSW activities without the Proposed Action, which could result in delays and congestion at ports that could lead to potential conflicts with military aircraft and vessels due to increased activity in the vicinity of the airports listed in the Affected Environment. Port improvements and construction activities in or near ports could require alteration of navigation patterns at nearby airports, which could impact military uses. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction is completed, and all navigation hazards and collision risks would be gradually eliminated during decommissioning as offshore WTGs are removed. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on military and national security. | **Offshore:** the Proposed Action and Alternatives C through F would require construction and O&M vessels, which could result in minor delays and congestion at ports. This could lead to potential conflicts with military aircraft and vessels due to increased port activity. Although no port improvements are currently planned as part of the Proposed Action and Alternatives C through F, if port upgrades are required, port improvements and construction activities in or near ports could require alteration of navigation patterns at nearby airports, which could impact military uses. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction and O&M is completed. Vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. However, port utilization is not expected to increase beyond what is currently allowed under land use regulations. Therefore, port utilization is expected to have a **negligible** adverse effect on military and national security.<br>Although Alternatives C through F would result in a slight reduction of port utilization due to a reduction of the number of WTGs and their associated IACs, impacts on this resource would be similar to the Proposed Action.<br>Project activities combined with reasonably foreseeable activities would result in a minimal increase in port utilization that would be accounted for through port improvements and capacity planning. Therefore, the cumulative impacts of noise on military and national security would be **negligible** adverse. | **Offshore:** Although Alternative G would result in a slight reduction of port utilization due to a reduction of the number of WTGs and their associated IACs, impacts on this resource would be similar to the Proposed Action.<br>Project activities combined with reasonably foreseeable activities would result in a minimal increase in port utilization that would be accounted for through port improvements and capacity planning. Therefore, the cumulative impacts of noise on military and national security would be **negligible** adverse. |
| Presence of structures: Allisions | Constructed and permitted OSW COP projects are introducing 13 structures into the GAA. Other existing stationary facilities that present allision risks include dock facilities, meteorological buoys associated with OSW lease areas, and other offshore or shoreline-based structures. OSW project use | No additional non-OSW stationary structures were identified within the GAA. Stationary structures such as private or commercial docks could be added close to the shoreline. | See Section 3.17.2.4.2 for analysis. | See Section 3.17.2.9 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | of navigation safety zones and WTG spacing is anticipated to reduce some of the risk of collisions and allisions. | | | | |
| Presence of structures: Fish aggregation | Constructed and permitted OSW COP projects are introducing 13 structures into the GAA. These stationary structures act as fish aggregating devices (FADs). These FADs can concentrate recreational and commercial fishing, which can add to conflict or collision risks for military and national security vessels and increase demand for SAR operations. | No future non-OSW additional stationary structures that would act as FADs were identified within the GAA. | See Section 3.17.2.4.2 for analysis. | See Section 3.17.2.9 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Presence of structures: Navigation hazard | Constructed and permitted OSW COP projects are introducing 13 structures into the GAA. Other existing stationary facilities within the GAA that present navigational hazards consist of communication towers; dock facilities; and other onshore and offshore commercial, industrial, and residential structures. OSW project use of navigation safety zones and WTG spacing is anticipated to reduce some of these risks to navigation. | No future non-OSW stationary structures were identified within the offshore GAA. Onshore, development activities are anticipated to continue, with additional proposed communications towers and onshore commercial, industrial, and residential developments. | See Section 3.17.2.4.2 for analysis. | See Section 3.17.2.9 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Presence of structures: Space use conflicts | Constructed and permitted OSW COP projects are introducing 13 structures into the GAA. Other existing stationary facilities within the GAA that present a navigational hazard include communication towers; dock facilities; and other onshore and offshore commercial, industrial, and residential structures. OSW project use of navigation safety zones and WTG spacing is anticipated to reduce some of these risks to navigation. | No future non-OSW stationary structures were identified within the offshore GAA. Onshore, development activities are anticipated to continue, with additional proposed communications towers and onshore commercial, industrial, and residential developments. | See Section 3.17.2.4.2 for analysis. | See Section 3.17.2.9 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Presence of structures: Transmission cable infrastructure | Seven submarine cable corridors cross cumulative lease areas. Constructed and permitted OSW COP projects are also introducing an estimated 163 miles of new offshore cable in the GAA. Cable activities could cause military vessels to change course or otherwise alter operations and could increase demand for SAR. These impacts are expected to be limited to cable emplacement corridors. | Submarine cables would remain in current locations with infrequent maintenance continuing along those cable routes for the foreseeable future. | See Section 3.17.2.4.2 for analysis. | See Section 3.17.2.9 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Traffic: Vessels, collisions | Current vessel traffic in the region is described in Section 3.16.1. Vessel activities associated with OSW in the cumulative lease areas is currently limited to site assessment | Continued vessel traffic in the region is described in Section 3.16.1. | See Section 3.17.2.4.2 for analysis. | See Section 3.17.2.9 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | surveys and constructed and permitted OSW COP projects. | | | | |
| Traffic: Aviation | Onshore and offshore military and national security use areas could have designated surface and subsurface boundaries and special use airspace. Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments.<br>Warning Area W-105A is a special use airspace area primarily used by the U.S. Air Force located offshore Massachusetts and Rhode Island, and overlapping the RI and MA lease areas. | Although no future non-OSW stationary structures were identified within the offshore GAA, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non-OSW is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends. | See Section 3.17.2.4.2 for analysis. | See Section 3.17.2.9 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Climate Change | Climate change has resulted in a measurable increase in annual precipitation on the East Coast, which could impact military and national security-related aviation and air traffic due to more inclement weather incidents. | Sea level rise and storm severity/frequency would increase due to the effects of climate change. | Climate change has resulted in a measurable increase in annual precipitation on the East Coast, which could impact military and national security–related aviation and air traffic due to more inclement weather incidents. Future OSW activities could result in construction activities that increase GHG emissions. Increased GHG emissions could contribute to climate change impacts during construction. However, the construction of future OSW facilities could ultimately help slow the negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources, resulting in a net decrease in GHG emissions from energy generation. On this basis, the effects of climate change on military and national security under the No Action Alternative would be **negligible** adverse. | Similar to the No Action Alternative, the construction and installation, O&M, and decommissioning of the Proposed Action and Alternatives C through F could contribute to climate change impacts during construction. However, the Project could also ultimately help slow the negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources, resulting in a net decrease in GHG emissions from energy generation. On this basis, the effects of climate change on military and national security under the Proposed Action and Alternatives C through F would be **negligible** adverse. | Similar impacts to the Proposed Action and Alternatives C through F. On this basis, the effects of climate change on military and national security under Alternative G would be **negligible** adverse. |

* Includes one constructed and permitted COP project that occurs within the military and national security GAA: SFWF.

## Other Marine Uses: Aviation and Air Traffic

**Table E2-16. Summary of Activities and the Associated Impact-Producing Factors for Other Marine Uses: Aviation and Air Traffic**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases and discharges | Accidental releases and discharges have the potential to occur during vessel usage for permitted and built OSW COP projects, | No future activities were identified within the GAA other than ongoing activities. | Accidental releases and discharges would not overlap with aviation and air traffic uses and | **Offshore:** The effects of this IPF from the Proposed Action and Alternatives C through F would not impact aviation and air traffic | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities. These activities do not overlap with aviation and air traffic uses and areas. | | areas and therefore would result in a **negligible** adverse impact. | because accidental releases and discharges would not overlap with aviation and air traffic uses. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. | because there would be no effect on this resource. |
| | | | | **Onshore:** Same as offshore impacts. | **Onshore:** Same as offshore impacts. |
| Anchoring and new cable emplacement/maintenance | Anchoring activities have the potential to occur due to permitted and built OSW COP projects, ongoing military use and survey, and commercial and recreational activities. These activities do not overlap with aviation and air traffic uses and areas. | No future activities were identified within the GAA other than ongoing activities. | Future OSW activities would require adding new cables and maintaining them as part of future wind projects. The offshore effects of anchoring and new cable emplacement/maintenance would have no bearing on aviation or air traffic, as these uses do not overlap. Onshore construction and maintenance of cables associated with future OSW activities would occur in areas that are not likely to overlap with aviation uses. The use of onshore construction equipment would not interfere with air traffic. On this basis, the effects of anchoring and new cable emplacement/maintenance on aviation and air traffic under the No Action Alternative would be **negligible** adverse. | **Offshore:** Onshore construction, maintenance, and decommissioning of cables associated with future OSW activities would occur in areas that are not likely to overlap with aviation uses. The use of onshore construction equipment would not interfere with air traffic. On this basis, the effects of anchoring and new cable emplacement/maintenance on aviation and air traffic under the Proposed Action and Alternatives C through F would be **negligible** adverse. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. On this basis, the effects of anchoring and new cable emplacement/maintenance on aviation and air traffic under Alternative G would be **negligible** adverse. |
| | | | | **Onshore:** Same as offshore impacts. | **Onshore:** Same as offshore impacts. |
| Light | Constructed and permitted OSW COP projects are introducing 81 lighted structures into the GAA, as well as lighted vessels. Other impacts from lighting on aviation and air traffic include light associated with non-OSW military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis. Impacts are expected to be minimal. | Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. Light from onshore structures is expected to gradually increase in line with human population growth along the coast, with minimal offshore impacts. | See Section 3.17.2.2.2 for analysis. | See Section 3.17.2.7 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Noise | Noise impacts are expected from OSW and non-OSW construction and vessel traffic. Construction occurs frequently in nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this IPF consist of | Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the GAA for this resource. Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain. | While future OSW activities without the Proposed Action would result in construction and decommissioning noise and limited operational noise, noise is not expected to impact aviation and air traffic. Therefore, the effects of noise on aviation and air traffic under the No Action Alternative would be **negligible** adverse. | **Offshore:** All Project-associated noise would comply with regulatory noise thresholds and noise is not expected to impact aviation and air traffic. Alternatives C through F could result in a slight reduction to construction and operational noise but otherwise would be similar to the Proposed Action. Therefore, the effects of noise on aviation and air traffic | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, the effects of noise on aviation and air traffic under Alternative G would be **negligible** adverse.<br>Reasonably foreseeable future actions would occur over a dispersed geographic area and would not generate noise high enough to |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | constructed and permitted OSW COP projects, commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Noise is not expected to impact aviation and air traffic. | | | under the Proposed Action and Alternatives C through F would be **negligible** adverse.<br>Reasonably foreseeable future actions would occur over a dispersed geographic area and would not generate noise high enough to impact aviation uses. Therefore, the cumulative impacts would also be **negligible** adverse. | impact aviation uses. Therefore, the cumulative impacts would also be **negligible** adverse. |
| | | | | **Onshore:** There would be onshore noise impacts associated with the construction of Alternatives B through F. Construction would be limited to daylight hours, and noise impacts would consist of noise generated from heavy equipment performing clearing, grading, excavating, installing foundations, and heavy lifting of substation components. Noise modeling shows that noise is expected to remain below Town of North Kingstown noise ordinance levels. Because there is no permanent noise-generating equipment associated with the onshore transmission cable, operational noise of the underground cables is expected to have no impacts to aviation and air traffic. The OnSS and ICF, as designed, would generate sound similar to or below existing ambient sound levels; therefore, operational noise levels would not have an impact on aviation and air traffic. It is expected that reasonably foreseeable future actions would have similar noise impacts to the Proposed Action and Alternatives C through F. Therefore, impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on aviation and air traffic. | **Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on aviation and air traffic. |
| Port utilization | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in navigation patterns at nearby airports. The increased activity could | Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, and changes in navigation patterns at nearby airports. | See Section 3.17.2.2.2 for analysis. | See Section 3.17.2.7 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | cause potential impacts to aviation and air traffic. | | | | |
| Presence of structures: Navigation hazard | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA. Other existing aboveground stationary facilities within the GAA that present navigational hazards include communication towers, dock facilities, and other onshore and offshore structures exceeding 200 feet in height. The addition of these structures increases navigational complexity and may change aircraft navigation patterns for aircraft flying at low altitudes and for airports in the vicinity, increasing collision risks for some aircraft. However, more than 90% of existing air traffic in the GAA would occur at altitudes that would not be impacted by the presence of WTGs. | No future non-OSW stationary structures were identified within the offshore GAA. Onshore development activities are anticipated to continue with additional proposed communications towers. | See Section 3.17.2.2.2 for analysis. | See Section 3.17.2.7 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Presence of structures: Space use conflicts | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA. Other existing aboveground stationary facilities within the GAA that could cause space use conflicts for aircraft consist of communication towers, and other onshore and offshore structures exceeding 200 feet in height. Impacts would be as described for Presence of structures: Navigation hazard. | No future non-OSW stationary structures were identified within the offshore GAA. Onshore, development activities are anticipated to continue with additional proposed communications towers. | See Section 3.17.2.2.2 for analysis. | See Section 3.17.2.7 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Traffic: Aviation | Onshore and offshore military and national security use areas could have designated surface and subsurface boundaries and special use airspace. Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments.<br>Warning Area W-105A is a special use airspace area primarily used by the U.S. Air Force located offshore Massachusetts and Rhode Island, and overlapping the RI and MA lease areas. | Although no future non-OSW stationary structures were identified within the offshore GAA, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non-OSW is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends. | See Section 3.17.2.2.2 for analysis for offshore impacts. This IPF would not impact onshore uses. | See Section 3.17.2.7 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts for offshore impacts. This IPF would not impact onshore uses. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Traffic: Vessels | Current vessel traffic in the region is described in Section 3.16.1. The GAA would continue to have numerous ports, and the extensive marine traffic related to constructed and permitted OSW COP | Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased | See Section 3.17.2.2.2 for analysis. | See Section 3.17.2.7 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | projects, shipping, fishing, and recreation would continue to be important to the region's economy. | port visits by deep draft vessels and consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic. | | | |
| Climate change | Climate change has resulted in a measurable increase in annual precipitation on the East Coast, which could impact military and national security–related aviation and air traffic due to more inclement weather incidents. | Sea level rise and storm severity/frequency would increase due to the effects of climate change. | Future OSW activities could result in construction activities that increase GHG emissions. Increased GHG emissions could contribute to climate change impacts. Climate change has resulted in a measurable increase in annual precipitation on the East Coast, which could impact aviation and air traffic due to more inclement weather incidents. However, the construction of future OSW facilities would ultimately help slow the negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources. On this basis, the effects of climate change on aviation and air traffic under the No Action Alternative would be **negligible** adverse. | **Offshore:** the Proposed Action and Alternatives C through F could result in GHG emissions during Project construction, O&M, and decommissioning phases as well as offset negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources. Therefore, the effects of climate change on aviation and air traffic under Alternatives C through F would be **negligible** adverse.<br>**Onshore:** Same as offshore impacts. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, the effects of climate change on aviation and air traffic under Alternative G would be **negligible** adverse. |

* Includes three constructed and permitted COP projects within the aviation and air traffic GAA: Block Island, SFWF, and Vineyard Wind 1.

## Other Marine Uses: Undersea Cables

**Table E2-17. Summary of Activities and the Associated Impact-Producing Factors for Other Marine Uses: Undersea Cables**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases and discharges | Accidental releases and discharges of fuels and fluids have the potential to occur during vessel usage for permitted and built OSW COP projects, dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities. | Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities. | The effects of this IPF from the No Action Alternative would not impact undersea cables because accidental releases and discharges would result in water quality impacts that do not impact undersea cables. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. | **Offshore:** The effects of this IPF from the Proposed Action and Alternatives C through F would not impact undersea cables because accidental releases and discharges would result in water quality impacts that do not impact undersea cables. Alternatives C through F would require fewer construction, O&M, and decommissioning vessel trips, reducing the risk of accidental releases and discharges, but there would be no measurable change on effects between all Project alternatives. Therefore, this IPF would result in a **negligible** adverse impact and **negligible** adverse cumulative impact under the Proposed Action and Alternatives C through F because there would be no effect on this resource. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Therefore, this IPF would result in a **negligible** adverse impact and **negligible** adverse cumulative impact under Alternative G because there would be no effect on this resource. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | **Onshore:** Same as offshore impacts. | **Onshore:** Same as offshore impacts. |
| Anchoring and new cable emplacement/maintenance | Impacts from this IPF have the potential to occur due to permitted and built OSW COP projects, ongoing military use and survey, commercial, and recreational activities. These disturbances would be limited to local areas. Any cable crossings are anticipated to include mapping and installation of cable protection at the crossing location, as well as standard design techniques for undersea cable installation. | Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Cable emplacement/maintenance would be infrequent and short term. | The presence of future OSW energy cables could preclude future submarine cable placement within any given development footprint, requiring future cables to route around these areas. However, the placement and presence of these cables would not prohibit the placement of additional cables and pipelines. Following standard industry procedures, cables and pipelines can be crossed without adverse impacts. The risk of allision to cable maintenance vessels could increase as more OSW energy projects are constructed. However, given the infrequency of required maintenance at any given location along a cable route, this risk is expected to be low. Impacts on submarine cables would be eliminated during decommissioning of OSW farms if export cables associated with those projects are removed. Therefore, the effects of anchoring and new cable emplacement/maintenance on undersea cables under the No Action Alternative would be **negligible** adverse. | **Offshore:** The installation of the RWEC would cross submarine cables that run through the regional waters. Most submarine cables pass through Green Hill, Rhode Island. In addition, there are NOAA nautical chart cable and pipeline areas that denote where such infrastructure could be located. Because Revolution Wind would use standard techniques during installation, O&M, and decommissioning to prevent damage to cables, adverse impacts would be **negligible** adverse. The effects of this IPF would be the same or slightly reduced from the Proposed Action under Alternatives C through F.<br>Up to 13,469 miles of cables are expected to be installed between 2021 and 2030 in the RI/MA WEA as part of reasonably foreseeable future actions. However, the placement and presence of these cables would not prohibit the placement of additional cables and pipelines. Impacts on undersea cables would be eliminated during decommissioning of OSW farms if export cables associated with those projects are removed. Therefore, Project activities combined with reasonably foreseeable activities would result in a **negligible** adverse impact on undersea cables. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F: impacts would be **negligible** adverse. The effects of this IPF would be the same or slightly reduced from the Proposed Action under Alternative G.<br>Impacts on undersea cables would be eliminated during decommissioning of OSW farms if export cables associated with those projects are removed. Therefore, Project activities combined with reasonably foreseeable activities would result in a **negligible** adverse impact on undersea cables. |
| | | | | **Onshore:** Same as offshore impacts. | **Onshore:** Same as offshore impacts. |
| Light | Constructed and permitted OSW COP projects are introducing 13 lighted structures into the GAA, as well as lighted vessels. Impacts from lighting also include light associated with military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Impacts are expected to be minimal. | Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. | Future OSW activities without the Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize allision risks. Implementation of navigational lighting and marking per FAA and BOEM requirements and guidelines would further reduce the risk of vessel collisions during installation or maintenance of undersea cables. This would result in a general increase of lights in the GAA, which could have a small negative impact on vessels performing cable construction or maintenance by increasing | **Offshore:** Lighting for construction, operations, and decommissioning under all Project alternatives would not impact undersea cables because light has no impact on undersea cables. Alternatives C through F would result in smaller Project footprints and fewer lighted offshore structures than the Proposed Action, but the reduction of impacts would not be measurable. This IPF would result in **negligible** adverse impacts because there would be no effect on this resource. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in **negligible** adverse impacts because there would be no effect on this resource. |
| | | | | **Onshore:** Same as offshore impacts. | **Onshore:** Same as offshore impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | navigational complexity. However, given that no new cables associated with non–wind energy actions are anticipated, the effects of light on undersea cable construction or maintenance under the No Action Alternative would be **negligible** adverse. | | |
| Noise | Ongoing noise from OSW and non-OSW construction occurs frequently nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. Noise from construction near shorelines is expected to gradually increase over the next 30 years in line with human population growth along the coast of the GAA. | No future activities were identified within the GAA other than ongoing activities. | The effects of this IPF from the No Action Alternative would not impact undersea cables because noise has no impact on existing undersea cables or the construction or maintenance of undersea cables. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. | **Offshore:** Project construction, operations, and decommissioning noise would not impact undersea cables because noise has no impact on undersea cables. Alternatives C through F would result in smaller Project footprints and fewer offshore structures than the Proposed Action, but the reduction of impacts would not be measurable. This IPF would result in **negligible** adverse impacts because there would be no effect on this resource.<br>**Onshore:** Same as offshore impacts. | **Offshore:** Project construction, operations, and decommissioning noise would not impact undersea cables because noise has no impact on undersea cables. Alternative G would result in smaller Project footprints and fewer offshore structures than the Proposed Action, but the reduction of impacts would not be measurable. This IPF would result in **negligible** adverse impacts because there would be no effect on this resource.<br>**Onshore:** Same as offshore impacts. |
| Port utilization | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in port usage. The increased activity could cause potential navigational complexity. | Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators. | There could be a very minimal increase in vessel use at ports associated with the No Action Alternative. Vessels used for undersea cable installation and maintenance of existing or future non–wind energy cables could conflict with vessels used for construction, O&M and decommissioning of future OSW actions by increasing congestion and delays at ports. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Port utilization is also not expected to increase beyond what is currently allowed under land use regulations; therefore, port utilization that supports future OSW activities would not impact the construction, operation, and maintenance of existing and future undersea cables. Therefore, there would be **negligible** adverse impacts from increased port utilization for the construction, operation, and maintenance of existing and future undersea cables. | **Offshore:** Vessels used for the Project could impact installation and O&M of other undersea cables by increasing congestion and delays at ports. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Port utilization is also not expected to increase beyond what is currently allowed under land use regulations; therefore, port utilization that supports the Proposed Action and Alternatives C through F would have **negligible** adverse impacts on existing and future undersea cables.<br>**Onshore:** Same as offshore impacts. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F; therefore, port utilization that supports Alternative G would have **negligible** adverse impacts on existing and future undersea cables.<br>**Onshore:** Same as offshore impacts. |
| Presence of structures: Allisions and navigation hazards | Constructed and permitted OSW COP projects are introducing 13 structures into the GAA. Other existing structures within and near the GAA that pose potential allision hazards include met buoys associated with OSW lease areas; and shoreline | Reasonably foreseeable non-OSW structures that could affect submarine cables have not been identified in the GAA. | See Section 3.17.2.6.2 for analysis. | See Section 3.17.2.11 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.21 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | developments such as docks, ports, and other commercial, industrial, and residential structures. Current activities could preclude future submarine cable placement in the GAA, although there are no known future cables identified to be placed within this area. Additionally, ongoing vessel traffic represents a risk for allisions with vessels used for construction of undersea cables. | | | | |
| Presence of structures: Space use conflicts | Submarine cables cross the GAA and are associated with a larger network of submarine cables that are present along the OCS. Constructed and permitted OSW COP projects are also introducing 13 structures into the GAA. Current activities could preclude future submarine cable placement in the GAA, although there are no known future cables identified to be placed within this area. | Reasonably foreseeable non-OSW structures have not been identified in the GAA. | See Section 3.17.2.6.2 for analysis. | See Section 3.17.2.11 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.21 for analysis of impacts. |
| Presence of structures: Transmission cable infrastructure | Seven submarine cable corridors cross cumulative lease areas. Constructed and permitted OSW COP projects are also introducing an estimated 163 miles of new offshore cable in the GAA. Current activities could preclude future submarine cable placement in the GAA, although there are no known future cables identified to be placed within this area. | Reasonably foreseeable non-OSW structures have not been identified in the GAA. | See Section 3.17.2.6.2 for analysis. | See Section 3.17.2.11 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.21 for analysis of impacts. |
| Traffic: Aviation | Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments. | Although no future non-OSW stationary structures were identified within the offshore GAA, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non-OSW is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends. | Future OSW activities could result in increased air traffic due to the use of helicopters and other aircraft during construction, installation, O&M, and decommissioning of future wind projects. While the exact increase in future project-related flights is unknown, it is anticipated that future OSW activities would result in a small increase in flight traffic. Future OSW projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. With implementation of FAA-approved flight plans, impacts of the No Action Alternative on undersea cables would be **negligible** adverse. | **Offshore:** Aviation and air traffic impacts from offshore construction, O&M, and decommissioning of the Project would not coincide with areas in which undersea cables are located. While Alternatives C through F would require fewer Project-related helicopter trips due to the reduction in number of offshore elements, the effects of this IPF on undersea cables and pipelines would be **negligible** adverse under all Project alternatives.<br>**Onshore:** Same as offshore impacts. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Although Alternative G would require fewer Project-related helicopter trips due to the reduction in number of offshore elements, the effects of this IPF on undersea cables and pipelines would be **negligible** adverse under all Project alternatives.<br>**Onshore:** Same as offshore impacts. |
| Traffic: Vessels | Current vessel traffic in the region is described in Section 3.16.1. The GAA would continue to have numerous ports, and the | Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not | See Section 3.17.2.6.2 for analysis. | See Section 3.17.2.11 and Section 3.17.2.1, Table 3.17-1 for analysis of impacts. | See Section 3.17.2.21 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | extensive marine traffic related to constructed and permitted OSW COP projects, shipping, fishing, and recreation would continue to be important to the region's economy. Ongoing vessel traffic could lead to course changes of vessels used for undersea cable maintenance and installation and increased traffic along vessel transit routes. | anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels and consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic. | | | |
| Climate change | Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters and sea level rise. | No future activities were identified within the GAA other than ongoing activities. | The effects of this IPF from the No Action Alternative would not impact undersea cables because undersea cables and cable placement are not impacted by ongoing or future climate change impacts. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. | **Offshore:** The impacts of this IPF would not impact undersea cables for the Proposed Action and Alternatives C through F because climate change impacts do not have a measurable effect on undersea cables. This IPF would result in **negligible** adverse impacts because there would be no effect on this resource.<br>Same as offshore impacts. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in **negligible** adverse impacts because there would be no effect on this resource.<br>Same as offshore impacts. |

* Includes one constructed and permitted COP project within the undersea cables GAA: SFWF.

# Other Marine Uses: Land-Based Radar

**Table E2-18. Summary of Activities and the Associated Impact-Producing Factors for Other Marine Uses: Land-Based Radar**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases and discharges | Accidental releases and discharges of fuels and fluids have the potential to occur during vessel usage for permitted and built OSW COP projects, dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities. | Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities. | The effects of this IPF from the No Action Alternative would not impact land-based radar because accidental releases and discharges would be limited in scope to the offshore and onshore areas occupied by future OSW activities and would not result in increased radar interference. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. | **Offshore:** The effects of this IPF from the Proposed Action and Alternatives C through F would not impact land-based radar because accidental releases and discharges from the Project would be limited to the areas in which construction, O&M, and decommissioning are taking place and would not be located near land-based radar systems, nor would land-based radar systems be affected by accidental releases and discharges. While Alternatives C through F would require fewer Project-associated vessel trips, incrementally reducing the risk of accidental releases and discharges, the effects under all Project alternatives would be similar. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.<br>**Onshore:** Same as offshore impacts. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. Although Alternative G would require fewer Project-associated vessel trips, incrementally reducing the risk of accidental releases and discharges, the effects under all Project alternatives would be similar. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.<br>**Onshore:** Same as offshore impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Anchoring and new cable emplacement/maintenance | Impacts from this IPF have the potential to occur due to permitted and built OSW COP projects, to ongoing military use and survey, commercial, and recreational activities. These disturbances would be limited to local areas and are not expected to increase radar interference. | Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Cable emplacement/maintenance would be infrequent and short term. | Offshore energy facility new cable emplacement and maintenance of cables would involve increased vessel traffic, which could create increased radar interference. However, the impacts are expected to be small and short term because anchoring and cable emplacement/maintenance activities are short-term activities that require few vessels. On this basis, the effects of anchoring and new cable emplacement/maintenance on land-based radar under the No Action Alternative would be **negligible** adverse. | **Offshore:** Cable construction associated with the Proposed Action and Alternatives C through F could result in increased vessel traffic, which could create increased radar interference. However, the impacts are expected to be small and short term in duration because anchoring and cable emplacement activities are short term and infrequent activities that require few vessels. Impacts under Alternatives C through F would be slightly reduced due to smaller Project footprints and fewer offshore structures, but effects would be similar under all Project alternatives. On this basis, the effects of anchoring and new cable emplacement/maintenance on land-based radar under the Proposed Action and Alternatives C through F during Project construction, O&M, and decommissioning would be **negligible** adverse.<br>Up to 2,961 acres could be affected by anchoring/mooring activities during OSW energy development within the GAA in addition to the Proposed Action and Alternatives C through F. However, the impacts are expected to be small and short term. Therefore, the cumulative impacts associated with the Proposed Action and Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be similar to those impacts described under the No Action Alternative and would be **negligible** adverse. | **Offshore: S**imilar impacts to the Proposed Action and Alternatives C through F. On this basis, the effects of anchoring and new cable emplacement/maintenance on land-based radar under Alternative G during Project construction, O&M, and decommissioning would be **negligible** adverse.<br>Up to 2,093 acres could be affected by anchoring/mooring activities during OSW energy development within the GAA under Alternative G. However, the impacts are expected to be short term. Therefore, the cumulative impacts of Alternative G when combined with past, present, and reasonably foreseeable activities would be similar to those impacts described under the Proposed Action and would be **negligible** adverse. |
| | | | | **Onshore:** Same as offshore impacts. | **Onshore:** Same as offshore impacts. |
| Light | Constructed and permitted OSW COP projects are introducing 81 lighted structures into the GAA, as well as lighted vessels. Other impacts from lighting include light associated with military, commercial, or construction vessel traffic but are not expected to result in radar interference. | No future activities were identified within the GAA other than ongoing activities. | The effects of this IPF from the No Action Alternative would not impact land-based radar because light from future OSW activities would not affect radar systems. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. | **Offshore:** Light from construction, O&M, and decommissioning of the Proposed Action and Alternatives C through F would not affect radar systems. This IPF would result in a **negligible** adverse effect on the operation and effectiveness of land-based radar systems because there would be no effect on this resource.<br>The cumulative effects of this IPF do not impact land-based radar and are therefore **negligible** adverse.<br>Although Alternatives C through F would require fewer construction vessel trips and | **Offshore:** Although Alternative G would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | |
| | | | | **Onshore:** Same as offshore impacts. | **Onshore:** Same as offshore impacts. |
| Noise | Noise impacts are expected from OSW and non-OSW construction and vessel traffic but are not expected to result in radar interference. | No future activities were identified within the GAA other than ongoing activities. | The effects of this IPF from the No Action Alternative would not impact land-based radar because noise from future OSW activities would not affect radar systems. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. | **Offshore:** Airborne noise from construction of the Proposed Action would have a **negligible** adverse effect on land-based radar systems because noise from future OSW activities would not affect radar systems.<br>Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore:** Although Alternative G would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. |
| | | | | **Onshore:** Same as offshore impacts. | **Onshore:** Same as offshore impacts. |
| Port utilization | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term but could result in increased radar interference. | No future activities were identified within the GAA other than ongoing activities. | There could be an increase in vessel use at ports associated with the No Action Alternative. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Port utilization is also not expected to increase beyond what is currently allowed under land use regulations; therefore, there would be **negligible** adverse impacts from increased port utilization on land-based radar. | **Offshore:** Various ports would be improved to support the Proposed Action (see Section 3.14). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. The number of construction vessels associated with the Proposed Action would increase, which could result in vessel congestion at ports, but this would be a short-term effect. An increase in vessel traffic could result in increased radar interference. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Because port utilization is not expected to increase beyond what is currently allowed under land use regulations, port utilization is expected to have a **negligible** adverse effect on land-based radar. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore:** Although Alternative G would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. |
| | | | | **Onshore:** Same as offshore impacts. | **Onshore:** Same as offshore impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Presence of structures: Navigation hazards | Constructed and permitted OSW COP projects are introducing 81 structures into the GAA. Wind developments in the direct line-of-sight with, or extremely close to, radar systems can cause clutter and interference. | Reasonably foreseeable non-OSW structures proposed for construction in the lease areas that could affect radar systems have not been identified. | See Section 3.17.2.3.2 for analysis. | See Section 3.17.2.1, Table 3.17-1 and Section 3.17.2.8 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Traffic: Aviation | Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments. | Although no future non-OSW stationary structures were identified within the offshore GAA, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non-OSW is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends. | Future OSW activities without the Proposed Action could result in increased air traffic due to the use of helicopters and other aircraft during construction, installation, O&M, and decommissioning of future wind projects. While the exact increase in future project-related flights is unknown, it is anticipated that future OSW activities would result in a small increase in flight traffic. Future OSW projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. With implementation of FAA-approved flight plans, impacts of the No Action Alternative on land-based radar would be **negligible** adverse. | **Offshore:** The Proposed Action would result in an increase in air traffic related to construction and installation of offshore Project elements. Two helicopter trips per day are anticipated per day during construction, with a total flight time of 8,832 hours, or approximately 4,416 hours per year over the 2-year construction period. Extrapolating from nationwide statistics cited in Section 3.17.2.2.1, helicopter flights for Project construction would represent a 63% increase in annual helicopter flight hours and a 7% increase in general aviation flight hours in the GAA during Project construction. O&M of the Proposed Action would result in a 0.01% increase in general aviation in the GAA. A helicopter route plan would be developed to meet industry guidelines and best practices in accordance with FAA guidance. The addition of one to two helicopter trips per day would have a **negligible** adverse impact on land-based radar in the GAA.<br>The Proposed Action would result in an average 1% increase in general aviation in the GAA over a 32-year construction, installation, O&M, and decommissioning period, with reasonably foreseeable future actions anticipated to have similar impacts in scale and duration. On the basis of a 1% increase in general aviation in the GAA, the cumulative effects of this IPF on land based radar would be **negligible** adverse.<br>Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore:** Although Alternative G would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. |
| | | | | **Onshore:** Same as offshore impacts. | **Onshore:** Same as offshore impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Traffic: Vessels | Current vessel traffic in the region is described in Section 3.16.1. The GAA would continue to have numerous ports and extensive marine traffic related to constructed and permitted OSW COP projects, shipping, fishing, and recreation. WTG spacing that allows more space for vessels to navigate would reduce potential interference on radar systems. | Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels and consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic | See Section 3.17.2.3.2 for analysis. | See Section 3.17.2.1, Table 3.17-1 and Section 3.17.2.8 for analysis of impacts. | See Sections 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Climate change | Climate change has resulted in a measurable increase in annual precipitation on the East Coast. | Sea level rise and storm severity/frequency would increase due to the effects of climate change. | Future OSW activities could result in construction activities that increase GHG emissions. Increased GHG emissions could contribute to climate change impacts. Climate change has resulted in a measurable increase in annual precipitation on the East Coast. However, the construction of future OSW facilities would ultimately help slow the negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources. On this basis, the effects of climate change on land-based radar under the No Action Alternative would be **negligible** adverse. | **Offshore:** The Proposed Action could result in construction, O&M and decommissioning activities that increase GHG emissions. Increased GHG emissions could contribute to climate change impacts. However, the beneficial impacts to climate change would be increased due shifting energy sources from nonrenewable to renewable sources, which would help offset additional future additional negative effects of climate change. Climate change impacts from the Proposed Action would not impact land-based radar because the construction, operation, and maintenance of land-based radar systems is not affected by climate change that can be linked to the Proposed Action. Therefore, the effects of climate change on land-based radar under the Proposed Action would be **negligible** adverse.<br>Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore:** Although Alternatives G would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. |
| | | | | **Onshore:** Same as offshore impacts. | **Onshore:** Same as offshore impacts. |

* Includes three constructed and permitted COP projects within the land-based radar GAA: Block Island, SFWF, and Vineyard Wind 1.

## Other Marine Uses: Scientific Research and Surveys

**Table E2-19**. **Summary of Activities and the Associated Impact-Producing Factors for Other Marine Uses: Scientific Research and Surveys**

| Associated IPFs: Sub-IPFs | Ongoing Activities | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases and discharges | Accidental releases and discharges of fuels and fluids have the potential to occur during vessel usage for permitted and built OSW COP projects, dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities. | Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities. | Fuels and oils would be required for construction and installation, O&M, and decommissioning of future OSW activities. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. OSRPs would be required for all future OSW projects, which includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. Releases during construction of future OSW activities during all phases of project construction would generally be localized and short term, resulting in little change to water quality.<br>In the event of a spill, water quality could be temporarily impacted, which could alter water quality in the vicinity of the spill. This could alter results of scientific surveys that are water quality dependent. However, an OSRP has been prepared for the Project and includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. Therefore, the effects of accidental releases and discharges on scientific research and surveys from future OSW activities without the Proposed Action would be **negligible** adverse. | **Offshore:** Fuels and oils would be required for Proposed Action offshore construction and installation, O&M, and decommissioning equipment, vessels, and infrastructure. In the event of a spill or release, offshore water quality would be degraded. As described in Section 3.21.1.2, the likelihood of a spill due to construction and installation activities and weather events is low (once per 1,000 years). However, water quality could be temporarily impacted in the vicinity of the spill. This could alter results of scientific surveys that are water quality dependent. An OSRP has been prepared for the Project and includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills.<br>Therefore, the effects of accidental releases and discharges on scientific research and surveys from the Proposed Action would be **negligible** adverse.<br>Reasonably foreseeable activities could also result in accidental releases and discharges, although those projects would be subject to the same minimization measures as the RWF. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse.<br>Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.<br>**Onshore:** The construction and installation of onshore Project components would not impact scientific research and surveys because accidental releases and discharges would be limited to an onshore construction footprint and scientific research and surveys | **Offshore:** Although Alternative G would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.<br>**Onshore:** The construction and installation of onshore Project components would not impact scientific research and surveys because accidental releases and discharges would be limited to an onshore construction footprint and scientific research and surveys would occur offshore. This IPF would result in a **negligible** adverse impact. |

| Associated IPFs: Sub-IPFs | Ongoing Activities | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | would occur offshore. This IPF would result in a **negligible** adverse impact. | |
| Anchoring and new cable emplacement/maintenance | Impacts from this IPF have the potential to occur due to permitted and built OSW COP projects, ongoing military use and survey, commercial, and recreational activities. These activities potentially increase navigational complexity and vessel traffic but are expected to minimally impact scientific research and surveys. | Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Cable emplacement/maintenance would be infrequent and short term. | See Section 3.17.2.5.2 for analysis. | See Section 3.17.2.1, Table 3.17-1 and Section 3.17.2.10 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Light | Constructed and permitted OSW COP projects are introducing 83 lighted structures into the GAA, as well as lighted vessels. Other impacts from lighting on scientific research and surveys include light associated with non-OSW military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis. These lighting sources could change species' behavior, which could impact the results of scientific research and surveys. | Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. Light from onshore structures is expected to gradually increase in line with human population growth along the coast, with minimal offshore impacts. | See Section 3.17.2.5.2 for analysis. | See Section 3.17.2.1, Table 3.17-1 and Section 3.17.2.10 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Noise | Noise impacts are expected from OSW and non-OSW construction and vessel traffic. Construction occurs frequently in nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this IPF consist of constructed and permitted OSW COP projects, commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels. | Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the GAA for this resource. Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain. | Construction and installation of future OSW projects would result in temporary increases in construction and decommissioning noise. There would be low levels of operational noise as part of future OSW projects. Construction noise has the potential to interfere with scientific research and surveys if such surveys are sensitive to noise impacts. However, construction noise levels are expected to be below regulatory thresholds and would be short term in duration. Operational noise impacts are expected to be very minimal and would also be below regulatory thresholds. Therefore, noise would have a **negligible** adverse impact on scientific research and surveys. | **Offshore and Onshore:** Construction and installation of the Proposed Action would result in a temporary increase in construction noise. O&M and decommissioning of the Proposed Action would result in long-term, permanent low levels of operational noise and temporary noise during decommissioning. These noise sources have the potential to interfere with scientific research and surveys if such surveys are sensitive to noise impacts. However, because NMFS anticipates that construction and O&M of the Project would result in curtailment of scientific research and surveys in the GAA, noise would have a **negligible** adverse impact on scientific research and surveys.<br>Reasonably foreseeable activities would also increase noise in the area, which could interfere with scientific research and surveys. However, reasonably foreseeable future actions would also result in curtailment of scientific research and surveys in the RI/MA | **Offshore and Onshore:** Although Alternative G would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. |

| Associated IPFs: Sub-IPFs | Ongoing Activities | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | WEA as additional wind projects are constructed. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse.<br>Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | |
| Port utilization | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in port usage. The increased activity could increase navigational complexity and vessel traffic, which could impede scientific research and studies. | Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators. | Various ports would be improved to support future OSW development within the GAA (see Section 3.14). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. The number of construction vessels would increase due to future OSW activities without the Proposed Action, which could result in delays and congestion at ports that could lead to potential conflicts with scientific research vessels due to increased port activity. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction is completed, and all navigation hazards and collision risks would be gradually eliminated during decommissioning as offshore WTGs are removed. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on scientific research and surveys. | **Offshore and Onshore:** Various ports would be improved to support the Proposed Action (see Section 3.14). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. Because port utilization is not expected to increase beyond what is currently allowed under land use regulations, port utilization that supports the Proposed Action would not impact scientific research and surveys. The number of construction and operational vessels would increase due to the Proposed Action, which could result in delays and congestion at ports that could lead to conflicts with scientific and research vessels. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on scientific research and surveys.<br>Reasonably foreseeable future actions would also result in improvements at various ports to support future OSW projects (see EIS Appendix E). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would also support state strategic plans and local land use goals for the development of waterfront infrastructure. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and | **Offshore and Onshore:** Although Alternative G would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. |

| Associated IPFs: Sub-IPFs | Ongoing Activities | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | reasonably foreseeable activities would be **negligible** adverse.<br>Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | |
| Presence of structures: Navigation hazards | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. NOAA has concluded that, within OSW facility areas, survey operations would be curtailed, if not eliminated, under current vessel capacities and monitoring protocols. Specifically, coordinators of large vessel survey operations or operations deploying mobile survey gear have currently determined that activities within OSW facilities are not within their safety and operational limits. | Reasonably foreseeable non-OSW activities would not implement stationary structures within the open ocean environment that would pose navigational hazards and raise the risk of allisions for survey vessels and collisions for survey aircraft. | See Section 3.17.2.5.2 for analysis. | See Section 3.17.2.1, Table 3.17-1 and Section 3.17.2.10 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |
| Traffic: Aviation | Military air traffic use the area and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments. Some vessels or low-flying aircraft may be required to alter course to avoid WTGs associated with constructed and permitted OSW COP projects. NOAA policy advises survey vessels to remain at least 1 mile from fixed structures if possible. | Although no future non-OSW stationary structures were identified within the offshore GAA, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non-OSW is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends. | Future OSW activities without the Proposed Action could result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects. While the exact increase in future project-related flights is unknown, it is anticipated that future OSW activities would result in a small increase in flight traffic. Future OSW projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. With implementation of FAA-approved flight plans, impacts of the No Action Alternative on scientific research and surveys would be **negligible** adverse. | **Offshore and Onshore:** Construction and installation of the Proposed Action would result in a 7% increase in general aviation in the GAA. O&M of the Proposed Action would result in a 0.01% increase in general aviation in the GAA. Please refer to Section 3.17 for analysis of the Project's construction and installation impacts. On the basis of the estimated increase in general aviation in the GAA, the effects of this IPF on scientific research and surveys under the Proposed Action would be **negligible** adverse, as the 7% increase in general aviation flight hours is not anticipated to impact air-based scientific research and surveys.<br>Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore and Onshore:** Although Alternative G would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. |
| Traffic: Vessels | Current vessel traffic in the region is described in Section 3.16.1. The GAA would continue to have numerous ports and extensive marine traffic related to constructed and permitted OSW COP projects, shipping, fishing, and recreation. | Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels and | See Section 3.17.2.5.2 for analysis. | See Section 3.17.2.1, Table 3.17-1 and Section 3.17.2.10 for analysis of impacts. | See Section 3.17.2.1, Table 3.17-1 for analysis of impacts. |

| Associated IPFs: Sub-IPFs | Ongoing Activities | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | These sources of vessel traffic may lead to course changes of scientific and research vessels or increase risk of collision. | consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic. | | | |
| Climate change | Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters and sea level rise. | No future activities were identified within the GAA other than ongoing activities. | The ongoing effects of global climate change are expected to adversely affect many marine resources that are the subject ongoing survey and research efforts. Climate change could influence the planning and objectives of future scientific research and surveys but would not be expected to have a measurable effect on their implementation. Therefore, the effects of this IPF on scientific surveys and research would be **negligible** adverse. | **Offshore and Onshore:** The ongoing effects of global climate change are expected to adversely affect many marine resources that are the subject of ongoing survey and research efforts. Climate change could influence the planning and objectives of future scientific research and surveys but would not be expected to have a measurable effect on their implementation. Therefore, the effects of this IPF on scientific surveys and research would be **negligible** adverse.<br>Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore and Onshore:** Although Alternative G would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. |

* Includes all constructed and permitted COP projects within the scientific survey GAA: Block Island, SFWF, Vineyard Wind 1, and Coastal Virginia Offshore Wind.

## Other Marine Uses: Offshore Energy Uses

Affected environment: The OCS near the Project is currently experiencing active leasing and exploration in support of OSW energy development. EIS Appendix E provides a list of known and anticipated OSW project and wind energy leases existing in the area that could lead to additional wind farm development. BOEM anticipates that developers could continue to propose OSW energy projects near the Project. The trend in increased wind farm development is anticipated to continue on the OCS. Several tidal energy projects have been implemented in the region and several are in the planning stages (see Appendix E of the COP). Tidal energy projects are typically located in the nearshore environment where landforms constrict tidal water passage, thereby increasing the velocity of tidal currents. These landforms exist in Narragansett Bay within the GAA; however, more detailed studies are needed to assess sites and determine economic viability for tidal energy uses (Robichaud et al. 2012). The Town of Edgartown has pursued developing a tidal energy site in the Muskeget Channel between Martha's Vineyard and Nantucket Island since 2007. It has operated as a test site and is usable for a wide range of testing. To date, over $2 million has been expended on resource, benthic, sediment, marine mammal, and other studies. The Bourne Tidal Test Site is located on Cape Cod Canal has been used for small tidal energy demonstration projects (New England Marine Energy Development System 2017).

**Table E2-20. Summary of Activities and the Associated Impact-Producing Factors for Other Marine Uses: Offshore Energy Uses**

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| Accidental releases and discharges | Accidental releases and discharges of fuels and fluids have the potential to occur during vessel usage for permitted and built OSW COP projects, dredge material ocean disposal, fisheries use, marine transportation, military use, survey | Future accidental releases from offshore vessel usage, spills, and consumption would likely continue a similar trend to ongoing activities. | Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of OSW is already evaluated as part of all other IPFs and uses. | **Offshore:** Because offshore energy projects occur within individual lease areas, there would be no opportunity for the RWF to directly overlap or substantially interfere with other renewable energy projects. Therefore, accidental releases and discharge associated with the RWF would not impact other offshore | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | activities, and submarine cable line and pipeline laying activities. | | The reader is referred to other subsections for evaluation of the impacts of future OSW on marine uses. | energy projects; This IPF would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | |
| Anchoring and new cable emplacement/ maintenance | Impacts from this IPF have the potential to occur due to permitted and built OSW COP projects, ongoing military use and survey, commercial, and recreational activities. These activities could cause potential conflicts with other offshore energy uses. | Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Cable emplacement/maintenance would be infrequent and short term. | Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of OSW is already evaluated as part of all other IPFs and uses.<br>The reader is referred to other subsections for evaluation of the impacts of future OSW on marine uses. | **Offshore:** Because offshore energy projects occur within individual lease areas, there would be no opportunity for the RWF to directly overlap or substantially interfere with other renewable energy projects. Therefore, anchoring and new cable emplacement/maintenance associated with the RWF would not impact other offshore energy projects; This IPF would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |
| Light | Constructed and permitted OSW COP projects are introducing 83 lighted structures into the GAA, as well as lighted vessels. Other impacts from lighting on offshore energy uses include light associated with non-OSW military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis. Impacts are expected to be minimal. | Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. Light from onshore structures is expected to gradually increase in line with human population growth along the coast, with minimal offshore impacts. | Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for standalone cumulative analysis because the impact of OSW is already evaluated as part of all other IPFs and uses.<br>The reader is referred to other subsections for evaluation of the impacts of future OSW on marine uses. | **Offshore:** Because offshore energy projects occur within individual lease areas, there would be no opportunity for the RWF to directly overlap or substantially interfere with other renewable energy projects. Therefore, light impacts associated with the RWF would not impact other offshore energy projects; This IPF would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |
| Noise | Noise impacts are expected from OSW and non-OSW construction and vessel traffic. Construction occurs frequently in nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and | Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the GAA for this resource. Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain. | Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of OSW is already evaluated as part of all other IPFs and uses. | **Offshore:** Because offshore energy projects occur within individual lease areas, there would be no opportunity for the RWF to directly overlap or substantially interfere with other renewable energy projects. Therefore, noise associated with the RWF would not impact other offshore energy projects; This IPF would result in a **negligible** adverse impact for the | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | temporary. Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this IPF consist of constructed and permitted OSW COP projects, commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels. | | The reader is referred to other subsections for evaluation of the impacts of future OSW on marine uses. | Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | |
| Port utilization | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in navigation patterns at nearby airports. The increased activity could cause potential conflicts with other offshore energy uses. | Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, changes in port usage by some fishing or recreational vessel operators, and changes in navigation patterns. | Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of OSW is already evaluated as part of all other IPFs and uses.<br>The reader is referred to other subsections for evaluation of the impacts of future OSW on marine uses. | **Offshore:** If construction time frames with other OSW energy project overlap, there could be increased impacts to construction ports. Such impacts are not anticipated to affect construction timelines or alter the layouts of other renewable energy projects. For this reason, impacts are deemed **negligible** adverse for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |
| Presence of structures: Navigation hazards | Constructed and permitted OSW COP projects are introducing 83 structures into the GAA. Other stationary structures are limited in the open ocean environment of the GAA and include met buoys associated with site assessment activities. Navigation complexity associated with existing structures could cause potential conflicts with other offshore energy uses. | Reasonably foreseeable non-OSW activities would not implement stationary structures within the open ocean environment that would pose navigational hazards and raise the risk of allisions for survey vessels and collisions for survey aircraft. | Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of OSW is already evaluated as part of all other IPFs and uses.<br>The reader is referred to other subsections for evaluation of the impacts of future OSW on marine uses. | **Offshore:** Because offshore energy projects occur within individual lease areas, there would be no opportunity for the RWF to directly overlap or substantially interfere with other renewable energy projects. Therefore, this IPF would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |
| Traffic: Aviation | Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments. | Although no future non-OSW stationary structures were identified within the offshore GAA, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non-OSW is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends. | Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of OSW is already evaluated as part of all other IPFs and uses.<br>The reader is referred to other subsections for evaluation of the impacts of future OSW on marine uses. | **Offshore:** Construction and installation of the Proposed Action would result in a 7% increase in general aviation in the GAA. O&M of the Proposed Action would result in a 0.01% increase in general aviation in the GAA. On the basis of the estimated increase in general aviation in the GAA, the effects of this IPF on offshore energy uses under the Proposed Action would be **negligible** adverse for the Proposed Action. Although Alternatives C through F would require fewer construction vessel and helicopter trips and WTGs and would reduce the overall duration of construction | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | | activities relative to the Proposed Action, impacts would also be **negligible** adverse. | |
| Traffic: Vessels | Current vessel traffic in the region is described in Section 3.16.1. The GAA would continue to have numerous ports and extensive marine traffic related to constructed and permitted OSW COP projects, shipping, fishing, and recreation. These sources of vessel traffic may increase navigation, which could cause potential conflicts with other offshore energy uses. | Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels and consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic | Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of OSW is already evaluated as part of all other IPFs and uses.<br>The reader is referred to other subsections for evaluation of the impacts of future OSW on marine uses. | **Offshore:** If construction or O&M time frames with other OSW energy project overlap, there could be increased navigation risk due to an increase in vessels in the GAA. Such impacts are not anticipated to affect construction timelines or alter the layouts of other renewable energy projects. For this reason, adverse impacts to other renewable energy projects are deemed **negligible** adverse for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |
| Climate change | Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters and sea level rise. | No future activities were identified within the GAA other than ongoing activities. | Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of OSW is already evaluated as part of all other IPFs and uses.<br>The reader is referred to other subsections for evaluation of the impacts of future OSW on marine uses. | **Offshore:** Climate change impacts from the Proposed Action would not have a measurable effect on other offshore energy uses. This IPF would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | **Offshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |

* Includes all constructed and permitted COP projects that occur within the offshore energy uses GAA: Block Island, SFWF, Vineyard Wind 1, and Coastal Virginia Offshore Wind.

## Other Marine Uses: Marine Mineral Resources and Dredged Material Disposal

<u>Affected environment:</u> BOEM's Marine Minerals Program manages non-energy minerals (primarily sand and gravel) in federal waters of the OCS and leases access to these resources to target shoreline erosion, beach renourishment, and restoration projects. At this time, there are no active or requested BOEM leases near the Project. The closest active BOEM lease is offshore of New Jersey, approximately 162 miles from the Project (BOEM 2018). One USACE borrow area (7A) is located offshore the town of Wainscott, in the vicinity of the RWEC.

The EPA designates and manages dredged material disposal sites, and the USACE permits the disposal of material in the sites. One active disposal site, the Rhode Island Sound Disposal Site, is located in the GAA approximately 3 miles east of Block Island, Rhode Island, and 10 miles west of the western boundary of the proposed RWF. No inactive or closed disposal sites are located in the GAA.

Increased shoreline erosion and coastal damage from storms has led to increased demand for sand resources in recent years.

**Table E2-21**. **Summary of Activities and the Associated Impact-Producing Factors for Other Marine Uses: Marine Mineral Resources and Dredged Material Disposal**

| **Associated IPFs:**<br>**Sub-IPFs** | **Ongoing Activities*** | **Future Non–Offshore Wind Activities Intensity/Extent** | **Future Offshore Wind Activities Intensity/Extent** | **Proposed Action and Alternatives C through F** | **Alternative G (Preferred Alternative)** |
|---|---|---|---|---|---|
| Accidental releases and discharges | Accidental releases and discharges of fuels and fluids have the potential to occur during vessel usage for permitted and built OSW COP projects, dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities. | Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities. | Fuels and oils would be required for construction, installation, O&M, and decommissioning of future OSW projects. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. OSRPs would be required for all future OSW projects, which includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. Releases during construction of future OSW projects during all phases of project construction would generally be localized and short term, resulting in little change to water quality.<br>In the event of a spill, marine mineral resources could potentially be impacted if such resources are susceptible to harm from contaminants, although the impacts would be very minimal. Therefore, the effects of vessel traffic on marine mineral resources and dredged material disposal under the No Action Alternative would be **negligible** adverse. | **Offshore and Onshore:** Fuels and oils would be required for Proposed Action offshore construction and installation, O&M, and decommissioning equipment, vessels, and infrastructure. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. As described in Section 3.21.1.2, the likelihood of a spill due to construction and installation activities and weather events is low (once per 1,000 years). An OSRP has been prepared for the Project and includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. A release during construction and installation of the Proposed Action would generally be localized and short term, resulting in little change to water quality.<br>In the event of a spill, marine mineral resources could potentially be impacted if such resources are susceptible to harm from contaminants, although the impacts would be very minimal. Therefore, the effects of accidental releases and discharges on marine mineral resources and dredged material disposal under the Proposed Action would be **negligible** adverse. Reasonably foreseeable activities could also result in accidental releases and discharges, although those projects would be subject to the same minimization measures as the RWF. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse.<br>Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint and duration of construction activities, but effects would also be **negligible** adverse. | **Offshore and Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |
| New cable emplacement/maintenance | Impacts from this IPF have the potential to occur due to permitted and built OSW COP projects, military use and survey, and commercial and recreational activities. These disturbances would be local and limited to emplacement corridors. | Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Cable emplacement/maintenance would be infrequent and short term. | Future offshore cable installation could prevent future marine mineral extraction activities where project footprints overlap with extraction areas (typically within 8 miles of the shoreline). Therefore, only a portion of new OSW cables could potentially overlap extraction areas. Additionally, future projects would avoid identified borrow areas by | **Offshore and Onshore:** Because marine mineral resources and EPA dredged material disposal sites are located outside the GAA, Project anchoring and new cable emplacement/maintenance would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and | **Offshore and Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | | | consulting with the BOEM Marine Minerals Program and the USACE before approving OSW cable routes. Therefore, the effects of anchoring and new cable emplacement/maintenance under the No Action Alternative would be **negligible** adverse. | WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. | |
| Light | Constructed and permitted OSW COP projects are introducing 13 lighted structures into the GAA, as well as lighted vessels. Impacts from lighting on offshore energy uses also include light associated with military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis. Impacts are expected to be minimal. | Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. Light from onshore structures is expected to gradually increase in line with human population growth along the coast, with minimal offshore impacts. | The effects of this IPF from the No Action Alternative would not impact marine mineral resources and dredged material disposal because light from future OSW activities would not affect marine mineral resources and dredged material disposal sites or activities. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. | **Offshore and Onshore:** The effects of this IPF from the Proposed Action to marine mineral resources and dredged material disposal would be **negligible** adverse because marine mineral resources and EPA dredged material disposal sites are located outside the GAA.<br>Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint, duration of construction activities, but effects would also be **negligible** adverse. | **Offshore and Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |
| Noise | Noise impacts are expected from OSW and non-OSW construction and vessel traffic. Construction occurs frequently in nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this IPF consist of constructed and permitted OSW COP projects, commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels. | Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the GAA for this resource. Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain. | The effects of this IPF from the No Action Alternative would not impact marine mineral resources and dredged material disposal because noise from future OSW activities would not affect marine mineral resources and dredged material disposal. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. | **Offshore and Onshore:** The effects of this IPF from the Proposed Action to marine mineral resources and dredged material disposal would be **negligible** adverse because marine mineral resources and EPA dredged material disposal sites are located outside the GAA.<br>Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint, duration of construction activities, but effects would also be **negligible** adverse. | **Offshore and Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |
| Port utilization | Constructed and permitted OSW COP projects are using nearby ports to support construction and O&M activities. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. | Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, changes in | The effects of this IPF from the No Action Alternative would be **negligible** adverse on marine mineral resources and dredged material disposal because port utilization and potential increased vessel traffic resulting from the No Action Alternative are not | **Offshore and Onshore:** Various ports would be improved to support the Proposed Action (see Section 3.14). The number of construction and maintenance vessels associated with the Proposed Action would increase which could result in vessel congestion at ports and potential collision risk with marine mineral | **Offshore and Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |

| Associated IPFs:<br>Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | Impacts from these activities would be short term and could include congestion in ports, delays, and changes in navigation patterns. | port usage by some fishing or recreational vessel operators, and changes in navigation patterns. | expected to overlap with BOEM lease areas or EPA dredged material disposal sites. | resource or dredging vessels leaving or returning to ports, but this would be a minimal increase in vessel traffic. Also, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on marine mineral resources and dredged material disposal.<br>Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint and duration of construction activities, but effects would also be **negligible** adverse. | |
| Presence of structures: Navigation hazards | Constructed and permitted OSW COP projects are introducing 13 structures into the GAA. Other existing stationary structures are limited in the open ocean environment of the GAA, and include met buoys associated with site assessment activities. Navigation complexity associated with existing structures could cause potential conflicts with other marine activities. | Reasonably foreseeable non-OSW activities would not implement stationary structures within the open ocean environment that would pose navigational hazards and raise the risk of allisions for survey vessels and collisions for survey aircraft. | Future offshore WTGs and OSSs could prevent future marine mineral extraction activities where project footprints overlap with extraction areas. However, this is unlikely as mineral extraction typically occurs within 8 miles of the shoreline. Therefore, there would be no risk of overlap with offshore structures, and their presence would have a **negligible** adverse effect on this resource. | **Offshore and Onshore:** There are no BOEM OCS sand and mineral lease areas and no identified sand resource blocks within the RWF and offshore RWEC; therefore, the Project and other reasonably foreseeable activities would have no impacts from structures or cable placement on these marine mineral resources. Similarly, because Project activities would not overlap any active dredged material disposal sites, the Project would have a **negligible** adverse impact on dredged material disposal.<br>Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint, duration of construction activities, but effects would also be **negligible** adverse. | **Offshore and Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |
| Traffic: Aviation | Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments. | Although no future non-OSW stationary structures were identified within the offshore GAA, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non-OSW is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends. | The effects of this IPF from the No Action Alternative would not impact marine mineral resources and dredged material disposal because aviation and air traffic are air- and land-based impacts that do not overlap with marine mineral resources and dredged material disposal uses. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. | **Offshore and Onshore:** The effects of this IPF from the Proposed Action would not impact marine mineral resources and dredged material disposal because aviation and air traffic are air- and land-based impacts that would not impact underwater marine mineral resources and dredged material disposal. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.<br>Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint, duration of construction activities, but effects would also be **negligible** adverse. | **Offshore and Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |
| Traffic: Vessels | Current vessel traffic in the region is described in Section 3.16.1. The GAA would continue to have numerous ports | Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not | Construction and operational vessel traffic from future OSW development is expected to increase. This could create conflicts with | **Offshore and Onshore:** Construction and operational vessel traffic from the Proposed Action is expected to occur. This could create | **Offshore and Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF |

| Associated IPFs: Sub-IPFs | Ongoing Activities* | Future Non–Offshore Wind Activities Intensity/Extent | Future Offshore Wind Activities Intensity/Extent | Proposed Action and Alternatives C through F | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|
| | and extensive marine traffic related to constructed and permitted OSW COP projects, shipping, fishing, and recreation. These sources of vessel traffic may increase navigation, which could cause potential conflicts with other marine activities. | anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels and consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic | vessels undergoing marine mineral extraction and dredged disposal activities. However, because future OSW activities would take place within the RI/MA WEA and there is no marine mineral extraction or dredged material disposal areas that overlap, this impact is expected to be **negligible** adverse. | conflicts with vessels undergoing marine mineral extraction and dredged disposal activities. However, because the Proposed Action would take place within the RI-MA WEA and there is no marine mineral extraction or dredged material disposal areas that overlap, this impact is expected to be **negligible** adverse.<br>Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint and duration of construction activities, but effects would also be **negligible** adverse. | would result in a **negligible** adverse impact. |
| Climate change | Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters and sea level rise. | No future activities were identified within the GAA other than ongoing activities. | Future OSW activities without the Proposed Action could result in construction activities that increase GHG emissions. Increased GHG emissions could contribute to climate change impacts. However, the construction of future OSW facilities would ultimately help slow the negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources. While negative impacts of climate change could affect marine mineral resources due to ocean acidification and other negative effects of climate change, future OSW activities without the Proposed Action are expected to help slow the negative impacts of climate change overall. Therefore, the effects of climate change under the No Action Alternative would be **negligible** adverse. | **Offshore and Onshore:** The Proposed Action could result in offshore and onshore construction, O&M, and decommissioning activities that increase GHG emissions. Increased GHG emissions could contribute to climate change impacts. However, O&M would help slow the negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources and reducing net GHG emissions in the area. While negative impacts of climate change could affect marine mineral resources due to ocean acidification and other negative effects of climate change, the Proposed Action is expected to help slow the negative impacts of climate change overall. Therefore, the effects of climate change under the Proposed Action by itself combined with other reasonably foreseeable projects would be **negligible** adverse.<br>Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint and duration of construction activities, but effects would also be **negligible** adverse. | **Offshore and Onshore:** Similar impacts to the Proposed Action and Alternatives C through F. This IPF would result in a **negligible** adverse impact. |

* Includes one constructed and permitted COP project that occurs within the marine mineral GAA: SFWF.

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# APPENDIX E2

## Assessment of Resources with Minor (or Less) Impact Determinations

# Contents

# Figures



# Tables

# Assessment of Resources with Minor Impact Determinations

This appendix provides an assessment of resources with minor or lower incremental impacts from implementation of the Proposed Action and other considered action alternatives. Because these sections were originally part of Chapter 3 of the Revolution Wind Farm and Revolution Wind Export Cable Project environmental impact statement (EIS), chapter and section naming and numbering were maintained for simplicity. All abbreviations and references for these sections are provided in the main EIS and Appendix B, respectively.

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## 3.4 Air Quality

### 3.4.1 Description of the Affected Environment for Air Quality

Geographic analysis area: The spatial scale for analysis of potential effects to air quality encompasses 1) the airshed within 25 miles of the estimate Project center (corresponding to the OCS Lease Area) and 2) the airshed within 15.5 miles of onshore construction areas and ports that may be used for the Project. These two areas collectively make up the air quality GAA (Figure 3.4-1) (see COP Figure 4.2.1-1). The air quality GAA encompasses the region subject to U.S. Environmental Protection Agency (EPA) review as part of an OCS permit for the Project under the Clean Air Act (CAA) and provides a reasonable buffer for the limited Project vessel and equipment emissions anticipated to occur within on-land construction areas and mustering port(s) outside of the OCS air permit area during proposed construction activities.

For the purposes of this analysis, the existing air quality conditions for each county within the GAA were evaluated. These counties comprise Providence and Washington Counties in Rhode Island, Suffolk and Kings Counties in New York, New London County in Connecticut, Gloucester County in New Jersey, Bristol and Dukes Counties in Massachusetts, Norfolk City in Virginia, and Baltimore County in Maryland.

Affected environment: The scope of the affected environment for the assessment of potential Project-related emissions and impacts to ambient air quality encompasses offshore areas and those states and counties where Project activities could occur. Project construction and O&M activities could use several regional existing port facilities as discussed in COP Section 3.3.10.1 and COP Table 3.3.10-1.

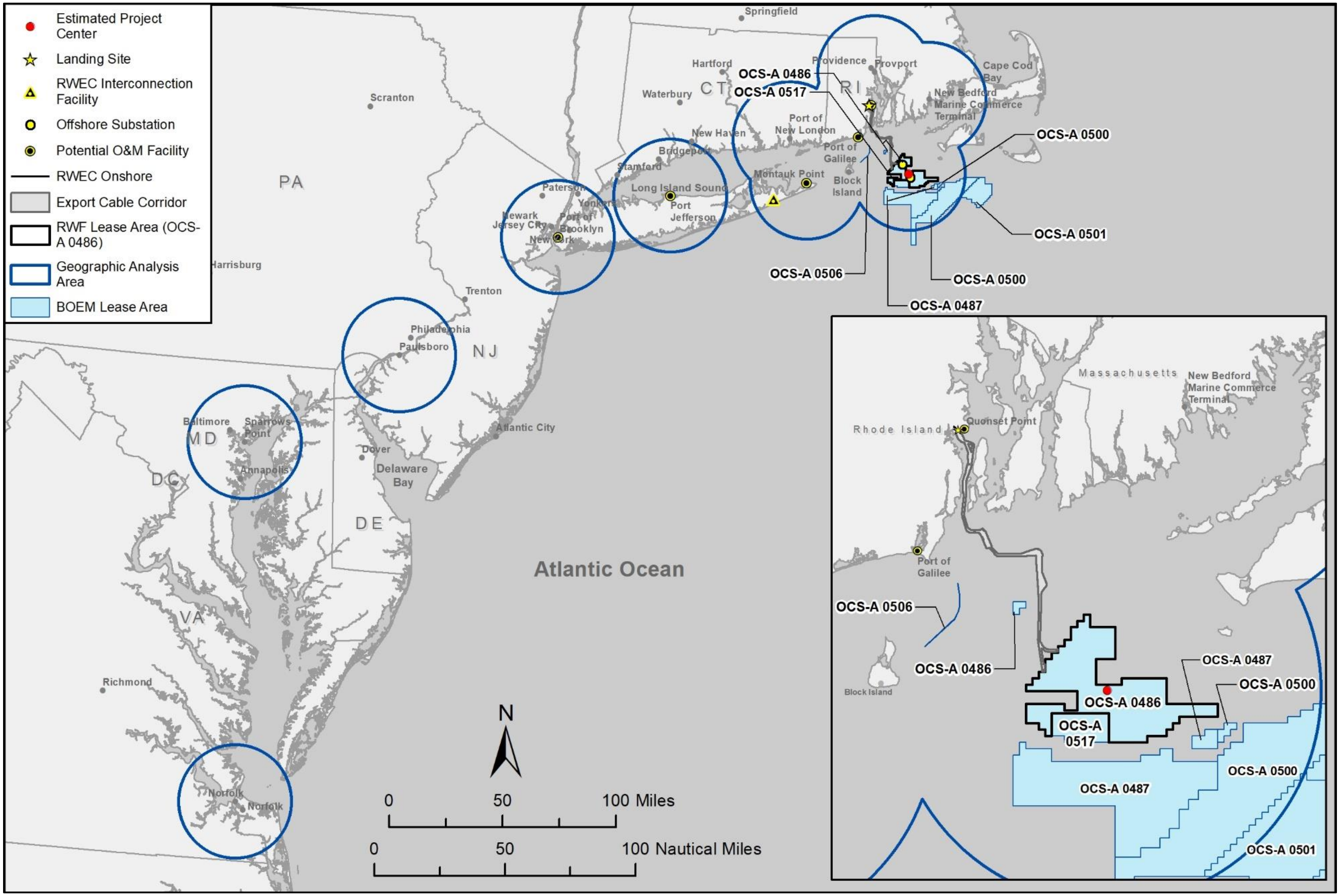


**Figure 3.4-1. Geographic analysis area for air quality.**

Air quality within a region is measured in comparison to the National Ambient Air Quality Standards (NAAQS), which are standards established by the EPA under the CAA (42 USC 7409) for criteria pollutants. The EPA has developed these standards to protect human health and welfare (primary standards) and provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (secondary standards). The criteria pollutants for which NAAQS have been established are carbon monoxide (CO), sulfur dioxide ($SO_2$), particulate matter 10 microns or less ($PM_{10}$), particulate matter 2.5 microns or less ($PM_{2.5}$), nitrogen dioxide ($NO_2$), ozone ($O_3$), and lead. The NAAQS are summarized in Table 3.4-1.

**Table 3.4-1. National Ambient Air Quality Standards**

| Pollutant | | Primary or Secondary | Form | Averaging Time | NAAQS |
|---|---|---|---|---|---|
| CO | | Primary | Not to be exceeded more than once per year | 8 hours | 9 parts per million (ppm) |
| | | | | 1 hour | 35 ppm |
| Lead | | Primary and secondary | Not to be exceeded | Rolling 3-month average | 0.15 microgram per cubic meter (μg/m$^3$) |
| $NO_2$ | | Primary | Ninety-eighth percentile of 1-hour daily maximum concentrations, averaged over 3 years | 1 hour | 100 parts per billion (ppb) |
| | | Primary and secondary | Annual mean | 1 year | 53 ppb |
| Ozone | | Primary and secondary | Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years | 8 hours | 0.070 ppm |
| PM | $PM_{2.5}$ | Primary | Annual mean, averaged over 3 years | 1 year | 12 μg/m$^3$ |
| | | Secondary | Annual mean, averaged over 3 years | 1 year | 15 μg/m$^3$ |
| | | Primary and secondary | Ninety-eighth percentile, averaged over 3 years | 24 hours | 35 μg/m$^3$ |
| | $PM_{10}$ | $PM_{10}$ | Primary and secondary | Not to be exceeded more than once per year on average over 3 years | 150 μg/m$^3$ |
| $SO_2$ | | Primary | Ninety-ninth percentile of 1-hour daily maximum concentrations, averaged over 3 years | 1 hour | 75 ppb |
| | | Secondary | Not to be exceeded more than once per year | 3 hours | 0.5 ppm |

Source: EPA (2023).

Note: $PM_{10}$ = PM between 2.5 and 10 micrometers in diameter; $PM_{2.5}$ = PM less than 2.5 micrometers in diameter.

* Preliminary guidance from the EPA looks to reduce the annual $PM_{2.5}$ standard from 12 μg/m$^3$ to the range of 9–10 μg/m$^3$

The EPA uses design values to designate and classify nonattainment areas. A design value is a statistic that describes pollutant levels at a given location so they can be compared to the NAAQS. Nonattainment occurs if any criteria air pollutant concentration design value exceeds its NAAQS. The CAA amendments of 1990 established the nonattainment designations as marginal, moderate, and serious. If a region is designated as nonattainment for a NAAQS, the CAA requires the state to develop a state implementation plan (SIP). A SIP provides for the implementation, maintenance, and enforcement of the NAAQS, and includes emission limitation and control measures to attain and maintain the NAAQS. The CAA also prohibits federal agencies from approving any activity that does not conform to a SIP, and this prohibition applies only with respect to nonattainment or maintenance areas (i.e., areas that were previously nonattainment and for which a maintenance plan is required). Conformity to a SIP means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards. The activities for which BOEM has authority are outside of any nonattainment or maintenance area, and BOEM lacks any continuing program responsibility over activities potentially within any nonattainment area. Therefore BOEM's approval of the COP is not subject to the requirement to show conformity.

The areas of attainment for criterial pollutants within the GAA reported by the EPA (2021a) are in Table 3.4-2.

**Table 3.4-2. U.S. Environmental Protection Agency Areas of Attainment for Criteria Pollutants**

| Location | EPA Reporting |
|---|---|
| Rhode Island, including all counties | Currently in attainment for all criteria pollutants. |
| Norfolk City, Virginia | Currently in attainment for all criteria pollutants. |
| Bristol and Norfolk Counties, Massachusetts | Currently in attainment for all criteria pollutants, but Dukes County is currently in marginal nonattainment for the 2008 8-hour $O_3$ standard. |
| Suffolk and Kings Counties, New York | Currently in severe nonattainment for the 2008 8-hour $O_3$ standard, moderate nonattainment for the 2015 8-hour $O_3$ standard, and in maintenance for the 2006 24-hour $PM_{2.5}$ standard. |
| Gloucester County, New Jersey | Currently in marginal nonattainment for the 2008 8-hour $O_3$ standard, moderate nonattainment for the 2015 8-hour $O_3$ standard, and in maintenance for the 2006 24-hour $PM_{2.5}$ standard. |
| New London County, Connecticut | Currently in serious nonattainment for the 2008 8-hour $O_3$ standard and moderate nonattainment for the 2015 8-hour $O_3$ standard. |
| Baltimore County, Maryland | Currently in moderate nonattainment for the 2008 8-hour $O_3$ standard and the 2015 8-hour $O_3$ standard, and nonattainment for the 2010 $SO_2$ standard. |

Additional descriptions of air quality conditions for counties in nonattainment status are provided below.

Dukes County, Massachusetts, is an island community with a relatively low population density and little heavy industry. As is common in the northeastern region, non-road engines used for construction activities and on-road vehicle traffic are the main sources of nitrogen oxide ($NO_X$) in Dukes County (EPA 2020a). Vegetation sources and non-road engines are the primary volatile organic compound (VOC) emission sources in Dukes County. VOC and $NO_X$ are precursor pollutants to the formation of $O_3$.

Although the EPA currently classifies Dukes County as being in marginal nonattainment for the 2008 8-hour $O_3$ standard, ambient air quality monitors in Dukes County reported a steady decrease in $O_3$ levels from 2012 to 2015 (EPA 2021b). The EPA also recently (August 2018) designated Dukes County in attainment for the more stringent 2015 8-hour $O_3$ standard of 70.0 parts per billion (ppb) based on the 2014–2016 $O_3$ design value of 64.3 ppb (EPA 2021b). Recently, Dukes County reported an $O_3$ design value of 70.0 ppb for the 2016–2018 time period, 71.0 ppb for the 2017–2019 time period, and 66.0 ppb for the 2018–2020 time period (EPA 2021b).

Suffolk and Kings Counties, New York, have a high population density and Suffolk County sees the highest amount of commuter miles traveled in the New York metro area (EPA 2017). Suffolk County reported a steady decrease in $O_3$ concentration levels from 2017 to 2020 (EPA 2021b). The $O_3$ design value based on observations at the Riverhead air monitor in Suffolk County was 76.7 ppb during the 2015–2017 time period, 75.3 ppb for the 2016–2018 time period, 72.0 ppb for the 2017–2019 time period, and 70.0 ppb for the 2018– 2020 time period (EPA 2021b). There is no $O_3$ air monitor within Kings County. The nearby air monitor in Queens County reported a decrease in $O_3$ concentration levels from 2018 to 2020. The $O_3$ design value based on observations at the Queens College air monitor in Queens County was 74.0 during the 2015–2017 time period, 74.0 ppb for the 2016–2018 time period, 74.0 ppb for the 2017–2019 time period, and 70.0 ppb for the 2018–2020 time period (EPA 2021b). Thus, the EPA currently classifies Kings and Suffolk Counties as being in severe nonattainment for 8-hour $O_3$ according to the 2008 standard and in moderate nonattainment for the 2015 standard. Both counties are also in maintenance for the 2006 24-hour $PM_{2.5}$ standard. The EPA reports that on-road vehicles are the primary source of $NO_X$ emissions emitted within Kings and Suffolk Counties; non-road engines are the second-largest source. Vegetation sources, solvent use in industry, off-highway engines, and on-road vehicles provide the most VOC emissions emitted within Kings and Suffolk Counties (EPA 2020a).

Gloucester County, New Jersey, has a much lower population density than Suffolk and Kings Counties, New York. Air quality within Gloucester County is affected by nearby Philadelphia. $NO_X$ emissions in Gloucester County are primarily from on-road vehicles, with fuel combustion for industrial purposes, electric generation, and other needs being the second-largest source. Storage and transport, vegetation, and solvent use are the primary sources of VOC emissions in Gloucester County (EPA 2020a). Although the EPA currently classifies Gloucester County as being in marginal nonattainment for the 2008 8-hour $O_3$ standard and moderate nonattainment for the 2015 8-hour $O_3$ standard, the ambient air quality monitor in Gloucester County reported a steady decrease in $O_3$ levels from 2018 to 2020 (EPA 2021b). Gloucester County reported an $O_3$ design value of 74.0 ppb for the 2015–2017 and 2016–2018 time periods, 72.0 ppb for the 2017–2019 time period, and 69.0 ppb for the 2018–2020 time period (EPA 2021b).

New London County, Connecticut, is a rural county with a low population density and small industrial bases. Neighboring metro areas outside this county heavily affect the air quality of the county in addition to regional sources. For this reason, changes to pollutant emissions by sources within the county have little impact on the overall air quality trends. $NO_X$ emissions in New London County are primarily from on-road vehicles, with fuel combustion for industrial purposes, electric generation, and other needs being the second-largest source. Vegetation sources and solvent use are the primary sources of VOC emissions (EPA 2020a). Although the EPA currently classifies the county as being in serious nonattainment for the 2008 8-hour $O_3$ standard and moderate nonattainment for the 2015 8-hour $O_3$ standard, the ambient air quality monitor in the county reported a small decrease in $O_3$ levels from 2018 to 2020 (EPA 2021b). New London County reported an $O_3$ design value of 76.0 ppb for the 2015–2017 time period, 75.0 ppb for the 2016–2018 and the 2017–2019 time periods, and 73.0 ppb for the 2018–2020 time period (EPA 2021b).

Baltimore County, Maryland, has a population density three times greater than New London County, Connecticut. Although the EPA currently classifies Baltimore County as being in moderate nonattainment for both the 2008 and 2015 8-hour $O_3$ standards, ambient air quality monitors in Baltimore County reported a steady decrease in $O_3$ levels from 2018 to 2020 (EPA 2021b). The $O_3$ design value based on observations at the Essex air monitor in Baltimore County was 73.0 ppb for the 2015–2017 and 2016–2018 time periods, 72.0 ppb for the 2017–2019 time period, and 69.0 ppb for the 2018–2020 time period (EPA 2021b). In Baltimore County, $NO_X$ emissions are primarily from on-road vehicles, with fuel combustion for industrial purposes, electric generation, and other needs being the second-largest source. Vegetation, solvent use, and on-road vehicles are the main sources of VOC emissions (EPA 2020a). The EPA has also classified Baltimore County as being in nonattainment for the 2010 $SO_2$ standard, although the $SO_2$ air quality monitor in Baltimore County has reported a steady decline in $SO_2$ concentration levels since 2016 (EPA 2021b). Baltimore County reported an $SO_2$ design value of 13.0 ppb for the 2015–2017 time period, 11.0 ppb for the 2016–2018 time period, 10.0 ppb for the 2017–2019 time period, and 9.0 ppb for the 2018–2020 time period (EPA 2021b). The main source of $SO_2$ emissions in Baltimore County comes from fuel combustion for electric generation (EPA 2020a).

The Ozone Transport Region (OTR) was established by operation of law under CAA Section 184 and comprises the states of Connecticut, Delaware, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont; the District of Columbia; and the portion of Virginia that is within the Consolidated Metropolitan Statistical Areas that includes the District of Columbia. Congress established the OTR in the 1990 CAA amendments based on the recognition that the transport of ozone and ozone precursors throughout the region may render the states' attainment strategies interdependent. States within the OTR may have similar permitting requirements as ozone nonattainment areas.

Table 3.4-3 presents the total emission inventory in tons per year (tpy) for select regulated pollutants (i.e., CO, $NO_X$, $PM_{10}$, $PM_{2.5}$, $SO_2$, and VOC) in nonattainment counties in 2017.

**Table 3.4-3. Nonattainment Counties, 2017 Emission Inventory for Regulated Pollutant (tpy)**

| County, State | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC |
|---|---|---|---|---|---|---|
| New London County, Connecticut | 25,671.25 | 5,300.74 | 2,882.84 | 1,072.31 | 289.57 | 15,606.98 |
| Dukes County, Massachusetts | 6,395.82 | 989.64 | 407.96 | 135.99 | 13.07 | 2,740.63 |
| Baltimore County, Maryland | 71,702.20 | 10,661.44 | 12,184.54 | 3,207.24 | 1,041.34 | 16,919.12 |
| Gloucester County, New Jersey | 30,399.73 | 6,260.63 | 2,161.41 | 1,311.48 | 599.94 | 10,507.34 |

| County, State | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC |
|---|---|---|---|---|---|---|
| Kings County, New York | 59,473.56 | 13,571.74 | 4,959.06 | 2,559.52 | 477.53 | 17,660.21 |
| Suffolk County, New York | 146,719.86 | 20,336.81 | 9,682.55 | 3,889.70 | 1,197.73 | 32,676.35 |

Source: EPA (2020a).

The CAA provides special air quality protection to national parks larger than 6,000 acres and national wilderness areas larger than 5,000 acres that were in existence before August 1977 (National Park Service 2020). These areas are referred to as Class I areas and are managed by the U.S. Forest Service (USFS), National Park Service (NPS), and U.S. Fish and Wildlife Service (USFWS). Designation as a Class I area allows only very small increments of new pollution above already existing air pollution levels. One of the purposes of the Prevention of Significant Deterioration permitting program under the CAA, is to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value. Air quality related values (AQRVs) are used to determine whether these resources may be adversely affected by a change in air quality. Federal land managers AQRVs include visibility, vegetation, water quality, soils, and impacts to fish and wildlife. The potential harm from air pollution to these resources depends on quantity of emission, the type of air emission exposure, and the sensitivity of the resources. Current visibility conditions and trends in Class I areas are established via the IMPROVE (Interagency Monitoring of Protected Visual Environments) program. The nearest Class I areas to the Proposed Action are Lye Brook Wilderness, located approximately 155 miles northwest of the Lease Area, and Brigantine Wilderness, located approximately 190 miles southwest of the Lease Area. The Lye Brook Wilderness IMPROVE monitor is located on the ski slopes of Mount Snow approximately 9.5 miles southeast of the Lye Brook Wilderness Area boundary. The Brigantine Wilderness is made up of three separate areas; all three are part of the Edwin B. Forsythe National Wildlife Refuge. The Brigantine Wilderness IMPROVE monitor is located at the Edwin B. Forsythe National Wildlife Refuge Visitor Center, approximately 4 miles west and 4 miles south-southwest of the two closest Brigantine Wilderness Area boundaries. Visibility at both the Lye Brook Wilderness and Brigantine Wilderness Class I areas has been steadily improving since 2010 (Federal Land Manager Environmental Database 2021). No visibility or deposition modeling was conducted as part of this EIS analysis because both Lye Brook Wilderness and Brigantine Wilderness Class I areas are located more than 155 miles away from the Lease Area. If further visibility modeling is required, it will be conducted during the OCS permitting process. As part of the EPA's OCS air permit, the Project will be evaluated for compliance with NAAQS and PSD increments for operating emissions and significant impact level, and an AQRV analysis will be conducted at the Lye Brook Wilderness Area for construction emissions.

*Climate Change*: Climate change is a global issue that results from the increase in greenhouse gases (GHGs) in the atmosphere. An analysis of regional climate impacts prepared by the Fourth National Climate Assessment (U.S. Global Change Research Program 2018) concludes that the rate of warming in the Northeast has markedly accelerated over the past few decades, with seasonal differences in temperature decreasing in recent years as winters have warmed three times faster than summers. Higher temperatures from the increase of GHGs in the atmosphere increase the number of heat events and extreme rain events that cause coastal flooding. The higher temperatures also extend the duration of the pollen season. Analysis of past records and future projections indicates an overall increase in regional temperatures, including near the Lease Area. The most recently available data on GHG emissions in the

United States indicate that annual GHG emissions in 2019 were an estimated 6,558 million metric tons of carbon dioxide equivalents ($CO_2e$) (EPA 2021c).

Sulfur hexafluoride ($SF_6$) is often used in electrical switchgears because of its unique properties. However, $SF_6$ is also the most potent GHG known to date. Fortunately, it is technically feasible to use $SF_6$-free switchgears for medium voltage switchgear up to 36 kV. Recent independent evaluations show that $SF_6$-free switchgear is not only technically equivalent, but also more cost competitive over the full service life (Eaton 2021).

The Project would be designed in accordance with the International Electrotechnical Commission 61400-1 and 61400-3 standards. These standards require designs to withstand forces based on site-specific conditions for a 50-year return interval (2% chance occurrence in a single year) for the WTGs, which corresponds to a Category 3 hurricane in this area (International Electrotechnical Commission 2019a). This means that the WTGs are designed not merely for average conditions but for the higher end event that is reasonably likely to occur. The newly revised International Electrotechnical Commission 61400-3 standard now also recommends a robustness load case for extreme metocean conditions, where the WTG support structures are checked for a 500-year event (0.2% chance occurrence in a single year), which corresponds to wind gusts at the strength of a Category 5 hurricane, to ensure that the appropriate level of safety is maintained in case of a less likely event (International Electrotechnical Commission 2019b). The Project would be constructed using a certified verification agent to ensure that all design specifications are met. The Project would also be designed in alignment with the findings of the *NYSERDA: Offshore Wind Climate Adaptation and Resilience Study* (New York State Energy Research and Development Authority [NYSERDA] 2021). It is possible that severe weather could cause blades to fail, but because of the construction design, it is highly unlikely that the towers would topple.

### 3.4.2 Environmental Consequences

#### 3.4.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

The Project design parameters that would influence the magnitude of impacts on air quality are listed in Table 3.4-4.

**Table 3.4-4. Project Design Parameters**

| Design Parameter |
|---|
| Air emission ratings of construction equipment engines |
| Port selection and location of construction laydown areas |
| Choice of cable-laying locations and pathways |
| Choice of marine traffic routes to and from the Lease Area |
| Number of offshore substations |
| Soil characteristics at excavation sites |
| Emission control strategy for fugitive emissions due to excavation and hauling operations |

Variability of the Project design as a result of the PDE includes the number of WTGs and their spacing within the Lease Area, spatial coverage of the overall Lease Area, and the construction schedule. A reduction (or increase) in the number of WTGs installed and their associated IACs would likely have an associated reduction (or increase) in associated vessel and equipment use and their generated air emissions. Additionally, variations in the planned cable layout and landfall locations would impact the magnitude and spatial extent of emissions. Appendix D provides additional information about the PDE.

See Appendix E1 for a summary of IPFs analyzed for air quality across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible effect are excluded from Chapter 3 and provided in Table E1-1 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4 to facilitate reader comparison across alternatives.

Table 3.4-5 discloses IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action follows the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action.

The conclusion section for each alternative analysis provides additional rationale for this impact determination. The overall impact of any alternative would be **moderate** adverse because the overall effects would be notable, but the resource would recover completely from adverse impacts without mitigation or remedial action.

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**Table 3.4-5. Alternative Comparison Summary for Air Quality**

<table>
<tr><th>Impact-Producing Factor</th><th>Alternative A<br>(No Action Alternative)</th><th>Alternative B<br>(Proposed Action)<br>Up to 100 WTGs*</th><th>Alternative C<br>(Habitat Alternative)<br>64 or 65 WTGs</th><th>Alternative D<br>(Transit Alternative)<br>78 to 93 WTGs</th><th>Alternative E<br>(Viewshed Alternative)<br>64 or 81 WTGs</th><th>Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs</th><th>Alternative G<br>(Preferred Alternative)<br>65 WTGs</th></tr>
<tr><td rowspan="2">Air emissions and climate change</td><td>Offshore: During construction, impacts from future wind development activities on air quality would be temporary and minor to moderate adverse, depending on the extent and duration of emissions. Primary emission sources would include increased vessel and air traffic, combustion emissions from construction equipment, and fugitive emissions.<br><br>Future offshore wind projects could also beneficially contribute to a broader combination of actions to reduce future impacts from climate change over the long term.</td><td>Offshore: Project construction would have a limited duration, and most emissions would occur offshore. The only air emissions anticipated during O&M would result from crew and maintenance vessels and helicopters. Therefore, impacts on air quality near populated areas would be temporary minor adverse. Project O&M would also generate long-term minor beneficial impacts by providing energy to the region from a renewable resource and due to avoided health events.<br><br>The overall cumulative impacts associated with the Proposed Action when combined with other past, present, and reasonably foreseeable activities would be moderate adverse, although regional air quality could be improved over the Project life cycle when compared to the No Action Alternative.</td><td colspan="4">Offshore: When compared to the maximum case for the Proposed Action, construction under Alternatives C through F could result in a decrease in Project-related emissions due to less trenching and/or vessel traffic to install a reduced number of WTGs and their associated IACs. In such cases, emissions from construction and installation would be less than the Proposed Action but still temporary minor adverse.<br><br>Alternatives C through F could also result in reduced O&M emissions because fewer WTGs installed, when compared to the maximum case under the Proposed Action, would mean potentially reduced inspection time, fewer turbines needing regular maintenance, etc. Alternatives C through F would avoid similar amounts of emissions as the minimum and maximum avoided emission values for the Proposed Action presented in Table 3.4-13. During O&M, Alternatives C through F would also result in long-term minor beneficial impacts on regional air quality by substituting some existing fossil fuel sources with a renewable source, which would contribute to a long-term net decrease in emissions in the region. Therefore, overall impacts on air quality under Alternatives C through F would likely be minor adverse and long term minor beneficial.<br><br>Alternatives C through F would result in impacts on air quality at quantities and durations similar to, or slightly reduced from, the Proposed Action. Although regional air quality could be improved when compared to the No Action Alternative, it would be too remote or speculative to conclude what that change would be. Given the marginal reduction, however, the cumulative impacts of Alternatives C through F on air quality when combined with past, present, and reasonably foreseeable activities would remain moderate adverse.</td><td>Offshore: Alternative G would reduce the number of allowable WTGs and their associated IACs, which would likely have a corresponding reduction in associated vessel and equipment use and air emissions compared to the Proposed Action. BOEM expects the impacts from this alternative would be similar to the Proposed Action: minor adverse due to air emissions from construction activities.<br><br>Alternative G could also have fewer O&M emissions because there would be fewer WTGs to inspect and maintain compared to the Proposed Action. Alternative G would also contribute to long-term minor beneficial impacts by substituting some fossil fuel sources of electricity generation with a lower emitting renewable source and therefore would result in a net reduction in cumulative air emissions in the region.<br><br>In the context of other reasonably foreseeable environmental trends and planned actions, BOEM expects that the alternative's impacts would be similar to the Proposed Action (with individual IPFs leading to impacts that would be short term minor adverse and long term minor beneficial). The overall cumulative impacts of Alternative G on air quality when combined with past, present, and reasonably foreseeable activities would therefore be the same as the Proposed Action: moderate adverse, with potential regional improvements to air quality when compared to the No Action Alternative.</td></tr>
<tr><td>Onshore: Ongoing activities and reasonably foreseeable activities other than offshore wind would result in moderate adverse impacts on air quality, primarily driven by recent market and permitting trends indicating future electric generating units would most likely include natural gas–fired and oil-fired dual fuel facilities, a mix of natural gas, and dual fuel natural gas/oil.</td><td>Onshore: Air emissions generated by construction and O&M of the onshore facilities could have temporary negligible to minor adverse impacts on air quality.<br><br>When combined with other onshore sources of air emissions, cumulative impacts on air quality from onshore Project activities would be long term minor adverse.</td><td colspan="4">Onshore: Alternatives C through F would not impact onshore activities; therefore, construction and O&M impacts would be the same as those described for the Proposed Action: temporary, negligible to minor adverse. Cumulative impacts would also be the same as those described for the Proposed Action: long term minor adverse.</td><td>Onshore: Alternative G would not impact onshore activities. The impacts to air quality from construction and O&M of Alternative G would be the same as the Proposed Action: temporary, negligible to minor adverse. Likewise, the cumulative impacts would be the same as the cumulative impacts from the Proposed Action: long term minor adverse.</td></tr>
</table>

* If the Proposed Action were to select an 11- to 12–MW turbine, then the total number of WTGs installed and impacts from associated air emissions would be similar or the same as those under Alternatives C through F.

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### 3.4.2.2 Alternative A: Impacts of the No Action Alternative on Air Quality

#### 3.4.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for air quality (see Section 3.4.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the air quality GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.4.2.2.2 Cumulative Impacts

This section discloses potential cumulative air quality impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

<u>Air emissions and climate change</u>: Under the No Action Alternative, assuming no other future offshore wind projects are developed, electric generation needs would continue to be met by fossil fuel–generating technologies, resulting in more air emissions than what would be expected should future offshore wind development occur. Specific impacts would depend on the type of fossil fuel used (natural gas, oil, coal), the technology and pollution control systems chosen, and the site-specific issues associated with individual electric generation facilities. However, the continued use of existing fossil fuel–combusting electric generation sources would result in annual emissions that could have been avoided by using non–fossil fuel energy sources.

Using the EPA's Avoided Emissions and geneRation Tool (AVERT) version 4.1, avoided $CO_2$ emissions are calculated for the operational life of the Project with a capacity factor of 45% (AVERT offshore wind default) for the New England region based on the EPA's 2019 regional data file. More recent data are available, but because of the temporary declines in electricity demands, particularly from March through May 2020 likely caused by the COVID-19 pandemic, the EPA recommends using the 2019 regional data file when assessing annual, near-term future avoided emissions. Table 3.4-18 contains the associated annual $CO_2e$ emissions (and avoided $CO_2$ emissions) for each alternative and the No Action Alternative. The No Action Alternative emissions were assumed equivalent to the emissions that would be avoided by the operation of the Proposed Action. The No Action Alternative (Alternative A) would result in no emissions during construction and O&M because the Project would not be built, but the No Action Alternative would also offer no avoided emissions, resulting in higher GHG emissions over the Project duration by not displacing traditional power generation via offshore wind. The missing avoided GHG emissions are equivalent to 268,076 gasoline-powered passenger vehicles driven each year. These figures are relative to the existing grid configuration, but the actual annual quantity of avoided emissions attributable to this proposed facility is expected to diminish over time if the electric grid becomes greener due to the addition of other renewable energy facilities and retirement of high-emitting generators.

Assuming the development of other future wind development and other renewable energy sources, these sources would decrease emissions over the long term, likely reduce the need for traditional fossil fuel power generation in the region, and could result in improved air quality when compared to expected air quality without other future wind development and renewable energy sources. Adjacent states have also proposed emission-reduction targets and renewable goals that overlap the operations of the Project and that are aimed at reducing air emissions and shifting energy sources from traditional fossil fuel generation to cleaner sources of energy. These plans could further reduce, but would not eliminate, air emissions.

During construction, impacts from future wind development activities on air quality under the No Action Alternative would be temporary **minor** to **moderate** adverse, depending on the extent and duration of emissions. Primary emission sources would include increased vessel and air traffic, combustion emissions from construction equipment, and fugitive emissions. Engine idling time would be limited in the Lease Area, as recommended by BOEM. Furthermore, best available control technology or lowest achievable emission rate requirements for vessels operating as OCS sources may be as stringent as Tier 4 engine standards (the EPA's strictest emission requirements for diesel engines) and would be determined by the EPA's OCS air permit.

Based on assumed construction schedules, offshore wind development would occur with overlapping construction schedules between 2022 and 2030. As shown in Table 3.4-6, construction of these projects in the GAA with sufficient details to estimate emissions would generate an estimated 124,277 tons of $NO_X$, 2,684 tons of $SO_2$, 5,795 tons of $PM_{10}$, and 7,709,706 metric tons of $CO_2e$ over the 8-year construction period. For comparison purposes, according to the EPA's 2017 National Emissions Inventory, Suffolk County reported 8,122 tons of $NO_X$, 124 tons of $SO_2$, and 872 tons of $PM_{10}$ from highway vehicles; 6,566 tons of $NO_X$, 34 tons of $SO_2$, and 537 tons of $PM_{10}$ from off-highway vehicles; and 860 tons of $NO_X$, 421 tons of $SO_2$, and 146 tons of $PM_{10}$ from electrical utilities' combustion of fuel (EPA 2020a). Similarly, future offshore wind project GHG emissions during construction would be negligible (7,709,706 metric tons of $CO_2e$) as compared to aggregate global emissions, and these projects could beneficially contribute to a broader combination of actions to reduce future impacts from climate change over the long term. An analysis by Barthelmie and Pryor (2021) calculated that, depending on global trends in GHG emissions and the amount of wind energy expansion, development of wind energy could reduce predicted increases in global surface temperature by 0.3 to 0.8 degrees Celsius (°C) (0.5–1.4 degrees Fahrenheit [°F]) by 2100.

As shown in Table 3.4-7, the O&M of future offshore wind projects in the GAA would have a proportionally small contribution of long-term and intermittent emissions, including 2,940 tons of $NO_X$, 44 tons of $SO_2$, 110 tons of $PM_{10}$, and 700,114 metric tons of $CO_2e$.

#### 3.4.2.2.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on air quality associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on air quality, primarily through construction-related air emissions.

BOEM anticipates that the impacts of ongoing activities, such as air emissions and GHGs, would be **moderate** adverse. In addition to ongoing activities, reasonably foreseeable activities other than offshore wind could also contribute to impacts on air quality. Reasonably foreseeable activities, other than offshore wind, that will increase air emissions and GHGs include construction and operation of new energy generation facilities to meet future power demands as transportation and heating become increasingly electrified. Although states are developing onshore renewable energy facilities (through their state energy plans) to the extent practicable to help meet future demand, these state plans also depend on the development of offshore wind. Therefore, under the No Action Alternative, to the extent that offshore wind is not developed, there would be a shortfall from planned renewable power generation, and nonrenewable sources would likely be needed to meet future demand. These facilities could include new natural gas–fired power plants or coal-fired, oil-fired, or clean coal–fired plants. Areas of nonattainment would be faced with potentially increased emissions or struggle to meet air quality goals. BOEM anticipates that the impacts of reasonably foreseeable activities other than offshore wind would be **moderate** adverse. BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **moderate** adverse impacts on air quality, primarily driven by recent market and permitting trends indicating future electric generating units would most likely include natural gas–fired and oil-fired dual fuel facilities, a mix of natural gas, and dual fuel natural gas/oil.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would be **minor** to **moderate** adverse. Emissions generated from construction and decommissioning of the offshore wind projects would be the primary source of impacts to air quality. Other future offshore wind projects could also lead to reduced emissions from fossil fuel–combusting power generation facilities, resulting in **minor** to **moderate** beneficial impacts on air quality.

**Table 3.4-6. Projected Construction Emissions (tons) for Carbon Dioxide and Regulated Pollutants for Projects in the Geographic Analysis Area from 2022 to 2030**

| Project | $CO_2e$ | $NO_X$ | $SO_2$ | CO | $PM_{10}$ | $PM_{2.5}$ | VOC |
|---|---|---|---|---|---|---|---|
| Block Island (state waters) | 42,940 | 585.96 | 0.424 | 101.16 | 37.15 | N/A | 25.73 |
| **Total State Waters** | **42,940** | **585.96** | **0.42** | **101.16** | **37.15** | **N/A** | **25.73** |
| Vineyard Wind 1 part of OCS-A 0501 | 250,920 | 4,961.00 | 38.00 | 1,116.00 | 172.00 | 125.00 | 122.00 |
| New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind]) | 393,627 | 5,917.00 | 41.00 | 1,406.00 | 238.00 | 230.00 | 124.00 |
| Sunrise, OCS-A 0487 | 230,504 | 2,092.80 | 2.10 | 869.40 | 38.60 | 38.60 | 49.10 |
| South Fork, OCS-A 0517 | 97,026 | 521.50 | 3.60 | 80.70 | 17.50 | 16.90 | 11.70 |
| New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind]) | 520,958 | 7,732.00 | 54.00 | 1,841.00 | 339.00 | 329.00 | 164.00 |
| South Coast Wind, OCS-A 0521 | 2,633,405 | 39,965.00 | 1,556.00 | 8,284.00 | 2,897.00 | 1,566.00 | 1,590.00 |
| Beacon Wind, part of OCS-A 0520 | 1,012,652 | 17,677.13 | 507.50 | 1,757.69 | 290.39 | 269.87 | 729.55 |
| Vineyard Northeast Wind (OCS-A 0522) | 1,246,612 | 17,298.00 | 133.10 | 4,087.00 | 635.00 | 613.00 | 390.00 |
| OCS-A 0500 remainder | 976,300 | 15,222.71 | 286.81 | 3,239.29 | 678.96 | 464.72 | 396.64 |
| Bay State Wind, part of OCS-A 0500 | 304,762 | 12,304.27 | 61.01 | 2,936.89 | 451.61 | 74.52 | 148.83 |
| **Total MA/RI Leases (without Proposed Action)** | **7,666,766** | **123,691.40** | **2,683.12** | **25,617.97** | **5,758.07** | **3,727.60** | **3,725.82** |
| **OCS Total (without Proposed Action)** | **7,709,706** | **124,277.36** | **2,684.54** | **25,719.13** | **5,795.22** | **3,727.60** | **3,751.55** |

Source: BOEM (2021).

Note: N/A = not applicable.

**Table 3.4-7. Projected Operations and Maintenance Emissions (tons) for Carbon Dioxide and Regulated Pollutants for Projects in the Geographic Analysis Area from 2022 to 2030**

| Project | $CO_2e$ | $NO_X$ | $SO_2$ | CO | $PM_{10}$ | $PM_{2.5}$ | VOC |
|---|---|---|---|---|---|---|---|
| Block Island (state waters) | 1,572 | 21.40 | 0.01 | 2.80 | 1.40 | N/A | 0.80 |
| **Total State Waters** | **1,572** | **21.40** | **0.01** | **2.80** | **1.40** | **N/A** | **0.80** |
| Vineyard Wind 1 part of OCS-A 0501 | 342,121 | 71.00 | 0.90 | 18.00 | 12.30 | 12.00 | 2.00 |
| New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind]) | 20,259 | 178.00 | 0.50 | 45.00 | 6.00 | 5.80 | 3.20 |
| Sunrise, OCS-A 0487 | 20,242 | 183.80 | 0.20 | 76.30 | 3.40 | 3.40 | 4.30 |
| South Fork, OCS-A 0517 | 18,894 | 92.90 | 0.50 | 17.30 | 3.00 | 2.80 | 1.90 |
| New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind]) | 27,594 | 179.00 | 0.50 | 45.00 | 6.00 | 5.80 | 3.20 |
| South Coast Wind, OCS-A 0521 | 48,898 | 729.00 | 28.00 | 180.00 | 24.00 | 19.00 | 13.00 |
| Beacon Wind, part of OCS-A 0520 | 32,069 | 124.40 | 5.00 | 23.60 | 3.40 | 3.20 | 5.00 |
| Vineyard Northeast Wind (OCS-A 0522) | 86,780 | 773.00 | 2.60 | 196.00 | 26.00 | 25.00 | 14.00 |
| OCS-A 0500 remainder | 80,434 | 337.76 | 4.66 | 88.32 | 12.58 | 11.68 | 7.65 |
| Bay State Wind, part of OCS-A 0500 | 21,252 | 249.93 | 0.98 | 64.77 | 11.73 | 11.38 | 6.73 |
| **Total MA/RI Leases (without Proposed Action)** | **698,542** | **2,918.79** | **43.84** | **754.29** | **108.41** | **100.05** | **60.97** |
| **Total** | **700,114** | **2,940.19** | **43.85** | **757.09** | **109.81** | **100.05** | **61.77** |

Source: BOEM (2021).

Note: N/A =not applicable.

### 3.4.2.3 Alternative B: Impacts of the Proposed Action on Air Quality

In their *Air Emissions Calculations and Methodology* technical report, Tech Environmental (2023) conservatively assumed that construction of the Project would only take 1 year. For estimating potential transit emissions, 11 regional ports that could be used during construction and O&M were considered (Table 3.4-8).

**Table 3.4-8. Regional Ports Considered**

| Port Name | Location |
|---|---|
| Port of Providence | Providence County, Rhode Island |
| Port of Davisville at Quonset Point | Washington County, Rhode Island |
| Port of Montauk | Suffolk County, New York |
| Port Jefferson | Suffolk County, New York |
| Port of Brooklyn | Kings County, New York |
| Port of New London | New London County, Connecticut |
| Paulsboro Marine Terminal | Gloucester County, New Jersey |
| New Bedford Marine Commerce Terminal | Bristol County, Massachusetts |
| Cashman Shipyard in Quincy | Norfolk County, Massachusetts |
| Port of Norfolk | Norfolk City, Virginia |
| Sparrow's Point | Baltimore County, Maryland |

All ports except New York's Port of Montauk, Port Jefferson, and Port of Brooklyn were used for estimating construction emissions. The three ports in New York and the Port of Davisville at Quonset Point in Rhode Island were used for estimating O&M emissions.

It was conservatively assumed that when there were multiple port options for a particular Project phase involving regular transit, the port used for the emission calculations was the one with the longest transit distance. In the cases where multiple ports were listed as potential ports for vessel activities, the emissions were conservatively allocated to all potential ports. This approach provides a very conservative estimate of potential emissions for each state.

$O_3$ emissions are not included in the air quality impact analyses presented herein. $O_3$ emissions cannot be easily quantified since $O_3$ formation is a byproduct of chemical reactions between VOC and $NO_X$ caused by heat and sunlight and thus emissions of $O_3$ depend on local weather conditions.

#### 3.4.2.3.1 Construction and Installation

##### Offshore Activities and Facilities

Air emissions and climate change: Table 3.4-9 presents a summary of the Project's estimated offshore construction emissions emitted during a maximum-case scenario in which all construction activities would occur in a single year. Construction emissions occurring within 15.5 miles of on-land construction areas and port locations are compared to the emission inventories of the impacted counties.

Over the approximate 1-year construction period, Project air emissions from vessels, helicopters, generators, and fuel-burning equipment could have temporary, direct impacts on air quality. Estimated emissions for most pollutants occurring within 15.5 miles of on-land construction areas and port locations would represent a 16.0% or less temporary increase in air pollutants for counties within the GAA. $NO_X$ construction emissions are more substantial in comparison to the counties' $NO_X$ emissions (in the range of 2%–45%). However, these emissions would be temporary and could be reduced by implementing proposed EPMs (see Table F-1 in Appendix F). Furthermore, this is a conservative analysis of the impact of the construction emissions occurring within 15.5 miles of on-land construction areas and port locations because it assumes all of the emissions would directly affect the nearest county's air. Emissions occurring outside the OCS permit area within 15.5 miles of on-land construction areas and port locations would primarily result from transit vessels used to transport equipment and material. Vessel engines are required to meet certain emission standards and must use low-sulfur diesel fuel. Realistically, vessel transit emissions would be spread out over the transport route. Depending on wind conditions at the time of emissions, it is likely that not all emissions generated miles offshore would reach land. Therefore, Project construction activities would have a temporary **minor** adverse impact on New London, Gloucester, Baltimore, Providence, Washington, Bristol, and Norfolk City Counties' air quality.

Construction emissions occurring offshore in the OCS permit area are not compared to county emission inventories because only a portion of the generated construction emissions would actually reach nearby counties and would depend on wind conditions at the time the emissions are generated. The OCS air permitting process will require air dispersion modeling of these emissions to demonstrate compliance with the NAAQS. If the Project cannot demonstrate compliance, the permit would not be issued, and the Project would not proceed.

The emission totals presented in the analysis represent a worst-case construction scenario in which all construction activities would occur in a single year. Project construction would also have a limited duration, and most emissions would occur offshore. The emissions quantified in Table 3.4-9 would not be emitted entirely at a single point or port and would not continuously affect nearby populated areas. Therefore, impacts on air quality near populated areas would be temporary **minor** adverse.

**Table 3.4-9. Summary of Geographic Analysis Area Offshore Construction Emissions (tpy)**

| Source | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | $CO_2e$ |
|---|---|---|---|---|---|---|---|
| **Construction Emissions within 15.5 Miles of Potential Project On-Land Construction Areas and Port Locations** | | | | | | | |
| RWF-Connecticut | 22.3 | 101.6 | 3.4 | 3.3 | 0.1 | 3.6 | 14,980 |
| Percentage of New London County, Connecticut, emission inventory | 0.09% | 1.92% | 0.12% | 0.31% | 0.03% | 0.02% | 0.76% |
| RWF-New Jersey | 674.8 | 2,796.2 | 94.5 | 91.2 | 8.4 | 49.5 | 190,927 |
| Percentage of Gloucester County, New Jersey, emission inventory | 2.22% | 44.66% | 4.37% | 6.95% | 1.40% | 0.47% | 2.91% |
| RWF-Maryland | 533.4 | 2,210.3 | 74.7 | 72.1 | 6.6 | 39.1 | 150,923 |
| Percentage of Baltimore County, Maryland, emission inventory | 0.74% | 20.73% | 0.61% | 2.25% | 0.63% | 0.23% | 3.03% |
| RWF-Rhode Island | 169.5 | 711.7 | 24.1 | 23.3 | 2.2 | 14.8 | 56,604 |
| RWEC-Rhode Island | 62.8 | 260.5 | 8.7 | 8.4 | 0.8 | 4.6 | 18,169 |
| **Total Rhode Island** | **232.3** | **972.2** | **32.8** | **31.7** | **3.0** | **19.4** | **74,773** |
| Percentage of Providence County, Rhode Island, emission inventory | 0.50% | 12.45% | 0.73% | 1.63% | 0.63% | 0.12% | 1.47% |
| Percentage of Washington County, Rhode Island, emission inventory | 1.60% | 37.79% | 2.80% | 5.34% | 2.88% | 0.26% | 11.65% |
| RWF-Massachusetts | 175.4 | 734.6 | 24.9 | 24.0 | 2.1 | 14.9 | 58,274 |
| RWEC-Massachusetts | 88.6 | 367.0 | 15.7 | 12.1 | 1.1 | 6.5 | 25,598 |
| **Total Massachusetts** | **264.0** | **1,101.6** | **40.6** | **36.1** | **3.2** | **21.4** | **83,872** |
| Percentage of Bristol County, Massachusetts, emission inventory | 0.53% | 12.39% | 1.12% | 1.93% | 0.37% | 0.13% | 1.95% |
| Percentage of Norfolk County, Massachusetts, emission inventory | 0.44% | 11.02% | 0.85% | 1.84% | 0.68% | 0.14% | 1.27% |

| Source | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | $CO_2e$ |
|---|---|---|---|---|---|---|---|
| RWF-Virginia | 613.5 | 2,551.6 | 86.2 | 83.2 | 7.5 | 47.0 | 182,269 |
| Percentage of Norfolk City, Virginia, emission inventory | 2.47% | 41.85% | 5.72% | 12.09% | 3.24% | 0.80% | 16.32% |
| RWF-maximum potential federal water | 2,105.5 | 8,745.7 | 293.9 | 283.9 | 25.1 | 153.0 | 595,830 |
| **Outer Continental Shelf Permit Area Construction Emissions** | | | | | | | |
| RWF | 941.9 | 3,854.1 | 125.5 | 121.3 | 12.3 | 80.6 | 264,307 |
| RWEC-OCS | 65.7 | 270.0 | 9.0 | 8.7 | 0.9 | 4.8 | 17,961 |
| **Total OCS Permit Area Construction Emissions** | **1,007.6** | **4,124.1** | **134.5** | **130.0** | **13.2** | **85.4** | **282,268** |

Source: Tech Environmental (2023).

Notes:

RWF-Connecticut = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of New London.

RWF-New Jersey = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Paulsboro Marine Terminal.

RWF-Rhode Island = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of Providence and the Port of Davisville at Quonset Point.

RWEC-Rhode Island = the portion of RWEC offshore segment construction emissions that would occur outside the OCS permit area and within 15.5 miles of shore.

RWF-Maryland = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from Sparrow's Point.

RWF-Massachusetts = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the New Bedford Marine Commerce Terminal and during transit to and from European ports.

RWEC-Massachusetts = the portion of RWEC offshore segment construction emissions that would occur outside the OCS permit area and within 15.5 miles of shore.

RWF-Virginia = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of Norfolk and during transit to Sparrow's Point.

RWEC-OCS = the portion of RWEC offshore segment construction emissions that would occur within the OCS permit area.

### Onshore Activities and Facilities

Air emissions and climate change: Table 3.4-10 presents the estimated onshore construction emissions for the Project. The onshore facilities, inclusive of the landfall work area, onshore transmission cable, OnSS, and ICF (including associated interconnection circuits and Project easement), would be constructed in Davisville, Washington County, Rhode Island, which is in attainment for all pollutants.

**Table 3.4-10. Summary of Emissions from Onshore Facilities Construction (tpy)**

| Source | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | $CO_2e$ |
|---|---|---|---|---|---|---|---|
| OnSS and ICF | 367.5 | 382.0 | 14.6 | 13.8 | 1.3 | 26.8 | 164,525 |
| Onshore transmission cable | 8.9 | 37.2 | 1.8 | 1.8 | 0.1 | 2.4 | 7,342 |
| Horizontal directional drilling in the landfall work area | 4.3 | 14.3 | 0.7 | 0.7 | 0.0 | 1.0 | 3,271 |
| **Total** | **380.7** | **433.5** | **17.1** | **16.3** | **1.4** | **30.2** | **175,138** |
| Percentage of Kent County, Rhode Island, emission inventory | 2.31% | 20.26% | 1.72% | 2.94% | 1.18% | 0.53% | 21.38% |
| Percentage of Providence County, Rhode Island, emission inventory | 0.82% | 5.55% | 0.38% | 0.84% | 0.29% | 0.18% | 3.44% |
| Percentage of Washington County, Rhode Island, emission inventory | 2.62% | 16.85% | 1.46% | 2.74% | 1.34% | 0.40% | 27.28% |

Source: Tech Environmental (2023).

Construction of the onshore facilities is estimated to take 18 months, but the air technical report analysis conducted by Tech Environmental (2023) presumes that construction could occur as quickly as 1 year. Construction of the onshore facilities would involve emissions from on-road and non-road equipment, which could have temporary, direct impacts on air quality. The Port of Davisville at Quonset Point would be used for construction support activities. The estimated onshore facilities construction emissions for regulated pollutants were compared to county emission inventories for the counties within 15.5 miles of the Port of Davisville at Quonset Point (the GAA). The Proposed Action onshore facility construction $NO_X$ emissions would be approximately 5.5% of Providence County, Rhode Island's annual $NO_X$ emissions, 16.9% of Washington County, Rhode Island's annual $NO_X$ emissions, and 20.3% of Kent County, Rhode Island's annual $NO_X$ emissions. Most emissions of regulated pollutants were between 0.29% and 2.94% of Kent, Providence, or Washington Counties' annual emissions. Air emissions generated by constructing the onshore facilities could have temporary **minor** adverse impacts on air quality.

#### 3.4.2.3.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

Air emissions and climate change: Emissions from the Project O&M would be much lower than those produced during construction because there would be no direct emissions associated with wind turbine operation. The only air emissions anticipated during O&M would result from crew and maintenance vessels and helicopters. Planned maintenance activities include annual turbine service and safety surveys, annual oil and lubricant changes, annual inspections of turbines and foundations, seafloor and submarine surveys, biannual electrical inspections, regular electrical component servicing, annual scheduled maintenance, and all major and minor corrective maintenance. Table 3.4-11 summarizes the Project O&M emissions estimated for the air quality GAA. Project O&M emissions occurring within 15.5 miles of on-land construction areas and port locations are compared to the emission inventories of the impacted counties. These O&M emissions occurring within 15.5 miles of on-land construction areas and port locations would increase the annual emissions of each pollutant by 1.5% or less for all counties within the GAA.

Project O&M emissions occurring offshore in the OCS permit area are not compared to county emission inventories because only a portion of these emissions would actually reach nearby counties, depending on wind conditions at the time of emission. The OCS air permitting process will require air dispersion modeling of these emissions to demonstrate compliance with the NAAQS. Therefore, Project O&M activities would have a **minor** adverse impact on the air quality in the counties in the GAA.

Project O&M would also generate long-term **minor** beneficial impacts by providing energy to the region from a renewable resource. Currently, the region in which this wind farm would serve obtains between 40% and 51% of its power through the combustion of natural gas (U.S. Energy Information Administration 2021). By replacing a portion of the air pollutant emissions generated by fossil fuel–fired power plants, significant reductions in air pollutants emissions can be achieved. A recent study of current wind projects found that there is a net reduction in emissions within 6 months of the commencement of operations (Inderscience Publishers 2014). Furthermore, as transportation and heating become increasingly electrified, the demand for electrical power will grow. Without offshore wind, states would not be able to meet their emission targets and meet this increasing demand.

**Table 3.4-11. Summary of Offshore Operations and Maintenance Emissions (tpy)**

| Source | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | $CO_2e$ |
|---|---|---|---|---|---|---|---|
| **Operations and Maintenance Emissions within 15.5 Miles of Potential Project On-Land Areas and Port Locations** | | | | | | | |
| RWF-New York | 51.2 | 205.3 | 6.9 | 6.7 | 0.1 | 3.0 | 14,506 |
| Percentage of Kings County, New York, emission inventory | 0.09% | 1.51% | 0.14% | 0.26% | 0.02% | 0.02% | 0.28% |
| Percentage of Suffolk County, New York, emission inventory | 0.03% | 1.01% | 0.07% | 0.17% | 0.01% | 0.01% | 0.14% |
| RWF-Rhode Island | 3.3 | 13.0 | 0.4 | 0.4 | 0.0 | 0.3 | 1,001 |
| Percentage of Washington County, Rhode Island, emission inventory | 0.02% | 0.51% | 0.03% | 0.07% | 0.00% | 0.00% | 0.16% |
| **Outer Continental Shelf Permit Area Emissions** | | | | | | | |
| RWF | 207.6 | 847.7 | 27.4 | 26.6 | 0.6 | 12.4 | 57,820 |

Source: Tech Environmental (2023).

Notes:

RWF-New York = the portion of RWF O&M emissions that would occur outside the OCS permit area and within 15.5 miles from shore during transit to and from the Port of Montauk, Port Jefferson, and the Port of Brooklyn.

RWF-Rhode Island = the portion of RWF O&M emissions that would occur beyond the OCS permit area and within 15.5 miles from shore during transit to and from the Port of Providence and the Port of Davisville at Quonset Point.

In the case of decommissioning, emissions would result largely from the operation of decommissioning equipment and vessels or aircraft. Associated air emissions would occur 35 years in the future when air quality conditions, emissions technology, and regulations would be different; therefore, estimating decommissioning emission impacts now is speculative. Because portions of the Project would be decommissioned in place, fewer decommissioning activities and less equipment would be required; therefore emissions from decommissioning activities would be less than those from construction activities. The decommissioning activities would be subject to a future OCS air permit, or similar, application. There would be no further air emissions from RWF once decommissioning is complete.

The use of wind to generate electricity reduces the need for electricity generation from new traditional fossil fuel–powered plants in New England that produce GHG emissions. BOEM obtained avoided emissions from EPA's AVERT Excel Edition, Version 4.1 for the New England region based on EPA's 2019 regional data file. Regional data for 2020 is available, but due to the temporary declines in electricity demands, particularly from March through May 2020 likely caused by the pandemic, the EPA recommends using the 2019 regional data file when assessing annual, near-term future avoided emissions. The EPA's AVERT is not a long-term projection tool. It is not intended to analyze avoided emissions more than 5 years from baseline. To provide a very rough estimate of the long-term avoided emissions of the Project, the maximum and minimum annual avoided emissions estimated by AVERT were multiplied by 35 years (to represent the lifetime avoided emissions). The $CO_2$ emissions produced by the New York electric grid from traditional fossil fuel–fired power plants that would be displaced by the Proposed Action are presented in Table 3.4-16. The Proposed Action would result in a net annual reduction of 1,357,865 tons of $CO_2$, which is the equivalent of the removal of 274,120 gasoline-powered passenger vehicles driven per year, with a lifetime reduction of 47,525,275 tons of $CO_2$.

The EPA's CO-Benefits Risk Assessment (COBRA) screening model Desktop Edition, Version 4.1 was used to estimate the health impacts of avoided emissions in the United States and in the combined area of Connecticut, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Virginia. The model used the following inputs: 2023 was selected as the analysis year to estimate the health impacts of emissions changes. New York was selected as the state where the emission changes would occur; Fuel Combustion: Electric Utility was the sector where the emission changes would occur; and the AVERT output file for the minimum annual avoided emissions for $NO_X$, $SO_2$, $PM_{2.5}$, VOC, and $NH_3$ was loaded into the COBRA application. The model provides estimated ranges of reduced occurrences of health events caused by air pollution, such as mortality, nonfatal heart attacks, and hospitalizations. It also estimates the total health benefit, which encompasses all saved costs of the avoided health events. COBRA includes a discount rate of either 3%, to account for the interest that may be earned from government backed securities, or 7%, to account for private capital opportunity costs. Monetary values presented are in 2017 dollars. The EPA recommends using both for a bounding approach. For the entire United States, COBRA estimates that the total health benefit ranges from $12,096,077 to $27,290,022 at a 3% discount rate and from $10,793,564 to $24,334,469 at a 7% discount rate. COBRA estimates statistical lives saved within the entire United States to range from 1.09 to 2.46 (EPA 2020b). For Connecticut, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Virginia, combined, COBRA estimates that the total health benefit ranges from $9,891,082 to $22,309,940 at a 3% discount rate and from $8,826,280 to $19,893,704 at a 7% discount rate. COBRA estimates statistical lives saved within Connecticut, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Virginia, combined, to range from 0.89 to 2.01 (EPA 2020b). For a 5-year estimate for the United States, the total health benefit ranges from $60,480,383 to $136,450,108 at a 3% discount rate and from $53,967,819 to $121,672,344 at a 7% discount rate. Over the course of 5 years, the statistical lives saved within the entire United States is between 5.44 and 12.31. This 5-year estimate is representative of the avoided emissions during operations only. This would represent a long-term **minor** beneficial impact due to avoided health events.

### Onshore Activities and Facilities

Air emissions and climate change: Onshore O&M activities would include periodic inspections, preventative maintenance, and regular equipment servicing. Table 3.4-12 presents the estimated onshore facilities O&M emissions for the Project. Annual O&M emissions from onshore facilities range from < 0.01% to 0.01% of Kent, Providence, and Washington Counties' annual emissions. Impacts on air quality from Project onshore facilities' O&M emissions would be **negligible** adverse.

**Table 3.4-12. Summary of Emissions from Onshore Facilities Operations and Maintenance (tpy)**

| Source, State | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | $CO_2e$ |
|---|---|---|---|---|---|---|---|
| Onshore facilities, Rhode Island | 0.6 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 22 |
| **Total** | **0.6** | **0.2** | **0.0** | **0.0** | **0.0** | **0.0** | **22** |
| Percentage of Kent County, Rhode Island, emission inventory | < 0.01% | 0.01% | < 0.01% | < 0.01% | < 0.01% | < 0.01% | < 0.01% |
| Percentage of Providence County, Rhode Island, emission inventory | < 0.01% | < 0.01% | < 0.01% | < 0.01% | < 0.01% | < 0.01% | < 0.01% |
| Percentage of Washington County, Rhode Island, emission inventory | < 0.01% | 0.01% | < 0.01% | < 0.01% | < 0.01% | < 0.01% | < 0.01% |

Source: Tech Environmental (2023).

Decommissioning activities associated with the onshore facilities would not likely impact air quality in the region. Associated air emissions would occur 35 years in the future when air quality conditions, emissions technology, and regulations would be different; therefore, estimating decommissioning emission impacts now is speculative. Because portions of the Project would be decommissioned in place, fewer decommissioning activities and less equipment would be required; therefore emissions from decommissioning activities would be less than those from construction activities. There would be no further air emissions from RWF once decommissioning is complete.

## 3.4.2.3.3 Cumulative Impacts

### Offshore Activities and Facilities

Air emissions and climate change: Construction and installation, O&M, and decommissioning emissions associated with the Proposed Action would result in temporary moderate adverse, long-term minor adverse, and long-term minor beneficial impacts on air quality. The Proposed Action's construction emissions (see Tables 3.4-10 and 3.4-13) would noticeably increase emissions of regulated pollutants over the construction emissions generated by other offshore wind projects associated with the No Action

Alternative (see Table 3.4-5). Therefore, total cumulative construction-related air emissions from all planned offshore wind energy projects, including the Proposed Action, in the Massachusetts Wind Energy Area (MA WEA) would consist of an estimated 128,401 tons of $NO_X$, 2,697 tons of $SO_2$, 5,930 tons of $PM_{10}$, and 7,991,974 tons of $CO_2e$. However, these effects would be localized and would cease when Project construction is complete.

Table 3.4-13 combines the total estimated construction emissions contributed by the Proposed Action within the OCS air permit area with the estimated local construction emissions that occur beyond the OCS air permit area and within 15.5 miles of shore (RWF-New Jersey, RWF-Massachusetts, RWEC-Rhode Island, etc.). The totals are not compared to county emission inventories because only portions of the Proposed Action construction emissions generated offshore within the OCS air permit area would reach nearby counties, depending on wind conditions at the time of emission. The OCS air permitting process will require air dispersion modeling of these emissions to demonstrate compliance with the NAAQS.

**Table 3.4-13. Geographic Analysis Area Offshore Cumulative Construction Emissions (tpy)**

| Source, State | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | $CO_2e$ |
|---|---|---|---|---|---|---|---|
| **Connecticut** | | | | | | | |
| RWF-Connecticut | 22.3 | 101.6 | 3.4 | 3.3 | 0.1 | 3.6 | 14,980 |
| RWF-OCS | 941.9 | 3,854.1 | 125.5 | 121.3 | 12.3 | 80.6 | 264,307 |
| RWEC-OCS | 65.7 | 270.0 | 9.0 | 8.7 | 0.9 | 4.8 | 17,961 |
| **Total Connecticut Emissions** | **1,029.9** | **4,225.7** | **137.9** | **133.3** | **13.3** | **89.0** | **297,248** |
| **New Jersey** | | | | | | | |
| RWF-New Jersey | 674.8 | 2,796.2 | 94.5 | 91.2 | 8.4 | 49.5 | 190,927 |
| RWF-OCS | 941.9 | 3,854.1 | 125.5 | 121.3 | 12.3 | 80.6 | 264,307 |
| RWEC-OCS | 65.7 | 270.0 | 9.0 | 8.7 | 0.9 | 4.8 | 17,961 |
| **Total New Jersey Emissions** | **1,682.4** | **6,920.3** | **229.0** | **221.2** | **21.6** | **134.9** | **473,195** |
| **Maryland** | | | | | | | |
| RWF-Maryland | 533.4 | 2,210.3 | 74.7 | 72.1 | 6.6 | 39.1 | 150,923 |
| RWF-OCS | 941.9 | 3,854.1 | 125.5 | 121.3 | 12.3 | 80.6 | 264,307 |
| RWEC-OCS | 65.7 | 270.0 | 9.0 | 8.7 | 0.9 | 4.8 | 17,961 |
| **Total Maryland Emissions** | **1,541.0** | **6,334.4** | **209.2** | **202.1** | **19.8** | **124.5** | **433,191** |
| **Rhode Island** | | | | | | | |
| RWF-Rhode Island | 169.5 | 711.7 | 24.1 | 23.3 | 2.2 | 14.8 | 56,604 |
| RWEC-Rhode Island | 62.8 | 260.5 | 8.7 | 8.4 | 0.8 | 4.6 | 18,169 |
| RWF-OCS | 941.9 | 3,854.1 | 125.5 | 121.3 | 12.3 | 80.6 | 264,307 |
| RWEC-OCS | 65.7 | 270.0 | 9.0 | 8.7 | 0.9 | 4.8 | 17,961 |
| **Total Rhode Island Emissions** | **1,239.9** | **5,096.3** | **167.3** | **161.7** | **16.2** | **104.8** | **357,041** |

| Source, State | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | $CO_2e$ |
|---|---|---|---|---|---|---|---|
| **Massachusetts** | | | | | | | |
| RWF-Massachusetts | 175.4 | 734.6 | 24.9 | 24.0 | 2.1 | 14.9 | 58,274 |
| RWEC-Massachusetts | 88.6 | 367.0 | 15.7 | 12.1 | 1.1 | 6.5 | 25,598 |
| RWF-OCS | 941.9 | 3,854.1 | 125.5 | 121.3 | 12.3 | 80.6 | 264,307 |
| RWEC-OCS | 65.7 | 270.0 | 9.0 | 8.7 | 0.9 | 4.8 | 17,961 |
| **Total Massachusetts Emissions** | **1,271.6** | **5,225.7** | **175.1** | **166.1** | **16.4** | **106.8** | **366,140** |
| **Virginia** | | | | | | | |
| RWF-Virginia | 613.5 | 2,551.6 | 86.2 | 83.2 | 7.5 | 47.0 | 182,269 |
| RWF-OCS | 941.9 | 3,854.1 | 125.5 | 121.3 | 12.3 | 80.6 | 264,307 |
| RWEC-OCS | 65.7 | 270.0 | 9.0 | 8.7 | 0.9 | 4.8 | 17,961 |
| **Total Virginia Emissions** | **1,621.1** | **6,675.7** | **220.7** | **213.2** | **20.7** | **132.4** | **464,537** |

Source: Tech Environmental (2023).

Notes:

RWF-Connecticut = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of New London.

RWF-New Jersey = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Paulsboro Marine Terminal.

RWF-Rhode Island = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of Providence and the Port of Davisville at Quonset Point.

RWEC-Rhode Island = the portion of RWEC offshore segment construction emissions that would occur outside the OCS permit area and within 15.5 miles of shore.

RWF-Maryland = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from Sparrow’s Point.

RWF-Massachusetts = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the New Bedford Marine Commerce Terminal and during transit to and from European ports.

RWEC-Massachusetts = the portion of RWEC offshore segment construction emissions that would occur outside the OCS permit area and within 15.5 miles of shore.

RWF-Virginia = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of Norfolk and during transit to Sparrow’s Point.

RWEC-OCS = the portion of RWEC offshore segment construction emissions that would occur within the OCS permit area.

RWF-OCS = the portion of RWF construction emissions that occur within the OCS permit area.

Air quality impacts from O&M of the Proposed Action, provided in Tables 3.4-11 and 3.4-12, would combine with the air quality impacts from all other O&M activities that could occur under the No Action Alternative (see Table 3.4-8), albeit at lower emission quantities compared to the construction and installation period. O&M emissions would noticeably add emissions in localized areas, several times per year, for the life of the Project. Total cumulative operation-related air emissions from all of the planned wind projects, including the Proposed Action, in the Massachusetts WEA would consist of an estimated 3,788 tons of $NO_X$, 44 tons of $SO_2$, 137 tons of $PM_{10}$, and 757,202 tons of $CO_2e$.

Table 3.4-14 combines the total estimated annual O&M emissions contributed by the Proposed Action within the OCS air permit area with the estimated annual O&M emissions emitted by the Proposed Action within 15.5 miles of the on-land areas and port locations in New York (RWF-New York). When this summed conservative total is compared to the 2017 National Emission Inventory for Kings and Suffolk Counties, New York, Kings County would see a 0.2% to 7.8% increase (depending on the pollutant) in its regulated pollutant annual emissions, whereas Suffolk County would see a 0.06% to 5.2% increase in its regulated pollutant annual emissions. Similarly, Table 3.4-14 combines the total annual O&M emissions emitted by the Proposed Action within the OCS air permit area with the estimated annual O&M emissions emitted by the Proposed Action within 15.5 miles of the on-land areas and port locations in Rhode Island (RWF – Rhode Island). When this summed conservative total is compared to Washington County, Rhode Island's 2017 National Emission Inventory, there would be a 0.6% to 33.5% increase in its regulated pollutant annual emissions. These are very conservative estimated increases because not all of the annual O&M emissions generated within the OCS air permit area would impact each nearby county in turn. Instead, only a portion of emissions generated within the OCS air permit area would actually reach land, depending on wind conditions at the time of emission.

### Table 3.4-14. Geographic Analysis Area Offshore Cumulative Operations and Maintenance Emissions (tpy)

| Source, State | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | $CO_2e$ |
|---|---|---|---|---|---|---|---|
| **New York** | | | | | | | |
| RWF-New York | 51.2 | 205.3 | 6.9 | 6.7 | 0.1 | 3.0 | 14,506 |
| RWF-OCS | 207.6 | 847.7 | 27.4 | 26.6 | 0.6 | 12.4 | 57,820 |
| **Total New York Emissions** | **258.8** | **1,053.0** | **34.3** | **33.3** | **0.7** | **15.4** | **72,326** |
| Percentage of Kings County, New York, emission inventory | 0.44% | 7.76% | 0.69% | 1.30% | 0.15% | 0.09% | 1.41% |
| Percentage of Suffolk County, New York, emission inventory | 0.18% | 5.18% | 0.35% | 0.86% | 0.06% | 0.05% | 0.69% |
| Rhode Island | | | | | | | |
| RWF-Rhode Island | 3.3 | 13.0 | 0.4 | 0.4 | 0.0 | 0.3 | 1,001 |
| RWF-OCS | 207.6 | 847.7 | 27.4 | 26.6 | 0.6 | 12.4 | 57,820 |
| **Total Rhode Island Emissions** | **210.9** | **860.7** | **27.8** | **27.0** | **0.6** | **12.7** | **58,821** |
| Percentage of Washington County, Rhode Island, emission inventory | 1.45% | 33.46% | 2.37% | 4.55% | 0.58% | 0.17% | 9.16% |

Source: Tech Environmental (2023).

Notes:

RWF-New York = the portion of RWF O&M emissions that would occur outside the OCS permit area and within 15.5 miles from shore during transit to and from the Port of Montauk, Port Jefferson, and the Port of Brooklyn.

RWF-Rhode Island = the portion of RWF O&M emissions that would occur beyond the OCS permit area and within 15.5 miles from shore during transit to and from the Port of Providence and the Port of Davisville at Quonset Point.

RWF-OCS = the portion of RWF construction emissions that occur within the OCS permit area.

The Proposed Action would also have a noticeable contribution on existing GHG emissions. The construction and installation, O&M, and the eventual decommissioning of the Proposed Action would generate approximately 2,447,102 metric tons more $CO_2e$ emissions over the No Action Alternative within the OCS air permit area. However, these contributions are small in proportion to aggregate national and global emissions. In 2019, U.S. GHG emissions totaled 6,558 million metric tons of $CO_2e$ (EPA 2021c).

While cumulative air emissions in the region would increase during construction, the Project could also contribute to a long-term, cumulative net decrease in emissions by substituting some existing fossil fuel sources with a renewable source. As calculated in AVERT v4.1, the Proposed Action would avoid an estimated minimum of 235 tons of $NO_X$, 103 tons of $SO_2$, 41 tons of $PM_{2.5}$, 26 tons of VOC, 37 tons of $NH_3$, and 1,415,685 tons of $CO_2$ every year and would avoid an estimated maximum of 292 tons of $NO_X$, 126 tons of $SO_2$, 51 tons of $PM_{2.5}$, 33 tons of VOC, 46 tons of $NH_3$, and 1,771,439 tons of $CO_2$ every year by providing energy generation that existing fossil fuel–generated energy sources would have otherwise provided (EPA 2020c). This represents up to an estimated 5.3% to 6.2% increase in avoided emissions over the No Action Alternative on an annual basis. When combined with estimated avoided emissions from other offshore wind projects in the GAA, an estimated minimum of 4,582 tons of $NO_X$, 1,892 tons of $SO_2$, 803 tons of $PM_{2.5}$, 522 tons of VOC, 726 tons of $NH_3$, and 28,143,672 tons of $CO_2$ could cumulatively be avoided every year and an estimated maximum of 4,897 tons of $NO_X$, 2,017 tons of $SO_2$, 859 tons of $PM_{2.5}$, 559 tons of VOC, 776 tons of $NH_3$, and 30,111,159 tons of $CO_2$ could cumulatively be avoided every year.

Based on the above considerations, BOEM anticipates that the overall cumulative impacts associated with the Proposed Action when combined with other past, present, and reasonably foreseeable activities would be **moderate** adverse, although regional air quality could be improved over the Project life cycle when compared to the No Action Alternative.

The Social Cost of Carbon, now referred to as the Social Cost of GHG (SC-GHG), attempts to quantify the monetary value of net damages from climate change. The SC-GHG is the estimated cost resulting from the addition of GHG emissions to the atmosphere. SC-GHG values for use in analysis are derived on a per-metric ton basis for $CO_2$, $CH_4$, and $N_2O$ for each emission year from 2020 to 2050. Higher global warming potential GHGs such as $CH_4$ and $N_2O$ have a higher SC-GHG on a per metric ton basis than $CO_2$. The intention in the analysis is to include the value of all climate change impacts, including changes in net agricultural productivity, human health effects, property damage from increased flood risk natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services (Interagency Working Group on Social Cost of Greenhouse Gases [IWG] 2021). EO 12866 (Regulatory Planning and Review) directs agencies to “base decisions on the best reasonably obtainable scientific, technical, economic, and other information.” EO 13990 (Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis) reinstates the IWG and directs it to publish an interim update to the SC-GHG, which includes a method to estimate the social cost of $CO_2$, $CH_4$, and $N_2O$. The interim SC-GHG estimates presented in *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide* were published on February 26, 2021, and are used as the basis for this analysis (IWG 2021).

The interim SC-GHG estimates from IWG (2021) described above are used to contextualize GHG impacts in terms of economic damages. The cost attributable to 1 metric ton of each GHG emitted is estimated based on the year emitted and the estimated global economic damages discounted to their present value using the appropriate discount rate. The estimated costs in Table 3.4-15 were calculated for the Project based on the calculated emission estimates.

**Table 3.4-15. Social Cost of Greenhouse Gases from Revolution Wind Farm (2020 $)**

| Social Cost Metric | 5% Discount Rate – Average | 3% Discount Rate – Average | 2.5% Discount Rate – Average | 3% Discount Rate – 95th percentile |
|---|---|---|---|---|
| SC-$CO_2$ | $25,364,349 | $102,345,778 | $157,342,814 | $311,327,904 |
| SC-$CH_4$ | $12,119 | $31,504 | $43,031 | $83,838 |
| SC-$N_2O$ | $439,500 | $1,623,132 | $2,482,422 | $4,315,390 |
| **Total** | $25,815,968 | $104,000,414 | $159,868,267 | $315,727,133 |

Significant uncertainty exists in the SC-GHG estimates. Uncertainty is addressed in part through a combination of multi-model ensemble, probabilistic analysis, and scenario analysis. However, it is important to disclose that uncertainty is substantial (IWG 2021). These uncertainties do not all work in the same direction in terms of their influence on the SC-GHG estimates. However, it is the IWG's judgment that, taken together, the limitations suggest that the interim SC-GHG estimates presented in IWG (2021) likely underestimate the damages from GHG emissions. Uncertainties in the SC-GHG estimates stem from inherent uncertainties about what will happen in the future as well as known limitations in the models used to develop the SC-GHG estimates in IWG (2021).

### Onshore Activities and Facilities

Air emissions and climate change: Project onshore facilities would result in temporary to long-term negligible to minor adverse air emissions as a result of on-road and non-road equipment use. The Proposed Action onshore facility construction $NO_X$ emissions are approximately 5.5% of Providence County, Rhode Island's annual $NO_X$ emissions, 16.9% of Washington County, Rhode Island's annual $NO_X$ emissions and 20.3% of Kent County, Rhode Island's annual $NO_X$ emissions.

Most O&M annual emissions of regulated pollutants were between 0.29% and 2.94% of Kent, Providence, or Washington Counties' annual emissions. Annual O&M emissions from onshore facilities would have a negligible adverse impact, ranging from < 0.01% to 0.01% of Kent, Providence, and Washington Counties' annual emissions. When combined with other onshore sources of air emissions, cumulative impacts on air quality would be long term **minor** adverse.

## 3.4.2.3.4 Conclusions

Construction and installation and decommissioning activities would cause increased air emissions temporarily. Emission sources from O&M activities would primarily use vehicles and vessels that emit less emissions than during construction and installation and decommissioning activities, and fewer annual trips would be needed. Therefore, BOEM expects the impact on air quality from the Proposed Action alone to be **minor** adverse due to air emissions from construction activities. While cumulative air emissions in the region would increase during construction, it is important to note that the Proposed Action could also contribute to a long-term net decrease in emissions by substituting some existing fossil fuel sources with a renewable source. By substituting some fossil fuel sources with a renewable source with less emissions, the Proposed Action would generate long-term **minor** beneficial impacts to regional air quality by contributing to a long-term net decrease in emissions in the region.

Considering all the IPFs together, BOEM anticipates that the overall cumulative impacts associated with the Proposed Action when combined with other past, present, and reasonably foreseeable activities would remain **moderate** adverse, although regional air quality could be improved when compared to the No Action Alternative.

#### 3.4.2.4 Alternatives C, D, E, F

Table 3.4-5 provides a summary of IPF findings for these alternatives.

Using AVERT Version 4.1, avoided $CO_2$ emissions are calculated for the operational life of each alternative with a capacity factor of 45% (AVERT offshore wind default) and with a capacity between 704 MW and 891 MW for each alternative. Alternative F required a blend of capacity factors based on the seasonal variation in wind speeds in which the full 14-MW capacity of the turbines could be used in the four winter months between November and March with lower speeds throughout the rest of the year, resulting in a functional maximum capacity of 12 MW. This led to an adjusted annual capacity factor of 40.3%.

Table 3.4-16 contains the associated annual $CO_2e$ emissions (and avoided $CO_2$ emissions) for Alternatives C through F. Alternative C1, excluding up to 35 WTG, is equivalent to 309,000 vehicles removed annually. Alternative C2, excluding up to 36 WTGs, has avoided GHG emissions equivalent to the removal of 304,229 vehicles per year. Alternative D, which excludes or relocates up to 22 WTGs, has net GHG emissions equivalent to the removal of 352,254 vehicles per year. Alternative E1, which excludes up to 36 WTGs, while also assuming a capacity of 11 MW, is an equivalent to the removal of 278,322 vehicles per year. Alternative E2, which excludes up to 19 WTGs and also assumes a capacity of 11 MW, has avoided GHG emissions equivalent to the removal of 352,668 vehicles per year. Alternative F would exclude up to 44 WTGs and assumes a capacity of 14 MW, has avoided GHG emissions equivalent to the removal of 249,405 vehicles per year. These figures are relative to the existing grid configuration, but the actual annual quantity of avoided emissions attributable to this proposed facility is expected to diminish over time if the electric grid becomes greener due to the addition of other renewable energy facilities and retirement of high-emitting generators.

##### 3.4.2.4.1 Conclusions

Although Alternatives C through F would reduce the number of allowable WTGs and their associated IACs, which would likely have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects the impacts from each alternative would be similar to the Proposed Action: **minor** adverse due to air emissions from construction activities. Project O&M would also contribute to long-term **minor** beneficial impacts by substituting some fossil fuel sources of electricity generation with a lower emitting renewable source and thus, would result in a net reduction in cumulative air emissions in the region.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that each alternative's impacts would be similar to the Proposed Action (with individual IPFs leading to impact that would be short term **minor** adverse and long term **minor** beneficial). The overall cumulative impacts of each alternative on air quality when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **moderate** adverse, with potential regional improvements to air quality when compared to the No Action Alternative. Overall adverse effects would be notable, but the resource would recover completely from adverse impacts.

#### 3.4.2.5 Alternative G

Table 3.4-5 provides a summary of IPF findings for this alternative.

Using AVERT Version 4.1, avoided $CO_2$ emissions are calculated for the operational life of Alternative G with a capacity factor of 45% (AVERT offshore wind default) and with a capacity of 704 MW. Table 3.4-16 contains the associated annual $CO_2e$ emissions (and avoided $CO_2$ emissions) for Alternative G compared to the other alternatives. Alternative G excludes 35 WTGs, assumes a capacity of 704 MW, and has avoided GHG emissions equivalent to the removal of 278,206 gasoline-powered passenger vehicles per year.

##### 3.4.2.5.1 Conclusions

Although Alternative G would reduce the number of allowable WTGs and their associated IACs, which would likely have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects the impacts from this alternative would be similar to the Proposed Action—**minor** adverse—due to air emissions from construction activities. Project O&M would also contribute to long-term **minor** beneficial impacts by substituting some fossil fuel sources of electricity generation with a lower emitting renewable source and therefore would result in a net reduction in cumulative air emissions in the region.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the alternative's impacts would be similar to the Proposed Action (with individual IPFs leading to impacts that would be short term **minor** adverse and long term **minor** beneficial). The overall cumulative impacts of this alternative on air quality when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **moderate** adverse, with potential regional improvements to air quality when compared to the No Action Alternative. Overall, adverse effects would be notable, but the resource would recover completely from adverse impacts.

**Table 3.4-16 Avoided Emissions and Lifetime Net Emissions for Each Alternative**

| Alternative | Quantity of WTGs | Year 1 $CO_2e$ Emissions (tons) | Annual $CO_2e$ Emissions for Years 2–36 (tpy) | Annual Avoided CO2 Emissions for Years 2–36 (tpy) | Net Annual $CO_2e$ Emissions for Years 2–36 (tpy) | Operational Lifetime Net $CO_2e$ Emissions (tons) |
|---|---|---|---|---|---|---|
| Alternative A (No Action Alternative) | 0 WTG | 0 | 0 | 0 | 1,415,685 | 49,548,975 |
| Alternative B (Proposed Action) at 704 MW | 100 WTGs | 282,268 | 57,820 | 1,415,685 | -1,357,865 | -47,525,275 |
| Alternative B (Proposed Action) at 880 MW | 100 WTGs | 282,268 | 57,820 | 1,771,439 | -1,713,619 | -59,976,665 |
| Alternative C1 (12 MW) at 780 MW | 65 WTGs | 183,474 | 37,583 | 1,568,224 | -1,530,641 | -53,572,431 |
| Alternative C2 (12 MW) at 768 MW | 64 WTGs | 180,652 | 37,005 | 1,544,014 | -1,507,009 | -52,745,310 |
| Alternative D (all at 12 MW) at 888 MW | 74 WTGs | 208,878 | 42,787 | 1,787,691 | -1,744,904 | -61,071,645 |
| Alternative E1 (11 MW) at 704 MW | 64 WTGs | 180,652 | 37,005 | 1,415,685 | -1,378,680 | -48,253,807 |
| Alternative E2 (11 MW) at 891 MW | 81 WTGs | 228,637 | 46,834 | 1,793,789 | -1,746,954 | -61,143,405 |
| Alternative F (14 MW) at 704 MW | 56 WTGs | 158,070 | 32,379 | 1,267,816 | -1,235,436 | -43,240,275 |
| Alternative G (11 MW) at 704 MW | 65 WTG | 183,474 | 37,583 | 1,415,685 | -1,378,102 | -48,233,570 |

#### 3.4.2.6 Mitigation

No potential additional mitigation measures by BOEM for air quality are identified in Table F-3 in Appendix F. Any BOEM COP approval (with or without modifications) would require that Revolution Wind obtain an OCS air permit and comply with all permit requirements during construction activities. The EIS analysis assumes compliance with all other federal and state permit requirements under other statutes when evaluating impacts. Because any mitigation measures under the OCS air permit would be required no matter the alternative selected by BOEM, the application of those mitigation measures would not result in a change in impact-level determinations between the Proposed Action and Alternative G.

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## 3.5 Bats

### 3.5.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Bats

Geographic analysis area: Although historical anecdotal observations of bats up to 1,212 miles (1,950 km) offshore North America exist, recent offshore observations of tree bats range from 10.5 to 26.0 miles (16.9–41.8 km) (Hatch et al. 2013). For this reason, and to capture most of the movement range for migratory bat species, the GAA for bats consists of the United States coastline from Maine to Florida and extends 100 miles (160.9 km) offshore and 5 miles (8.05 km) inland to capture the movement range for species in this group (Figure 3.5-1).

Northern long-eared bat (*Myotis septentrionalis*), which has been recently reclassified as endangered under the ESA as of November 30, 2022 (USFWS 2022), and other cave bats typically do not occur on the OCS. Tree bats are long-distance migrants; their range includes most of the Atlantic Coast from Florida to Maine. Although these species have been documented on the open ocean and could encounter WTGs, use of offshore habitat is thought to be limited and generally restricted to spring and fall migration. The onshore limit of the GAA is 0.5 mile (0.8 km) inland to cover onshore habitats used by the bat species that may be affected by offshore components of the proposed Project as well as those species that could be affected by proposed onshore Project components. The onshore limit of the GAA is intended to cover most of the onshore habitat used by those bat species that may encounter the Project during most of their life cycles.

Affected environment: This section provides information on existing bat species and habitat trends from past and present activities. Bats within the GAA are subject to pressure from ongoing activities generally associated with onshore impacts, including onshore construction and climate change. Onshore construction activities and associated impacts are expected to continue at current trends and have the potential to result in impacts on bat species. The Vineyard Wind Final EIS (BOEM 2021a), the South Fork Wind Farm (SFWF) Final EIS (BOEM 2021b), and COP Appendix AA (Biodiversity Research Institute [BRI] 2023) provide detailed discussions of existing bat resources as well as bat species and habitat trends along the East Coast, which are incorporated by reference. Appendix E1 of this EIS provides additional information regarding past and present activities and associated impacts to bats.

Eight bat species are present in the state of Rhode Island, five of which are likely year-round residents. Bat species that may occur in the offshore and onshore portions of the Lease Area are the long-distance migrants and the non-migrating cave-dwelling bats. Long-distance migrants consist of hoary bat (*Lasiurus cinereus*), eastern red bat (*Lasiurus borealis*), and silver-haired bat (*Lasionycteris noctivagans*). Non-migratory cave dwellers consist of northern long-eared bat, little brown bat (*Myotis lucifugus*), eastern small-footed bat (*Myotis leibii*), big brown bat (*Eptesicus fuscus*), and tri-colored bat (*Perimyotis subflavus*) (see Table 2-3 in COP Appendix AA [BRI 2023]). Both groups of bats are nocturnal insectivores that use a variety of forested and open habitats for foraging during the summer (Barbour and Davis 1969). Cave-hibernating bats are generally not observed offshore (Dowling and O’Dell 2018) and in winter migrate from summer habitat to hibernacula in the region (Maslo and Leu 2013). Migratory tree bats fly to southern parts of the United States in the winter and have been observed offshore during migration (Hatch et al. 2013; Stantec Consulting Services Inc. [Stantec] 2016, 2018).

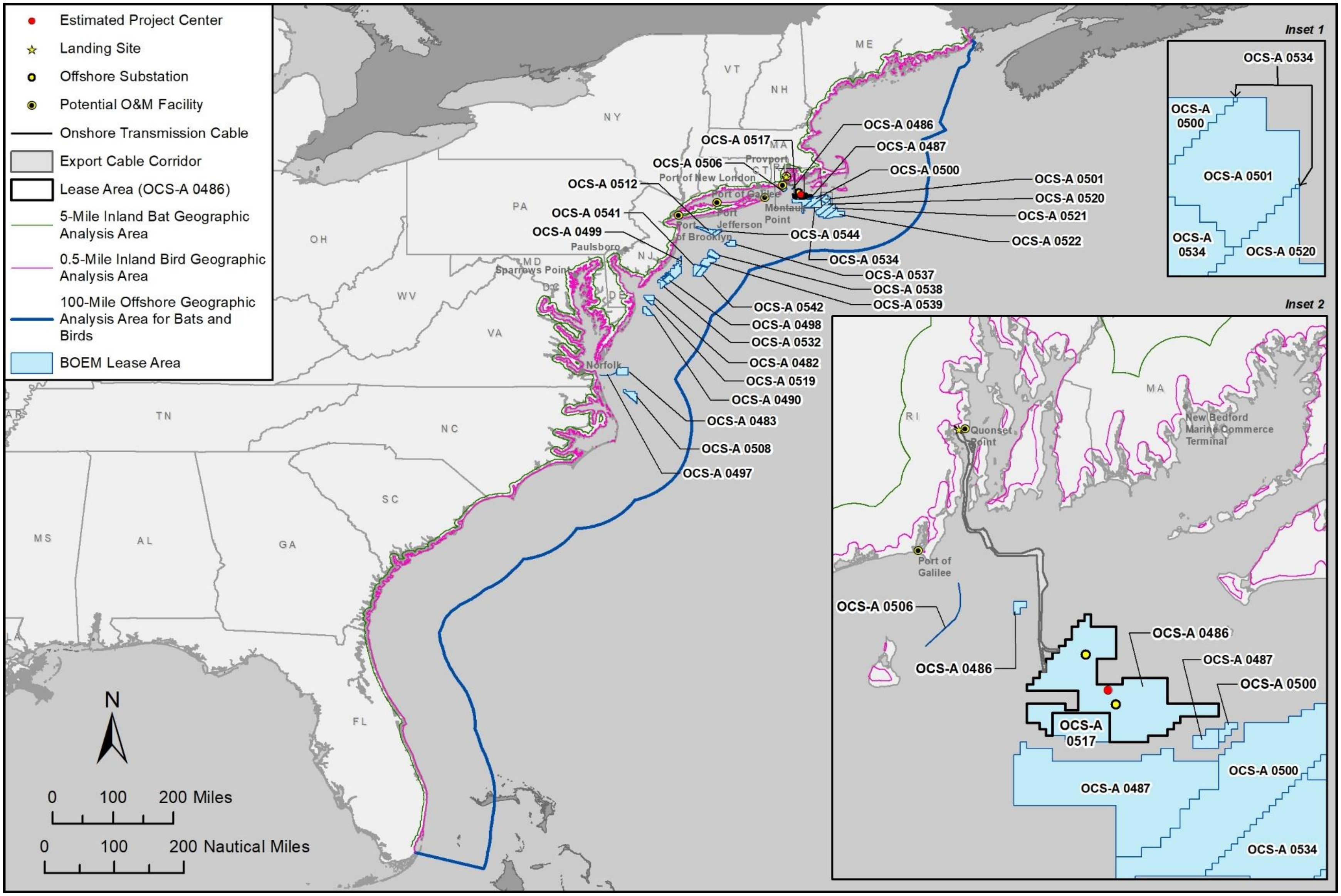


**Figure 3.5-1. Geographic analysis area for bats.**

**Offshore**

Although there is uncertainty on the specific movements of bats offshore, bats have been documented using the marine environment in the United States (Cryan and Brown 2007; Dowling and O'Dell 2018; Grady and Olson 2006; Hatch et al. 2013; Johnson et al. 2011; Stantec 2016). Bats have been observed to temporarily roost on structures, such as lighthouses on nearshore islands (Dowling et al. 2017). There is also historical evidence of bats, particularly eastern red bats, migrating offshore in the Atlantic (Hatch et al. 2013). In a Mid-Atlantic bat acoustic study conducted during the spring and fall of 2009 and 2010 (86 nights), the maximum distance that bats were detected from shore was 13.6 miles (21.9 km), and the mean distance was 5.2 miles (8.4 km) (Sjollema et al. 2014). In Maine, bats were detected on islands up to 25.8 miles (41.6 km) from the mainland (Peterson et al. 2014). In the Mid-Atlantic acoustic study (Sjollema et al. 2014), eastern red bats made up 78% (166 bat detections during 898 monitoring hours) of all bat detections offshore. This study also found that bat activity decreased as wind increased (Sjollema et al. 2014). In addition, eastern red bats were detected in the Mid-Atlantic up to 27.3 miles (44 km) offshore, outside the vicinity of islands or other structures, by high-resolution video aerial surveys (Hatch et al. 2013). Shipboard acoustic surveys conducted by Stantec in 2017 detected over 900 bat passes (primarily long-distance migratory tree bats) within the adjacent proposed SFWF Lease Area, export cable route, and adjacent offshore and coastal areas. Eastern red bats accounted for 69% of calls detected, whereas silver-haired bats accounted for 13%. All other species accounted for less than 5% of calls that were identified to species level. Peak detections for all species occurred during the month of August, suggesting that most offshore movement is associated with fall migration (Stantec 2018).

Several studies highlight the relationship between bat activity and weather conditions. Acoustic monitoring within the footprint of the proposed SFWF in southern New England found 82% of recorded bat passes with corresponding weather data occurred when wind speeds were < 5.0 meters/second (m/s) and temperatures were ≥ 15.0°C (Stantec 2018). This occurred during 49% of nighttime hourly rounded weather data increments during the monitoring period from July 14 to November 15. These weather conditions most often occurred from August through September. Bat activity occurred primarily during nights with warmer temperatures and low wind speeds, which has been likewise documented in several other studies (Fiedler 2004; Reynolds 2006; Stantec 2016). Similar monitoring at the operational Block Island Wind Farm in Rhode Island found that 90% of bat passes occurred at times when wind speeds were below 5.0 m/s and temperatures were at or above 15.0°C (Stantec 2018). Both studies reported very little activity at temperatures below 15.0°C, and most activity was documented at wind speeds between 2 and 4 m/s. Smith and McWilliams (2016) developed predictive models of regional nightly bat activity using continuous acoustic monitoring at several locations in coastal Rhode Island. Bat activity was found to steadily decrease with decreasing temperatures, and departures from seasonally normal temperatures increasingly inhibited bat activity later in the season (September through October). This study found no association between wind speed and bat activity, which contrasts with most other literature that shows bat activity is associated with relatively low wind speeds (Arnett et al. 2008; Cryan and Brown 2007; Fiedler 2004; Kerns et al. 2005), although wind speed data were regional and not site specific.

Cave-hibernating bats hibernate regionally in caves, mines, and other structures and primarily feed on insects in terrestrial and freshwater habitats. These species generally exhibit lower activity in the offshore environment than migratory tree bats (Sjollema et al. 2014), with movements primarily occurring during the fall. In the region, the maximum distance *Myotis* bats were detected offshore was 7.2 miles (11.5 km) (Sjollema et al. 2014). A recent nanotag tracking study on Martha's Vineyard recorded little brown bat (n = 3) movements off the island in late August and early September, with one individual flying from Martha's Vineyard to Cape Cod (Dowling et al. 2017). Big brown bats (n = 2) were also detected migrating from the island later in the year (October–November) (Dowling et al. 2017). These findings are supported by an acoustic study conducted on islands and buoys in the Gulf of Maine that indicated the greatest percentage of activity in July–October (Peterson et al. 2014). Presence in the Lease Area is considered rare for this group given the use of the coastline as a migratory pathway by cave-hibernating bats is likely limited to their fall migration period; acoustic studies indicate lower use of the offshore environment by cave-hibernating bats; and cave-hibernating bats do not regularly feed on insects over the ocean (BRI 2023).

Tree bats migrate south to overwinter and have been documented in the GAA's offshore environment (Hatch et al. 2013; Stantec 2018, 2019). Eastern red bats have been detected migrating from Martha's Vineyard late in the fall, with one individual tracked as far south as Maryland (Dowling et al. 2017). These results are supported by historical observations of eastern red bats offshore as well as recent acoustic survey results (Hatch et al. 2013; Peterson et al. 2014; Sjollema et al. 2014). Although little local data are available, shipboard and stationary acoustic surveys recorded several observations of bats flying over the ocean, with detections of migratory tree bats near the Lease Area (Stantec 2018). Tree bats may pass through the Lease Area during the migration period because they have been detected in the offshore environment primarily during late summer and fall. However, because bat movement offshore is generally limited to fall migration and bat activity offshore primarily occurs during wind speeds below 5.0 m/s, exposure to the Lease Area is expected to be relatively low as the average wind speeds in the Lease Area are between 5 and 10 m/s with stronger wind in the winter (BRI 2023:Section 4.2.4.1). Therefore, there is little evidence of bat use of the offshore environment and a relatively low proportion of the population is exposed.

**Onshore**

In July 2020, VHB performed acoustic presence-absence surveys for the federally threatened northern long-eared bat along the onshore transmission cable route and within the proposed OnSS parcel (VHB 2023a). Automated and qualitative analysis of acoustic data did not detect presence of the northern long-eared bat or the tri-colored bat, which is a candidate species for listing under the Endangered Species Act (ESA). Call data were auto classified with Bat Call Identification East, Version 2.8b, which resulted in the detection of the following species: big brown bat (n = 540 calls), eastern red bat (n = 891 calls), hoary bat (n = 23 calls), and silver-haired bat (n = 130 calls). Qualitative analysis of unknown species of concern calls confirmed 11 big brown bat calls and 135 eastern red bat calls (VHB 2023a).

**Special-Status Bat Species**

The official species list generated by the USFWS's Information for Planning and Consultation (IPaC) planning tool. on September 28, 2019, indicates that the federally endangered northern long-eared bat has the potential to occur within the footprint of the onshore facilities (VHB 2023b). The IPaC list also indicates that there are no critical habitats associated with the northern long-eared bat within the GAA. The range of the federally endangered Indiana bat (*Myotis sodalis*) does not include Rhode Island, and historical records of the Indiana bat demonstrate its presence only in Berkshire and Hampden Counties in Massachusetts (last recorded in 1939; Mass.gov 2019); however, a single tagged Indiana bat was detected in 2015 on Cape Cod and Nantucket (Motus Wildlife Tracking System 2015). The Indiana bat is also not among species of bats documented offshore (Pelletier et al. 2013; Stantec 2016). For these reasons, this assessment focuses solely on the potential occurrence of the northern long-eared bat within the GAA.

BOEM prepared a biological assessment (BA) for the potential effects on USFWS federally listed species under Section 7 of the ESA (BOEM 2022, 2023). The BA, as amended, was submitted to the USFWS on November 17, 2022, requesting initiation of consultation under Section 7 of the ESA, and the USFWS responded on November 25, 2022, with a letter of consultation initiation. The BA found that the Proposed Action *may affect but is not likely to adversely affect* listed species (BOEM 2022, 2023). BOEM requested concurrence on its conclusion that the impacts of the proposed onshore activities are expected to be discountable and insignificant and thus *may affect but are not likely to adversely affect* northern long-eared bat. There is no critical habitat designated for this species. In its final biological opinion, dated May 30, 2023, the USFWS concurred with BOEM's determination that the Project *may affect but is not likely to adversely affect* the northern long-eared bat because the best available information indicates the likelihood of the species occurring in the Lease Area is discountable (USFWS 2023).

Offshore, northern long-eared bats are generally not expected to occur within the Lease Area. A recent tracking study on Martha's Vineyard (n = 8; July–October 2016) did not record any offshore movements, and bats were presumed to hibernate on the island (Dowling et al. 2017). However, shipboard acoustic sampling near the SFWF detected a single northern long-eared bat call 21.1 miles (34 km) offshore (Stantec 2018). Most other northern long-eared bat passes detected during these surveys were 3 to 9 miles (5–14 km) offshore. Stationary acoustic detectors positioned on two turbines within the operational Block Island Wind Farm did not detect any northern long-eared bat calls (Stantec 2018, 2020). Similarly, vessel-based surveys at the construction site of the Block Island Wind Farm in 2016 did not detect any *Myotis* species (Stantec 2016). If northern long-eared bats were to migrate over water, most movements would likely be near the mainland. The related little brown bat has been documented migrating from Martha's Vineyard to Cape Cod, and northern long-eared bats may likewise migrate to mainland hibernacula from these islands in August and September (Dowling et al. 2017). Given there is little evidence of use of the offshore environment by northern long-eared bats and exposure is expected to be minimal, this species is not further assessed in the offshore environment. This conclusion is also consistent with the Vineyard Wind BA (BOEM 2020).

## 3.5.2 Environmental Consequences

### 3.5.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). The Project design parameters that would influence the magnitude of the impacts on bats include the number, size, and location of WTGs; the location of the OnSS and ICF; the type of lighting to be used; the location of construction within the landfall work area and within the transmission cable envelope; and the time of year during which construction occurs. Impacts associated with construction of the onshore elements of the Proposed Action during the active season for bats (generally April through October) could be avoided if onshore construction occurs outside this time frame.

The following EPMs would be implemented to minimize potential impacts to bats (see Appendix F, Table F-1):

- Revolution Wind evaluated siting alternatives for the OnSS using the criteria that included avoidance or minimization of disturbance to ecologically sensitive areas.
- Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mile (1-nm) × 1.15-mile (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This wide spacing of WTGs would allow avian and bat species to avoid individual WTGs and minimize risk of potential collision.
- The OnSS and ICF would be located on parcels that are already highly altered and include buried demolition waste.
- The transmission cable would be located primarily in unvegetated and previously disturbed or developed ROWs.
- To the extent feasible, tree and shrub removal for onshore facilities would occur outside the avian nesting and bat roosting period (May 1 through August 15). If tree and shrub removal cannot be avoided during this season, Revolution Wind would coordinate with appropriate agencies to determine appropriate course of action.
- Construction and operational lighting would be limited to the minimum necessary to ensure safety and to comply with applicable regulations.
- Revolution Wind would comply with FAA and USCG requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimize impacts on avian and bat species.
- Accidental spill or release of oils or other hazardous materials offshore would be managed through the OSRP.
- An SESC plan, including erosion and sedimentation control measures, would be implemented to minimize potential water quality impacts during construction and operation of the onshore facilities.
- Onshore facilities would be sited within previously disturbed and developed areas to the extent practicable.
- The onshore transmission cables would be buried and would therefore avoid the risk to avian and bat species associated with overhead lines.
- Revolution Wind would document any dead (or injured) birds/bats found incidentally on vessels and structures during construction, O&M, and decommissioning and provide an annual report to BOEM and USFWS.
- Revolution Wind would continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and would adhere to requirements imposed by these agencies.
- Revolution Wind previously committed to compliance with the northern long-eared bat 4(d) Rule (USFWS 2016b) to avoid and minimize long-term impacts on the species and sensitive upland habitats. However, the change in status from threatened to endangered nullified the prior 4(d) Rule that tailored protections for the species when it was listed as threatened. New interim

guidelines and protections have been issued by the USFWS. Revolution Wind would continue to coordinate with RIDEM and the USFWS to avoid and minimize adverse effects to northern long eared bats and would adhere to requirements imposed by these agencies.

These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for bats across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse impact are excluded from Chapter 3 and provided in Table E1-4 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.5-1 discloses IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

The overall impact to bats from any action alternative would be **minor** adverse, as the effects would be small, and the resource would recover completely, with no mitigating action required. The conclusion section for each alternative analysis provides additional rationale for this impact determination.

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**Table 3.5-1. Alternative Comparison Summary for Bats**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| Cable emplacement/ maintenance | Only small amounts of habitat removal, if any, would be required by onshore power infrastructure construction and would occur in previously disturbed areas. Temporary to short-term impacts associated with habitat loss or avoidance during cable emplacement/maintenance may occur, but no injury or mortality of bat individuals would be expected. Cable emplacement/maintenance is therefore expected to have **negligible** adverse impacts on bats. | **Onshore**: The onshore transmission cable route would be located primarily in unvegetated and previously disturbed or developed ROWs that do not provide high-quality habitat for bats; however, some of the alternative routes under consideration within the transmission cable envelope contain segments that would pass through undeveloped, vegetated areas comprised of upland forest and shrubland. The preferred transmission cable route is an approximate 1-mile (1.6-km) route that would predominantly follow along paved roads or previously disturbed areas such as parking lots. Based on Project timing, the limited area of effect relative to available habitat, and the proposed impact avoidance and minimization measures, adverse construction impacts of the Proposed Action on northern long-eared bat would be **negligible** adverse.<br>O&M impacts resulting from vegetation clearing would be reduced by observing time-of-year restrictions on vegetation removal to avoid bats' breeding season and therefore, **negligible** adverse. Impacts from land disturbance during decommissioning would be similar to those described within the construction impact analysis, although the impacts would likely be less because new vegetation clearing and grading would not be necessary.<br>Onshore construction and installation would add to other limited onshore bat habitat disturbance actions through the removal of approximately 1.6 acres (0.6 ha) of mixed oak/white pine forest at the ICF but would not result in population-level effects given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. Therefore, the cumulative impact of the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** adverse impacts to bats. | **Onshore**: Alternatives C through F would not alter onshore activities. Therefore, construction, O&M, and decommissioning impacts would be the same as the Proposed Action: short term **negligible** adverse. Likewise, cumulative impacts would be the same as the Proposed Action: short term **negligible** to **minor** adverse impacts. | | | | **Onshore**: Similar to Alternatives C through F, Alternative G would not alter onshore activities, and construction, O&M, and decommissioning impacts would be the same as the Proposed Action: short term **negligible** adverse. Likewise, cumulative impacts would be the same as the Proposed Action: short term **negligible** to **minor** adverse. |
| Light | Lighting sources on the WTGs and OSSs may serve as an attractant to bats as they navigate, or bats may be indirectly attracted to insect prey drawn to the lights. But based on collision mortalities | **Offshore**: Bats may demonstrate attraction to or avoidance of construction vessels installing offshore facilities. Exposure to vessels and installation infrastructure would be temporally limited to the construction period. Thus, behavioral | **Offshore**: No measurable change from Proposed Action construction impacts is anticipated for Alternatives C through F because the number and duration of construction vessels and work areas requiring nighttime lighting would be the same as described for the Proposed Action. | | | | **Offshore**: Similar to Alternatives C through F, there is no measurable change from Proposed Action construction impacts anticipated for Alternative G, and impacts to bats from offshore lighting under this |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | documented at onshore wind farms, the behavioral vulnerability to collision due to offshore lighting for all bat species would be **negligible** adverse. | changes due to lighting on construction vessels would be temporary, and impacts to bats would be **negligible** adverse, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the airspace of the RWF.<br>Lighting during the O&M phase of the Project would be limited, which should reduce insect and potential bat attraction (Stantec 2018). Revolution Wind would comply with FAA (2018) and BOEM (2021c) requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimize impacts on bat species. Overall, collision-related mortality or injury from lighting at the offshore facilities could result in **negligible** to **minor** adverse impacts to bats at the RWF, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the airspace of the RWF.<br>The Proposed Action would add up to 100 new WTGs with red flashing aviation hazard lighting to the offshore environment. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from construction areas. Ongoing and future non–offshore wind activities are expected to cause permanent impacts, primarily driven by light from offshore structures and short-term and localized impacts from vessel lights. For these reasons, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** adverse cumulative impacts to bats, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the Lease Area. | Alternatives C through F would reduce operational nighttime lighting due to a reduced number of lighted structures, thereby negligibly decreasing the risk of bat injury or mortality from collision with WTGs. However, impacts to bats from offshore lighting under these alternatives would likely be the same as the Proposed Action: **negligible** to **minor** adverse.<br>Alternatives C through F would add up to 56 to 93 new WTGs with red flashing aviation hazard lighting to the offshore environment. Additionally, marine navigation lighting would include one or more flashing white lights on each WTG and the OSSs and would be directed out and down to the water surface. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from construction areas. These lights could serve as an attractant to bats as they navigate, or bats may be indirectly attracted to insect prey drawn to the lights. Ongoing and future non–offshore wind activities are expected to cause permanent impacts, primarily driven by light from offshore structures and short-term and localized impacts from vessel lights. For these reasons, Alternatives C through F, when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** adverse cumulative impacts to bats, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the Lease Area. | | | | alternative would likely be the same as the Proposed Action: **negligible** to **minor** adverse.<br>Alternative G would add 65 WTGs with red flashing aviation hazard lighting to the offshore environment. Additionally, marine navigation lighting would include one or more flashing white lights on each WTG and the OSSs and would be directed out and down to the water surface. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from construction areas. These lights could serve as an attractant to bats as they navigate, or bats may be indirectly attracted to insect prey drawn to the lights. Ongoing and future non–offshore wind activities are expected to cause permanent impacts, primarily driven by light from offshore structures and short-term and localized impacts from vessel lights. For these reasons, Alternative G, when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** adverse cumulative impacts to bats, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the Lease Area. |
| | | **Onshore**: Most construction activities would occur during the day over the approximately 1-year construction period for the onshore facilities, impacts from lighting on bats would be **negligible** adverse.<br>During the O&M of the OnSS and ICF, general yard lighting would be used for assessment of equipment. In general, lighting would be off at night unless there is work in progress or lights are left on for safety and security purposes. Because the use of lighting at night is expected to be | **Onshore**: Alternatives C through F would not alter onshore activities. Therefore, impacts would be the same as the Proposed Action: temporary to short term **negligible** adverse. | | | | **Onshore**: Similar to Alternatives C through F, Alternative G would not alter onshore activities, and impacts would be the same as the Proposed Action: temporary to short term **negligible** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | | infrequent, the impacts it has on temporary bat displacement and/or behavior disruption would be **negligible** adverse.<br>Lighting from construction and operations could add to baseline light sources and activities associated with other onshore projects. When considered in the context of the other nearby commercial and industrial lighting within the GAA, BOEM expects **negligible** adverse cumulative impacts to bats. | | | | | |
| Noise | Anthropogenic noise on the OCS associated with future offshore wind development, including noise from pile driving and construction activities (e.g., use of noise-producing heavy equipment or machinery), could impact bats on the OCS. Construction activity would be temporary to short term and highly localized; however, no auditory impacts on bats would be expected.<br>Given the temporary and localized nature of potential impacts and bats' expected biologically insignificant response, impacts on bats are expected to be **negligible** adverse. No individual fitness (i.e., a bat's ability to survive and reproduce) or population-level impacts would occur as a result of onshore or offshore noise associated with future offshore wind development. | **Offshore**: Pile-driving noise and offshore construction noise associated with the Proposed Action would temporary to short term, and is expected to result in **negligible** adverse impacts.<br>Increases in activity and associated disturbances during RWF maintenance activities would have a short-term **negligible** adverse impact on bats because of the limited additional vessel activity and relatively low likelihood of bat occurrence near the RWF. There would also be no impacts to bats during O&M of the offshore RWEC because these components are underwater, and there would be no routine maintenance at these components.<br>Pile-driving and other construction noise and activity associated with the Proposed Action would add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. Therefore, the cumulative impact of the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** adverse impacts to bats. | **Offshore**: Alternatives C through F would slightly decrease construction impacts on bats from noise associated with pile driving for WTGs as compared to the Proposed Action. Impacts, if any, would be temporary, limited to behavioral avoidance, and localized and would be the same as the Proposed Action: short term **negligible** adverse.<br>No measurable change from Proposed Action O&M impacts is anticipated because operational noise sources and levels would be the same: short term **negligible** adverse.<br>Pile-driving and other construction noise and activity associated with Alternatives C through F would add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. However, Alternatives C through F's contribution would be limited in duration and cease when construction ends. Therefore, these alternatives when combined with other past, present, and reasonably foreseeable projects would result in short- to long-term **negligible** to **minor** adverse cumulative impacts to bats. | | | | **Offshore**: Similar to Alternatives C through F, Alternative G would slightly decrease construction impacts on bats from noise associated with pile driving for WTGs as compared to the Proposed Action, and impacts, if any, would be temporary, limited to behavioral avoidance, and localized and would be the same as the Proposed Action: short term **negligible** adverse.<br>No measurable change from Proposed Action O&M impacts is anticipated because operational noise sources and levels would be the same: short term **negligible** adverse.<br>Pile-driving and other construction noise and activity associated with Alternative G would add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. However, Alternative G's contribution would be limited in duration and cease when construction ends. Therefore, this alternative when combined with other past, present, and reasonably foreseeable projects would result in short- to long-term **negligible** to **minor** adverse cumulative impacts to bats. |
| | | **Onshore**: Some potential for temporary to short-term, and localized habitat impacts arising from onshore construction noise exists; however, no auditory impacts on bats would be expected. Therefore, noise impacts resulting from construction and installation of the onshore facilities would be temporary **negligible** adverse.<br>Most activities would generally not be conducted during the active bat foraging period between twilight and sunrise, thus noise from maintenance | **Onshore**: Alternatives C through F would not alter onshore activities. Therefore, impacts would be the same as the Proposed Action: temporary to long-term **negligible** adverse. | | | | **Onshore**: Similar to Alternatives C through F, Alternative G would not alter onshore activities, and impacts would be the same as the Proposed Action: temporary to long term **negligible** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action)<br>up to 100 WTGs | Alternative C<br>(Habitat Alternative)<br>64–65 WTGs | Alternative D<br>(Transit Alternative)<br>78–93 WTGs | Alternative E<br>(Viewshed Alternative)<br>64–81 WTGs | Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs | Alternative G<br>(Preferred Alternative)<br>65 WTGs |
|---|---|---|---|---|---|---|---|
| | | activities is not expected to impact bat foraging behavior. Noise and traffic resulting from operation of the onshore facilities would be temporary and **negligible** adverse. Impacts to bats from noise during decommissioning would be similar to that described for construction activities.<br>Construction noise and activities associated with construction and operation of the onshore facilities could add to baseline noise and activity associated with other onshore projects with overlapping construction periods. Normal operation of the OnSS would generate continuous noise, but BOEM expects long-term **negligible** adverse associated impacts when considered in the context of the other commercial and industrial noises nearby. | | | | | |
| Presence of structures | Some habitat conversion may result from port expansion activities required to meet the demands for fabrication, construction, transportation, and installation of wind energy structures. However, the noticeable increase from future offshore wind development would be a minimal contribution in the port expansion required to meet increased commercial, industrial, and recreational demand (BOEM 2019).<br>Cave bats rarely occur offshore and given the rarity of tree bats in the offshore environment, the likelihood of exposure of cave and tree bats to construction vessels during construction or maintenance activities, or the RSZ of operating WTGs in the lease areas, is very low. Therefore, related impacts are expected to be **negligible** adverse. | **Offshore**: Exposure to vessels and installation infrastructure would be temporally limited to the construction period. Behavioral vulnerability to collision with construction equipment is expected to be **negligible** adverse.<br>Collisions between bats and OSSs could cause injury and/or mortality. However, in general, these objects would not pose a collision risk because of a bat's ability to echolocate and detect stationary structures (Stantec 2018). Bat activity can be expected to be low during WTG operation and limited to warmer periods in the summer or during fall migration. Thus, the risk of injury and/or mortality to bats would be **negligible** to **minor** adverse. The structures associated with the Proposed Action, and the consequential **negligible** to **minor** adverse impacts, would remain at least until decommissioning of the Project is complete.<br>The Project's contribution to impacts on bats would be limited because migrating bats rarely use the OCS and the Project would account for less than 4% of the total future structures on the OCS. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in long-term **negligible** to **minor** adverse cumulative impacts to bats. | **Offshore**: Alternatives C through F would reduce the number of WTGs, potentially resulting in a reduced amount of offshore construction equipment and vessels required. However, because bat exposure to vessels and installation infrastructure would be temporally limited to the construction period, the behavioral vulnerability to collision with construction equipment under Alternatives C through F is expected to be the same as described for the Proposed Action: short term **negligible** adverse.<br>During operation, Alternatives C through F would reduce the number of WTGs as compared to the Proposed Action and potentially allow for improved maneuverability for bats through the Lease Area and negligibly decreases the risk of injury or mortality from collision with WTGs. However, impacts to bats from the presence of structures under these alternatives would not be substantially reduced and would likely be the same as the Proposed Action: long term **negligible** to **minor** adverse.<br>Alternatives C through F would add 56 to 93, additional WTGs and up to two OSSs to the No Action Alternative. Therefore, the total cumulative structures would be 3,146 to 3,183. Impacts to migration patterns or collision risk from these additional turbines would persist until decommissioning is complete. However, the Project's contribution to impacts on bats would be limited because migrating bats rarely use the OCS and the Project would account for less than 4% of the total future structures on the OCS. Therefore, these alternatives, when combined with past, present, and reasonably foreseeable projects would result in long-term **negligible** to **minor** adverse cumulative impacts to bats. | | | | **Offshore**: Similar to Alternatives C through F, construction impacts for Alternative G would be expected to be the same as described for the Proposed Action: short term **negligible** adverse.<br>During operation, similar to Alternatives C through F, Alternative G impacts to bats from the presence of structures would likely be the same as the Proposed Action: long term **negligible** to **minor** adverse.<br>Alternative G would add 65 WTGs and up to two OSSs to the No Action Alternative. Therefore, the total cumulative structures would be 3,155. Impacts to migration patterns or collision risk from these additional turbines would persist until decommissioning is complete. However, the Project's contribution to impacts on bats would be limited because migrating bats rarely use the OCS and the Project would account for less than 3% of the total future structures on the OCS. Therefore, this alternative when combined with past, present, and reasonably foreseeable projects would result in long-term **negligible** to **minor** adverse cumulative impacts to bats. |
| | | **Onshore**: Impacts on mortality and injury from the onshore construction operations would be avoided by observing time-of-year restrictions on vegetation removal that would avoid the breeding season of bats (see Appendix F, Table F-2). | **Onshore**: Alternatives C through F would not alter onshore activities. Therefore, impacts would be the same as the Proposed Action: temporary to long-term **negligible** adverse. | | | | **Onshore**: Similar to Alternatives C through F, Alternative G would not alter onshore activities, and impacts would be the same as |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | | Therefore, these temporary impacts, if any, from construction equipment and ongoing activity would be **negligible** adverse.<br>The OnSS and ICF would be visible structures that would result in permanent bat habitat conversion and loss. Land disturbance as it relates to vegetation clearing may result in the direct injury or mortality of bats. However, mortality and injury risk would be reduced by observing time-of-year restrictions on vegetation removal to avoid bats' breeding season. Collisions between bats and onshore facilities could cause mortality. However, in general, these objects would likely not pose a collision risk because of a bat's ability to echolocate and detect stationary structures (Stantec 2018). Therefore, the impacts to bats from the presence of onshore facilities would be long term **negligible** adverse**.**<br>The contribution of the Proposed Action to cumulative impacts would not result in population-level effects given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. The combined impacts on bats from habitat loss would likely be long term **negligible** adverse given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. | | | | | the Proposed Action: temporary to long term **negligible** adverse. |

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### 3.5.2.2 Alternative A: Impacts of the No Action Alternative on Bats

#### 3.5.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for bats (see Section 3.5.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA for bats. These IPFs are described and analyzed in Appendix E1.

#### 3.5.2.2.2 Cumulative Impacts

This section discloses potential bat impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non–offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

Cable emplacement/maintenance: A small amount of infrequent construction impacts associated with onshore power infrastructure would be required over the next 6 to 10 years to tie future offshore wind energy projects to the electric grid. Typically, this would require only small amounts of habitat removal, if any, and would occur in previously disturbed areas. Temporary to short-term impacts associated with habitat loss or avoidance during cable emplacement/maintenance may occur, but no injury or mortality of bat individuals would be expected. Cable emplacement/maintenance is therefore expected to have **negligible** adverse impacts on bats.

Light: Lighting sources on the WTGs and OSSs may serve as an attractant to bats as they navigate, or bats may be indirectly attracted to insect prey drawn to the lights. The lack of bat carcasses reported during large-scale bird-related fatality events at illuminated lighthouses, lightships, and oil or research platforms indicates that bats do not appear to be as susceptible to these types of collision risks as some birds (Stantec 2018). The wind turbines would be lit with aviation lighting, although the duration of lighting would be minimized by an automatic detection lighting system (ADLS) (see Table F-2 in Appendix F for details). Aviation lighting has not been found to influence bat collision risk at onshore facilities in North America (Arnett et al. 2008). Based on collision mortalities documented at onshore wind farms, the behavioral vulnerability to collision due to offshore lighting for all bat species would be **negligible** adverse.

Noise: Anthropogenic noise on the OCS associated with future offshore wind development, including noise from pile-driving and construction activities (e.g., use of noise-producing heavy equipment or machinery), could impact bats on the OCS. Noise from pile driving would occur during installation of foundations for offshore structures at a frequency of 4 to 6 hours at a time over 6 to 10 years. Construction activity would be temporary to short term, and highly localized. Further, the majority of these activities would take place during the day while bats are in torpor. A study evaluated the effect of noise on torpid bats and found that bats responded most strongly to colony and vegetation noise and most weakly to traffic noise (Luo et al. 2014). The study also documented evidence that torpid bats can rapidly habituate to repeated and prolonged noise disturbance, suggesting that traffic noise is less disturbing to torpid bats than colony or vegetation noise (Luo et al. 2014). Another study found that bats avoided foraging areas subjected to strong noise impacts (Schaub et al. 2008). This study suggests that foraging areas close to highways and other sources of intense broadband noises are degraded in their suitability as foraging areas for "passive listening" bats (Schaub et al. 2008). Because most construction activities would generally not be conducted during the active bat foraging period between twilight and sunrise, most noise generated from construction activities is not expected to impact bat foraging behavior. Luo et al. (2014) demonstrated that bat response to traffic noise was low relative to other stimuli (e.g., colony noise, vegetation) and that bats rapidly habituate to prolonged noise disturbance. Auditory impacts are not expected to occur because recent research shows that bats may be less sensitive to temporary threshold shifts than other terrestrial mammals (Simmons et al. 2016). Construction activities could generate noise sufficient to cause avoidance behavior by individual migrating tree bats (Schaub et al. 2008), thus potentially causing habitat-related impacts (i.e., displacement). These impacts would likely be limited to behavioral avoidance of pile-driving and/or construction activities (e.g., use of noise-producing heavy equipment or machinery), and no temporary or permanent hearing loss would be expected (Simmons et al. 2016). However, these impacts are unlikely because little use of the OCS is expected by bats, and only during spring and fall migrations. Therefore, based on available information, noise impacts resulting from construction of offshore facilities would be temporary **negligible** adverse.

Some potential for temporary to short-term and localized habitat impacts arising from onshore construction noise exists; however, no auditory impacts on bats would be expected. As discussed with offshore construction noise, recent literature suggests that bats are less susceptible to temporary or permanent hearing loss from exposure to intense sounds (Simmons et al. 2016). Impacts would be limited to individuals roosting adjacent to onshore construction locations. Nighttime work may be required on an as-needed basis, which could impact foraging bats. Some temporary displacement and/or avoidance of potentially suitable foraging habitat could occur, but these impacts would not be biologically significant. Some bats roosting near construction activities may be disturbed during construction, but they would move to a different roost farther from construction noise. This would not result in any impacts because frequent roost switching is common among bats (Hann et al. 2017; Whitaker 1998). Based on available information, noise impacts resulting from construction of the onshore facilities would be temporary **negligible** adverse.

Nonroutine activities associated with offshore wind facilities would generally require intense temporary activity to address emergency conditions. The noise made by onshore construction equipment or offshore repair vessels could temporarily deter bats from approaching the site of a given nonroutine event. Impacts on bats, if any, would be temporary and last only as long as repair or remediation activities were necessary to address these nonroutine events.

Given the temporary and localized nature of potential impacts and bats' expected biologically insignificant response, impacts on bats are expected to be **negligible** adverse. No individual fitness (i.e., a bat's ability to survive and reproduce) or population-level impacts would occur as a result of onshore or offshore noise associated with future offshore wind development.

<u>Presence of structures:</u> In addition to electrical infrastructure, some habitat conversion may result from port expansion activities required to meet the demands for fabrication, construction, transportation, and installation of wind energy structures. The general trend along the coastal region from Virginia to Maine is that port activity will increase modestly and require some conversion of undeveloped land to meet port demand and will result in permanent habitat loss for local bat populations. However, the noticeable increase from future offshore wind development would be a minimal contribution in the port expansion required to meet increased commercial, industrial, and recreational demand (BOEM 2019). The current

bearing capacity of existing ports is considered suitable for wind turbines, requiring no port modifications for supporting offshore wind energy development (U.S. Department of Energy [2014]).

Using the assumptions in Table E-4 in Appendix E, the cumulative offshore wind activities scenario would include up to 3,025 WTGs on the OCS that could result in potential impacts on bats. Cave bats (including the federally threatened northern long-eared bat and the state-endangered eastern small-footed bat, little brown bat, and tri-colored bat) rarely occur offshore (even during fall migration) and, therefore, exposure to construction vessels during construction or maintenance activities, or the rotor swept zone (RSZ) of operating WTGs in the lease areas, is expected to be **negligible** adverse, if exposure occurs at all (Pelletier et al. 2013).

Tree bats, however, may pass through offshore WEAs on the OCS during the fall migration, with limited potential for migrating bats to encounter vessels during construction and decommissioning of WTGs, electric service platforms, and offshore export cable corridors, although structure and vessel lights may attract bats because of the increased prey abundance. As discussed above, although bats have been documented at offshore islands, relatively little bat activity has been documented in open water habitat similar to the conditions in the WEAs (Stantec 2018, 2020). Several studies, such as Cryan and Barclay (2009), Cryan et al. (2014), and Kunz et al. (2007), discuss several hypotheses as to why bats may be attracted to WTGs. Many of these, including the creation of linear corridors, altered habitat conditions, or thermal inversions, would not apply to WTGs on the Atlantic OCS (Cryan and Barclay 2009; Cryan et al. 2014; Kunz et al. 2007). Other hypotheses associated with the Atlantic OCS regarding bat attraction to WTGs include bats perceiving the WTGs as potential roosts, potentially increased prey base, visual attraction, disorientation due to electromagnetic fields or decompression, or attraction due to mating strategies (Arnett et al. 2008; Cryan et al. 2007; Kunz et al. 2007). However, no definitive answer as to why, if at all, bats are attracted to WTGs has been postulated, despite intensive studies at onshore wind facilities. For this reason, some bats may encounter, or perhaps be attracted to, the expected structures (i.e., electric service platforms and non-operational WTG towers) to opportunistically roost or forage. However, bats’ echolocation abilities and agility make it unlikely that these stationary objects (i.e., electric service platforms and non-operational WTGs) or moving vessels would pose a collision risk to migrating individuals. This assumption is supported by the evidence that bat carcasses are rarely found at the base of onshore turbine towers (Choi et al. 2020).

Tree bat species that may encounter operating WTGs in the offshore lease areas include the eastern red bat, the hoary bat, and the silver-haired bat. Offshore O&M would present a seasonal risk factor to migratory tree bats that may use offshore habitats during fall migration. Although some potential exists for migrating tree bats to encounter operating WTGs during fall migration, the overall occurrence of bats on the OCS is relatively very low (Stantec 2016). With the proposed 1-nm (1.9-km) spacing between structures associated with future offshore wind development and the distribution of anticipated projects, individual bats migrating over the OCS within the RSZ of project WTGs would likely pass through projects with only slight course corrections, if any, to avoid operating WTGs. Further, unlike terrestrial migration routes there are no landscape features that would concentrate bats and increase exposure to the WEAs on the OCS (Baerwald and Barclay 2009; Cryan and Barclay 2009; Fiedler 2004; Hamilton 2012; Smith and McWilliams 2016). This combined with the expected infrequent and limited use of the OCS by migrating tree bats suggests very few individuals would encounter operating WTGs or other structures associated with future offshore wind development. Additionally, the potential collision risk to migrating tree bats varies with climatic conditions. For example, bat activity is associated with relatively low wind speeds and warm temperatures (Arnett et al. 2008; Cryan and Brown 2007; Fiedler 2004; Kerns et al. 2005). Given the rarity of tree bats in the offshore environment, the turbines being widely spaced apart, and the patchiness of expected projects on the OCS, the likelihood of collisions is expected to be low. Additionally, the likelihood of a migrating individual encountering one or more operating WTGs during adverse weather conditions is extremely low because bats have been shown to suppress activity during periods of strong winds, low temperatures, and rain (Arnett et al. 2008; Erickson et al. 2002).

For these reasons, the likelihood of exposure of tree bats to construction vessels during construction or maintenance activities, or the RSZ of operating WTGs in the lease areas, is very low, and therefore related impacts are expected to be **negligible** adverse.

#### 3.5.2.2.3 Conclusions

Under the No Action Alternative, the Project would not be built. Impacts from ongoing future non–offshore and offshore wind development activities would still occur. BOEM expects ongoing activities, future non–offshore wind development, and future offshore wind development to have continuing temporary to permanent impacts (e.g., disturbance, displacement, injury, mortality, and habitat conversion) on bats primarily through the onshore construction impacts, the presence of structures, and climate change. BOEM anticipates that the potential impacts of ongoing activities would be **negligible** adverse. In addition to ongoing activities, BOEM anticipates that the impacts of planned actions other than offshore wind development may also contribute to impacts on bats, including increasing onshore construction (see Appendix E1), but that these impacts would be **negligible** adverse. BOEM expects the combination of ongoing and planned actions other than offshore wind development to result in **negligible** adverse impacts on bats. Although the impacts from a substitute project may differ in location and time, depending on where and when offshore wind facilities are developed to meet the remaining demand, the nature of impacts and the total number of WTGs would be similar either with or without the Proposed Action. The No Action Alternative would forgo applicant-committed postconstruction acoustic monitoring for bats and annual mortality reporting. Their results could provide an understanding of the effects of offshore wind development, benefit the future management of these species, and inform planning of other offshore development. However, ongoing and future surveys and monitoring could still supply similar data.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with future offshore wind activities in the GAA would result in **negligible** adverse impacts from ongoing climate change, lighting, interactions with operating WTGs on the OCS, and onshore habitat loss. Given the infrequent and limited anticipated use of the OCS by migrating tree bats during spring and fall migration, as well as cave bats not typically occurring on the OCS, the IPFs associated with future offshore wind activities that occur offshore would not appreciably contribute to overall impacts on bats. Future offshore wind development could result in some potential for temporary disturbance and permanent loss of onshore bat habitat. However, habitat removal is anticipated to be minimal when compared to other past, present, and reasonably foreseeable activities. Any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness or population-level effects within the GAA.

### 3.5.2.3 Alternative B: Impacts of the Proposed Action Alternative on Bats

#### 3.5.2.3.1 Construction and Installation

##### Offshore Activities and Facilities

Light: Bats may demonstrate attraction to or avoidance of construction vessels installing offshore facilities, particularly if insects (i.e., prey) are drawn to the lights of the vessels (BOEM 2014). Exposure to vessels and installation infrastructure would be temporally limited to the construction period. Thus, behavioral changes due to lighting on construction vessels would be temporary, and impacts to bats would be **negligible** adverse, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the airspace of the RWF.

Noise: Pile-driving noise and offshore construction noise associated with the Proposed Action would be temporary to short term and highly localized and is expected to result in **negligible** adverse impacts. Auditory impacts are not expected to occur as recent research shows that bats may be less sensitive to temporary threshold shifts than other terrestrial mammals (Simmons et al. 2016). Impacts, if any, would be limited to behavioral avoidance of pile-driving and/or construction activities, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016).

Presence of structures: Bats are expected to seasonally occur in the Lease Area while migrating, commuting, or foraging. Bats were observed roosting aboard support vessels during the construction of the Block Island Wind Farm (Stantec 2016), suggesting the presence of artificial roosting structures may provide some benefit to bats in the offshore environment. Bats are well known for their ability to detect objects with echolocation (Horn et al. 2008; Johnson et al. 2004) and thus are unlikely to collide with stationary structures (Cryan 2011). Further, exposure to vessels and installation infrastructure would be temporally limited to the construction period. Behavioral vulnerability to collision with construction equipment is expected to be **negligible** adverse.

##### Onshore Activities and Facilities

Cable emplacement/maintenance: The preferred transmission cable route is an approximately 1-mile (1.6-km) route, that would predominantly follow along paved roads or previously disturbed areas such as parking lots that do not provide high-quality habitat for bats. However, some of the alternative routes under consideration within the transmission cable envelope contain segments that would pass through undeveloped, vegetated areas composed of upland forest and shrubland and would be approximately the same length (see Section 3.8). Impacts associated with construction of the onshore transmission cable could occur if construction activities take place during the active season for bats (generally April through October). Such activities may result in injury or mortality of individual bats, particularly juveniles as they are unable to flush from a roost if occupied by bats at the time of removal. However, tree and shrub removal would occur outside the bat roosting period (from May 1 through August 15) when feasible (see COP Table ES-1), thus limiting the potential for direct injury or mortality from the removal of occupied roost trees. There would be some potential for adverse impacts on bats as a result of the loss of potentially suitable roosting and/or foraging habitat, but these impacts would be **negligible** adverse.

BOEM anticipates that **negligible** adverse impacts, if any, would occur with adherence to USFWS northern long-eared bat conservation measures and that **negligible** adverse habitat impacts would not result in individual fitness or population-level effects given the limited amount of habitat removal and the presence of high-quality bat habitat in the vicinity. Based on Project timing, the limited area of effect relative to available habitat, and the proposed impact avoidance and minimization measures, adverse impacts of the Proposed Action on northern long-eared bat would be **negligible** adverse. A detailed impacts analysis to northern long-eared bats from Project construction activities is provided in the USFWS BA (BOEM 2022, 2023).

Light: Some overnight lighting would occur during construction of the onshore facilities. Wildlife typically not exposed to light, such as bats, may behave differently if exposed to light at nighttime. Because most construction activities would occur during the day over the approximately 1-year construction period for the onshore facilities, impacts from lighting on bats would be **negligible** adverse.

Noise: Some potential for temporary to short term and localized habitat impacts arising from onshore construction noise exists; however, no auditory impacts on bats would be expected. As discussed with offshore construction noise, recent literature suggests that bats are less susceptible to temporary or permanent hearing loss from exposure to intense sounds (Simmons et al. 2016). Based on available information discussed in Section 3.5.1.1, noise impacts resulting from construction and installation of the onshore facilities would be temporary **negligible** adverse.

Presence of structures: Visible structures (i.e., construction equipment) would be present during construction of the onshore facilities. Collisions between bats and vehicles or construction equipment could cause injury and/or mortality. However, in general, these objects would not pose a collision risk because of a bat's ability to echolocate and detect stationary structures (Stantec 2018). The operational footprints of the OnSS and ICF would result in habitat loss when forested upland is cleared and replaced with hard structures and crushed gravel yards. The ICF would result in a loss of approximately 1.6 acres (0.6 ha) of mixed oak/white pine forest, which is reflective of the operational footprint of the ICF. The OnSS would create a loss of 3.8 acres (1.5 ha) of mixed oak/white pine forest and 0.6 acre (0.2 ha) of ruderal pitch pine barren. Together, these losses represent a relatively small fraction of the 52 acres (21 ha) of contiguous bat habitat identified in the *Rhode Island Wildlife Action Plan* (RIWAP) (Rhode Island DEM et al. 2015). Impacts on mortality and injury from the onshore construction operations would be avoided by observing time-of-year restrictions on vegetation removal that would avoid the breeding season of bats (see COP Table ES-1). Therefore, these temporary impacts, if any, from construction equipment and ongoing activity would be **negligible** adverse.

#### 3.5.2.3.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

Light: Lighting sources on the WTGs and OSSs may serve as an attractant to bats as they navigate, or bats may be indirectly attracted to insect prey drawn to the lights. However, bats do not appear to be as susceptible to these types of collision risks as some birds (Stantec 2018), and aviation lighting has not been found to influence bat collision risk at onshore facilities in North America (Arnett et al. 2008). Lighting during the O&M phase of the Project would be limited, which should reduce insect and potential bat attraction (Stantec 2018). Revolution Wind would comply with FAA (2018) and BOEM (2021c) requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimize impacts on bat species. Overall, collision-related mortality or injury from lighting at the offshore facilities could result in **negligible** to **minor** adverse impacts to bats at the RWF, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the airspace of the RWF.

Noise: Boat activity and noise already occur within and adjacent to the Lease Area based on existing levels of vessel traffic, as described in Section 3.16. Increases in activity and associated disturbances during RWF maintenance activities would have a short-term **negligible** adverse impact on bats because of the limited additional vessel activity and relatively low likelihood of bat occurrence near the RWF. There would also be no impacts to bats during O&M of the offshore RWEC because these components are underwater, and there would be no routine maintenance at these components.

Presence of structures: During Project O&M, injury or mortality from collision with WTGs represents the greatest potential risk to bats. WTGs and other offshore facilities may also provide roosting opportunities for bats. Collisions between bats and OSSs could cause injury and/or mortality. However, in general, these objects would not pose a collision risk because of a bat's ability to echolocate and detect stationary structures (Stantec 2018). Additionally, individual bats could collide with WTGs, resulting in mortality or injury. It is difficult to confirm bat fatalities at offshore WTGs; however, offshore bat occurrences are relatively infrequent and primarily seasonal (during migration), and activity declines as the distance from shore increases. Existing data from meteorological buoys provide the best opportunity to further define bat use of open-water habitat far from shore where Project WTGs are proposed. Relatively few bat passes were detected at meteorological buoy sites, and use was sporadic when compared to sites on offshore islands (Stantec 2016). In general, the bat species assessed are not expected to regularly forage in the Lease Area, but some may be present during migration, particularly in the fall (BOEM 2012; Stantec 2018).

Specific weather conditions may contribute to bat mortality from turbines. Mortality data from onshore wind farms indicate that bat collision mortality is expected to occur mainly on nights with calm winds during migratory periods as relatively more bats are migrating at greater altitudes in favorable conditions (Arnett et al. 2008). Likewise, coastal and offshore acoustic studies (Stantec 2016) found that greater wind speeds and cool temperatures have an adverse effect on bat activity. However, during fall migration, bats may take advantage of favorable wind directions and may be more likely to fly during colder weather (Stantec 2016). Most offshore bat activity took place at wind speeds less than 5 m/s. Because average wind speeds in the Lease Area are between 5 and 10 m/s, with stronger wind in the winter, bat activity can be expected to be low during WTG operation and limited to warmer periods in the summer or during fall migration. Thus, the risk of injury and/or mortality to bats would be **negligible** to **minor** adverse. The structures associated with the Proposed Action, and the consequential **negligible** to **minor** adverse impacts, would remain at least until decommissioning of the Project is complete. Impacts from O&M of the RWF to the listed northern long-eared bat are not expected because of their low collision risk and the rarity of their occurrence offshore. A detailed impacts analysis to northern long-eared bats from Project operation and decommissioning is provided in the USFWS BA (BOEM 2022, 2023).

### Onshore Activities and Facilities

Cable emplacement/maintenance: Hazard tree removal would be performed on a cyclical basis to inspect and remove trees that may fall that are outside the edge of the maintained ROW. However, mortality and injury risk would be reduced by observing time-of-year restrictions on vegetation removal to avoid bats' breeding season. Therefore, the impacts resulting from vegetation clearing would be **negligible** adverse. Impacts from land disturbance during decommissioning would be similar to those described within the construction impact analysis, although the impacts would likely be less because new vegetation clearing and grading would not be necessary.

Light: During the O&M of the OnSS and ICF, general yard lighting would be used for assessment of equipment. In general, lighting would be off at night unless there is work in progress or lights are left on for safety and security purposes. Insect prey could be drawn in by lighting at the OnSS and ICF and thus attract foraging bats. However, the surrounding area is currently developed, and lighting-related effects would be abated using minimum-intensity and motion-activated lighting and shielding and downward angling light sources where practicable. As during construction of the onshore facilities, lighting at night has the potential to temporarily displace bats and/or disrupt normal behavior. Because the use of lighting at night is expected to be infrequent, the impacts it has on temporary bat displacement and/or behavior disruption would be **negligible** adverse.

Noise: According to VHB's onshore acoustic assessment (VHB 2023a), during O&M, the proposed OnSS and ICF would introduce new sources of sound, which are modeled to be 45.5 A-weighted decibels (dBA) equivalent sound level (Leq) or less when measured at the nearest anthropogenic sensitive receptors and fall within the ambient sound range measured at baseline conditions. Temporary noise and construction-related traffic may occasionally be generated due to nonroutine maintenance. Pickup trucks may be used to make routine visits to the OnSS and ICF during O&M. Occasional O&M emergency visits may necessitate bucket trucks, cranes, and similar vehicles. Infrequent vehicle usage within the OnSS and ICF may create temporary noise-related disturbance to bats adjacent to the OnSS. However, most activities would generally not be conducted during the active bat foraging period between twilight and sunrise, thus noise from maintenance activities is not expected to impact bat foraging behavior. Luo et al. (2014) demonstrated that bat response to traffic noise was low relative to other stimuli (e.g., colony noise, vegetation) and that bats rapidly habituate to prolonged noise disturbance. Based on this available information, noise and traffic resulting from operation of the onshore facilities would be temporary and **negligible** adverse. Impacts to bats from noise during decommissioning would be similar to that described for construction activities.

Presence of structures: The OnSS and ICF would be visible structures that would result in permanent bat habitat conversion and loss. Land disturbance in the form of vegetation management would occur on a periodic basis to maintain vegetation at shrub height within the operational footprint of the onshore facilities. Land disturbance as it relates to vegetation clearing may result in the direct injury or mortality of bats. However, mortality and injury risk would be reduced by observing time-of-year restrictions on vegetation removal to avoid bats' breeding season. Collisions between bats and onshore facilities could cause mortality. However, in general, these objects would likely not pose a collision risk because of a bat's ability to echolocate and detect stationary structures (Stantec 2018). Therefore, the impacts to bats from the presence of onshore facilities would be long term **negligible** adverse**.**

#### 3.5.2.3.3 Cumulative Impacts

### Offshore Activities and Facilities

Lighting: The Proposed Action would add up to 100 new WTGs with red flashing aviation hazard lighting to the offshore environment. Additionally, marine navigation lighting would include multiple flashing white lights on each WTG and the OSSs and would be directed out and down to the water surface. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from construction areas. These lights could serve as an attractant to bats as they navigate, or bats may be indirectly attracted to insect prey drawn to the lights.

However, the lack of bat carcasses reported during large-scale bird-related fatality events at illuminated lighthouses, lightships, and oil or research platforms indicates that bats do not appear to be as susceptible to these types of collision risks as some birds (Stantec 2018). As such, ongoing and future non–offshore wind activities are expected to cause permanent impacts, primarily driven by light from offshore structures and short-term and localized impacts from vessel lights. For these reasons, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** adverse cumulative impacts to bats, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the Lease Area.

<u>Noise:</u> Pile-driving and other construction noise and activity associated with the Proposed Action would add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. However, the Proposed Action's contribution to noise impacts would be limited in duration and cease when construction ends. Therefore, the cumulative impact of the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** adverse impacts to bats.

<u>Presence of structures:</u> The Proposed Action would add up to 100 additional WTGs and up to two OSSs to the No Action Alternative. Therefore, the total cumulative structures would be 3,190. Impacts to migration patterns or collision risk from these additional turbines would persist until decommissioning is complete. However, the Project's contribution to impacts on bats would be limited because migrating bats rarely use the OCS and the Project would account for less than 4% of the total future structures on the OCS. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in long-term **negligible** to **minor** adverse cumulative impacts to bats.

### Onshore Activities and Facilities

<u>Cable emplacement/maintenance:</u> The transmission cable envelope contains approximately 0.56 acre (0.22 ha) of mixed oak/white pine forest, 0.32 acre of softwood forest, 0.02 acre of ruderal grassland/shrubland, 0.008 acre of oak forest, and 0.006 acre of pitch pine barren (see Section 3.8). Onshore construction and installation would add to other limited onshore bat habitat disturbance actions. Land disturbance associated with cable emplacement could result in the loss of potentially suitable roosting and/or foraging habitat for bats. However, the preferred transmission cable route is an approximate 1-mile (1.6-km) route that would predominantly follow along paved roads or previously disturbed areas such as parking lots. Further, Revolution Wind and other future land developers would adhere to USFWS northern long-eared bat conservation measures. As a result, cumulative impacts would not result in population-level effects given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. Therefore, the cumulative impact of the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** adverse impacts to bats.

<u>Light:</u> The Proposed Action would involve the use of some overnight lighting during construction and installation and during O&M and decommissioning of the onshore facilities. O&M lighting of facilities would be switch activated and would only occur when O&M activities are ongoing. Lighting from construction and operations could add to baseline light sources and activities associated with other onshore projects. Because the use of lighting at night is expected to be infrequent, the impacts it has on temporary bat displacement and/or behavior would be short term **negligible** adverse. When considered in

the context of the other nearby commercial and industrial lighting within the GAA, BOEM expects **negligible** adverse cumulative impacts to bats.

Noise: Construction noise and activities associated with construction and operation of the onshore facilities could add to baseline noise and activity associated with other onshore projects with overlapping construction periods. However, the Proposed Action's incremental contribution would be **negligible** adverse as it would be limited in duration and cease when construction ends. No individual fitness or population-level effects would be expected. Normal operation of the OnSS would generate continuous noise, but BOEM expects long-term **negligible** adverse associated impacts when considered in the context of the other commercial and industrial noises nearby.

Presence of structures: Onshore construction and installation would add to other limited onshore bat habitat disturbance actions through the removal of approximately 1.6 acres (0.6 ha) of mixed oak/white pine forest at the ICF. The OnSS would create a loss of 3.8 acres (1.5 ha) of mixed oak/white pine forest. This land disturbance could result in the loss of potentially suitable roosting and/or foraging habitat for bats. However, Revolution Wind and other future land developers would adhere to USFWS northern long-eared bat conservation measures, which would also minimize impacts to other roosting/foraging bat species. As a result, the contribution of the Proposed Action to cumulative impacts would not result in population-level effects given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. The combined impacts on bats from habitat loss would likely be long term **negligible** adverse given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. Collisions between bats and structures have some limited potential to cause mortality. However, in general, these objects would not pose a collision risk because of a bat's ability to echolocate and detect stationary structures and therefore would not contribute to cumulative impacts to bats.

#### 3.5.2.3.4 Conclusions

In summary, construction and installation, O&M, and decommissioning of the Proposed Action would have **negligible** to **minor** adverse impacts on bats, especially if conducted outside the active season. The main significant risk would be from operation of the offshore WTGs, which could lead to long-term **negligible to minor** adverse impacts in the form of collision-related mortality, although BOEM anticipates this to be rare. In the context of reasonably foreseeable environmental trends in the area, impacts of individual IPFs resulting from ongoing and planned actions, including the Proposed Action, would be **negligible** to **minor** adverse. Considering all the IPFs together, BOEM anticipates that the impacts from ongoing and planned actions, including the Proposed Action, would result in **negligible** to **minor** adverse impacts on bats in the GAA because of ongoing climate change, interactions with operating WTGs on the OCS, and onshore habitat loss. Future offshore wind activities are not expected to materially contribute to the IPFs discussed above. Given the infrequent and limited anticipated use of the OCS by migrating tree bats during spring and fall migration and that cave bats do not typically occur on the OCS, the IPFs associated with future offshore wind activities that occur offshore would not be expected to appreciably contribute to overall impacts on bats. Some potential for temporary disturbance and permanent loss of onshore habitat may occur as a result of future offshore wind development. However, habitat removal is anticipated to be minimal, and any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness or population-level effects within the GAA. The Proposed Action would contribute to the overall impact rating primarily through the permanent impacts due to onshore habitat loss. Thus, the overall impacts on bats would be **minor** adverse because limited impacts are expected due to the minimal presence of bats within the Lease Area and bat populations would recover completely.

### 3.5.2.4 Alternatives C, D, E, and F

Table 3.5-1 provides a summary of IPF findings for these alternatives.

#### 3.5.2.4.1 Conclusions

Alternatives C through F would reduce the number of WTGs, which subsequentially would reduce the potential collision risk for bats. Still, BOEM expects the overall impacts of these alternatives to bats would be similar to the Proposed Action: **negligible** to **minor** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's contribution to the cumulative impacts would be similar to the Proposed Action (ranging from **negligible** to **minor** adverse, depending on the IPF). The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **minor** adverse.

### 3.5.2.5 Alternative G: Impacts of the Preferred Alternative on Bats

Table 3.5-1 provides a summary of IPF findings for this alternative.

#### 3.5.2.5.1 Conclusions

Although Alternative G would reduce the number of WTGs, the presence of WTGs could still increase the potential for collision, albeit at lower levels than the Proposed Action. Still, BOEM expects the overall impacts of these alternatives to bats would be similar to the Proposed Action: **negligible** to **minor** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternative G's contribution to cumulative impacts would be similar to the Proposed Action (ranging from **negligible** to **minor** adverse, depending on the IPF). The overall impacts of Alternative G when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **minor** adverse.

### 3.5.2.6 Mitigation

Mitigation measures resulting from agency consultations for bats are identified in Appendix F, Table F-2, and addressed in Table 3.5-2. Draft conservation recommendations proposed to BOEM by the USFWS on May 22, 2023, are identified in Appendix F, Table F-3, and addressed in Table 3.5-3.

**Table 3.5-2. Mitigation and Monitoring Measures Resulting from Consultations for Bats (Appendix F, Table F-2)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Annual bird and bat mortality reporting | Revolution Wind must submit an annual report covering each calendar year, due by January 31 of the following year, documenting any dead (or injured) birds or bats found on vessels and structures during construction, operations, and decommissioning. The report must be submitted to BOEM (at renewable_reporting@boem.gov), BSEE (at OSWSubmittals@bsee.gov), and the USFWS. The report must contain the following information: name of species, date found, location, a picture to confirm species identity (if possible), and any other relevant information. Carcasses with federal or research bands must be reported to the USGS Bird Banding Laboratory at https://www.usgs.gov/labs/bird-banding-laboratory. | This measure would not reduce impacts; however, the data gathered from the mortality reporting would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)). |
| Annual bird and bat mortality reporting | Any occurrence of dead ESA birds or bats must be reported to BOEM, BSEE, and USFWS as soon as practicable (taking into account crew and vessel safety), but no later than 24 hours after the sighting, and if practicable, carefully collect the dead specimen and preserve the material in the best possible state. | This measure would not reduce impacts; however, the data gathered from the monitoring would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)). |
| Annual bird and bat mortality reporting | Any occurrence of dead ESA birds or bats must be reported to BOEM, BSEE, and USFWS as soon as practicable (taking into account crew and vessel safety), but no later than 24 hours after the sighting, and if practicable, carefully collect the dead specimen and preserve the material in the best possible state. | This measure would not reduce impacts; however, the data gathered from the monitoring would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)). |
| Avian and bat monitoring program | At least 45 calendar days before beginning surveys, Revolution Wind must complete, obtain concurrence from the U.S. Department of the Interior (DOI), and adopt an avian and bat monitoring plan (ABMP), as described in Revolution Wind's *Avian and Bat Post-Construction Monitoring Framework* (BRI 2022) in COP Appendix AA (BRI 2023), including coordination with interested stakeholders. The DOI will review the ABMP and provide any comments on the plan within 30 calendar days of its submittal. Revolution Wind must resolve all comments on the ABMP to the DOI's satisfaction before implementing the plan. Revolution Wind may conclude that the DOI has concurred in the ABMP | |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | if the DOI provides no comments on the plan within 30 calendar days of its submittal date.<br>a. Monitoring. Revolution Wind must 1) install acoustic monitoring devices for bats for 2 years; 2) install Motus receivers within the wind farm; 3) refurbish up to two onshore Motus receiver stations; 4) provide funding for up to 150 Motus tags per year for up to 3 consecutive years; and 5) conduct a 1- to 2-year cross project radar study to measure migrant flux rates, flight heights, and marine bird avoidance.<br>b. Annual Monitoring Reports. Revolution Wind must submit to BOEM (at renewable_reporting@boem.gov), the USFWS, and BSEE (at OSWSubmittals@bsee.gov) a comprehensive report after each full year of monitoring (preconstruction and postconstruction) within 6 months of completion of the last avian survey. The report must include all data, analyses, and summaries regarding ESA-listed and non-ESA-listed birds and bats. The DOI will use the annual monitoring reports to assess the need for reasonable revisions (based on subject matter expert analysis) to the ABMP. The DOI reserves the right to require reasonable revisions to the ABMP and may require new technologies as they become available for use in offshore environments.<br>c. Postconstruction Quarterly Progress Reports. Revolution Wind must submit quarterly progress reports during the implementation of the ABMP to BOEM (at renewable_reporting@boem.gov) and the USFWS by the fifteenth day of the month following the end of each quarter during the first full year that the Project is operational. The progress reports must include a summary of all work performed, an explanation of overall progress, and any technical problems encountered.<br>d. Monitoring Plan Revisions. Within 15 calendar days of submitting the annual monitoring report, Revolution Wind must meet with BOEM and the USFWS to discuss the following: the monitoring results; the potential need for revisions to the ABMP, including technical refinements or additional monitoring; and the potential need for any additional efforts to reduce impacts. If the DOI determines after this | |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | discussion that revisions to the ABMP are necessary, the DOI may require that Revolution Wind modify the ABMP. If the reported monitoring results deviate substantially from the impact analysis included in the Final EIS, Revolution Wind must transmit to the DOI recommendations for new mitigation measures and/or monitoring methods.<br>e. Operational Reporting (Operations). Revolution Wind must submit to BOEM (at renewable_reporting@boem.gov) and BSEE (at OSWSubmittals@bsee.gov) an annual report summarizing the following monthly operational data calculated from 10-minute supervisory control and data acquisition (SCADA) for all turbines together in tabular format: the proportion of time the turbines were operational (spinning at > x rpm) each month, the average rotor speed (monthly rpms) of spinning turbines plus 1 standard deviation, and the average pitch angle of blades (degrees relative to rotor plane) plus 1 standard deviation. The DOI will use this information as inputs for avian collision risk models to assess whether the results deviate substantially from the impact analysis included in the Final EIS.<br>f. Raw Data. Revolution Wind must store the raw data from all avian and bat surveys and monitoring activities according to accepted archiving practices. Such data must remain accessible to the DOI and the USFWS, upon request for the duration of the lease. Revolution Wind must work with BOEM to ensure the data are publicly available. The USFWS may specify third-party data repositories that must be used, such as the Motus Wildlife Tracking System or MoveBank, and such parties and associated data standards may change over the duration of the monitoring plan. | |
| Adaptive mitigation for birds and bats | If the reported postconstruction bird and bat monitoring results (generated as part of Revolution Wind's *Avian and Bat Post-Construction Monitoring Framework* [BRI 2022]) indicate bird and bat impacts deviate substantially from the impact analysis included in this EIS, then Revolution Wind must make recommendations for new mitigation measures or monitoring methods. | This mitigation measure, if adopted, ensures that Project activities would not impact bats beyond the negligible to minor range of impacts discussed in this EIS. |

**Table 3.5-3. Additional Mitigation and Monitoring Measures under Consideration for Bats (Appendix F, Table F-3)**

| Mitigation Measure* | Description* | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| USFWS Biological Opinion Conservation Recommendation 2: Establish an Offshore Wind Adaptive Monitoring and Impact Minimization Framework to guide and coordinate monitoring, research and avian impacts assessment coastwide. | To address Service concerns related to potential effects of WTG operation on listed and other species of concern, at both the project and coastwide scales, the USFWS recommends that the BOEM develop and adopt an Offshore Wind Adaptive Monitoring and Impact Minimization Framework (Framework) for flying wildlife. Many details will need to be worked out, but here the USFWS provides some basic principles for establishment, adoption, and operation of the Framework.<br>• Establish a Framework Principals Group to consist of representatives from the BOEM, the BSEE, the USFWS, State natural resource agencies responsible for management of birds, bats, and insect, and offshore wind energy developers/operators.<br>• Develop and adopt a written Framework foundational document specifying:<br>○ the governance structure of the Principals Group;<br>○ the geographic coverage of the Framework;<br>○ the species covered by the Framework; and<br>○ the duration of the Framework.<br>• Establish an annual operating budget for the Framework to be funded by offshore wind energy developers/operators.<br>• Arrange for the Principals Group to meet at least annually, and for the Framework foundational document to be updated at least every 5 years.<br>• Provide for experts (both internal and external to the Principals Group) to regularly assess new and improved technologies and methods for estimating collision risk of covered species and measuring or detecting collisions. Adopt and deploy such methods deemed most promising by the Principals Group. | Pursuant to 50 CFR 402.14(j), conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. |

| Mitigation Measure* | Description* | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | • Coordinate monitoring and research across wind energy projects. Share and pool data and research results coastwide.<br>• Provide for experts (both internal and external to the Principals Group) to regularly assess new and improved technologies and methods for minimizing collision risk of covered species. Adopt and deploy such technologies/methods deemed most promising by the Principals Group.<br>• Provide for experts (both internal and external to the Principals Group) to periodically assess new and improved technologies and methods for evaluating indirect effects to covered species from WTG avoidance behaviors (e.g., impacts to time and energy budgets).<br>• Periodically assess the level and type of compensatory mitigation necessary to offset any unavoidable direct and indirect effects of WTG operation on covered species. Adopt and require the levels and types of mitigation deemed appropriate by the Principals Group.<br>• Consider partnering with other stakeholders or cross-sector organizations to provide administrative, institutional, and technical support to the Principals Group. | |

* Information in these rows was taken directly from the final biological opinion (USFWS 2023) and has not been edited.

#### 3.5.2.6.1 Measures Incorporated into the Preferred Alternative

Mitigation measures resulting from consultations, authorizations, and permits listed in Table 3.5-2 and in Appendix F, Table F-2, are incorporated into Alternative G (Preferred Alternative). The additional measures would further define how the effectiveness and enforcement of EPMs would be ensured and improve accountability for compliance with EPMs by implementing an avian and bat monitoring program. Because these measures ensure the effectiveness of and compliance with EPMs that are already analyzed as part of the Proposed Action, implementation of these measures would not further reduce the impact level of the Proposed Action but would ensure that Project activities would not impact birds beyond the negligible to minor range of impacts discussed in this EIS and the data gathered from avian mortality reporting would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)).

## 3.6 Benthic Habitat and Invertebrates (see section in main EIS)

# 3.7 Birds

## 3.7.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Birds

Geographic Analysis Area: The GAA for birds is the United States coastline from Maine to Florida (Figure 3.7-1). The offshore limit of the GAA is 100 miles (160.9 km) from the Atlantic Coast to capture the migratory movements of most species in this group. The onshore limit of the GAA is 0.5 mile (0.8 km) inland from the Atlantic Coast to cover onshore habitats used by the species that may be affected by offshore components of the Project as well as those species that could be affected by onshore Project components. The GAA was established to capture resident species and migratory species that winter as far south as South America and the Caribbean and those that breed in the Arctic or along the Atlantic Coast that travel through the area.

Affected Environment: Table A.8.3-1 in Appendix A of the Vineyard Wind 1 final EIS (BOEM 2021a), the SFWF final EIS (BOEM 2021b), and COP Appendix AA (BRI 2023), all incorporated here by reference, describe baseline conditions and the impacts, based on IPFs assessed, of ongoing and future activities other than offshore wind. These are further discussed below in the context of this Project. This section addresses potential impacts on bird populations that use inland, coastal, and offshore habitats, including both resident birds that use the Lease Area during all of (or portions of) the year and migrating birds with the potential to pass through the Lease Area during fall and/or spring migrations. Detailed information regarding species potentially present can be found in COP Appendix AA (BRI 2023) and COP Appendix K (VHB 2023). Given the differences in life history characteristics and habitat use between offshore, inland, and coastal bird species, the sections below provide a separate discussion of each group. This section also discusses migratory birds as well as bald and golden eagles. In addition, this section addresses federally listed threatened and endangered species, but further information is provided in the Project BA prepared for the USFWS (BOEM 2022, 2023a). Unless stated otherwise, special-status bird species are expected to be impacted similarly as described in general for other birds.

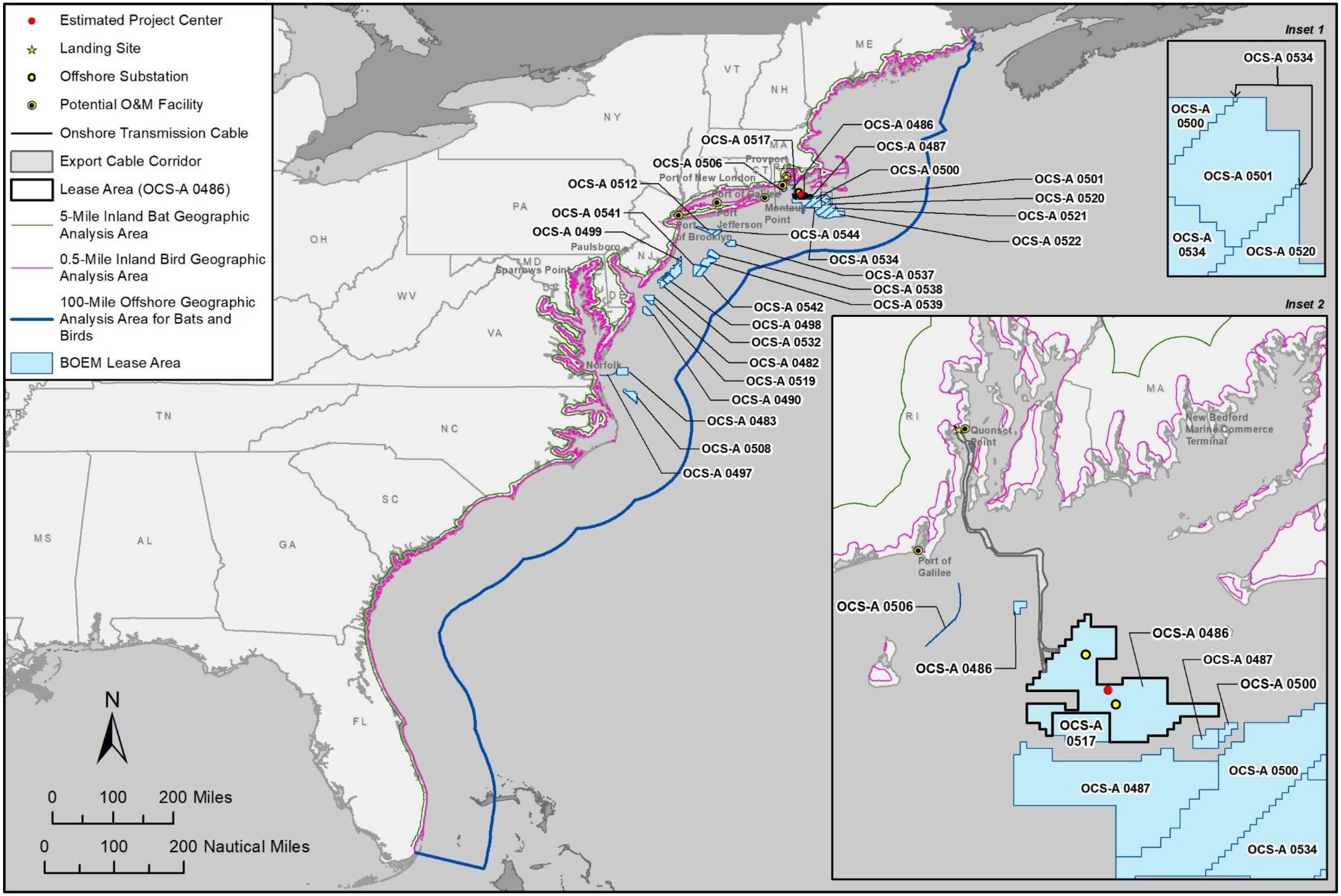


Figure 3.7-1. Geographic analysis area for birds.

### Migrating Birds

The Atlantic Flyway, which follows the U.S. Atlantic coast, is an important migration route for many bird species moving from breeding grounds in New England and eastern Canada to winter habitats in North, Central, and South America. Bays, beaches, coastal forests, marshes, and wetlands provide important stopover and foraging habitat for migrating birds (MMS 2007). Both the onshore and offshore facilities associated with the Proposed Action are located within the Atlantic Flyway. Bird species using this flyway during spring and fall migrations have the potential to encounter proposed Project facilities. Despite the level of human development and activity present, the Mid-Atlantic Coast plays an important role in the ecology of many bird species. Chapter 4.2.9.3 of the Atlantic OCS EIS/EA (BOEM 2014a), incorporated here by reference, discusses the use of Atlantic Coast habitats by migrating birds.

All native birds (except certain game birds protected under state laws) are protected under the Migratory Bird Treaty Act of 1918 (MBTA). The official list of migratory birds protected under the MBTA, and the international treaties that the MBTA implements, is found at 50 CFR 10.13. The MBTA makes it illegal to "take" migratory birds, their eggs, feathers, or nests.[1] Under Section 3 of Executive Order 13186, BOEM and the USFWS established an MOU on June 4, 2009, which identifies specific areas in which cooperation between the agencies would substantially contribute to the conservation and management of migratory birds and their habitats (MMS and USFWS 2009). The purpose of the MOU is to strengthen migratory bird conservation through enhanced collaboration between the agencies. One of the underlying tenets identified in the MOU is to evaluate potential impacts to migratory birds and design or implement measures to avoid, minimize, and mitigate such impacts as appropriate (MMS and USFWS 2009: Sections C, D, E(1), F(1–3, 5), G(6)).

Within the Atlantic Flyway, much of the bird migration activity is concentrated along the coastline (Watts 2010). Waterbirds use a corridor between the coast and several miles out onto the Atlantic OCS, whereas land birds tend to use a wider corridor extending from the coastline to tens of miles inland (Watts 2010). Although both groups may occur over land or water within the Atlantic Flyway and may extend considerable distances from shore, the highest diversity and density are centered on the shoreline. Migrating terrestrial species using the Atlantic Flyway may follow the coastline during migration or use more direct flight routes over expanses of open water. Many marine birds also make annual migrations up and down the eastern seaboard (e.g., gannet, loon, and sea ducks), taking them directly through the northeastern region in spring and fall. This results in a complex ecosystem where the community composition shifts regularly and where temporal and geographic patterns are highly variable. The region supports large populations of birds in summer, some of which breed in the area (e.g., coastal gulls and terns). Other summer residents (e.g., shearwaters and storm-petrels) visit from the Southern Hemisphere (where they breed during the austral summer). In the fall, many of the summer residents leave the area and migrate south to warmer regions and are replaced by species that breed farther north and winter in the northeastern region of the United States.

BOEM funds scientific studies and partners with the USFWS to better understand how migratory birds use the Atlantic OCS and to refine the understanding of the risks from development to migratory species (BOEM 2020). BOEM uses information from these studies, the USFWS, and the scientific literature to

[1] As described under 50 CFR 10.12, "Take means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect."

avoid leasing areas with high concentrations of migratory birds that are most vulnerable to offshore wind development. In addition, BOEM's stakeholder engagement during the delineation of the adjacent MA WEA resulted in the exclusion of 14 Atlantic OCS blocks that overlapped with high value sea duck habitat (BOEM 2013). BOEM worked with the USFWS to develop standard operating conditions for commercial leases and terms and conditions of plan approval that are intended to ensure that the potential for adverse impacts on birds is minimized. The standard operating conditions have been analyzed in recent EAs, consultations for lease issuance and site assessment activities, and BOEM's recent approval of the Virginia Offshore Wind Technology Advancement Project (BOEM 2015). Some of the standard operating conditions originated from BMPs in the ROD for the 2007 *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement* (MMS 2007:Section 2.7). BOEM and the USFWS will continue to work with lessees to develop postconstruction plans (e.g., those developed for the Vineyard Wind 1 final EIS (BOEM 2021a) and the SFWF final EIS (BOEM 2021b) aimed at monitoring the effectiveness of mitigative measures considered necessary to minimize impacts to migratory birds with the flexibility to consider the need for modifications or additions to the measures.

**Regional Offshore and Inland Birds**

The Lease Area is located within the Mid-Atlantic Bight, an oceanic region spanning Cape Cod, Massachusetts, to Cape Hatteras, North Carolina. A broad group of bird species may pass through the Lease Area and surrounding area, including migrants (e.g., raptors and songbirds), coastal birds (e.g., shorebirds, waterfowl, and waders), and marine birds (e.g., seabirds and sea ducks). See Table 3-1 in COP Appendix AA for a list of species that may pass through the Lease Area (BRI 2023). A high diversity of marine birds uses the Lease Area because it is located at the northern end of the Mid-Atlantic Bight, which overlaps northern and southern species assemblages (BRI 2023). Avian surveys were conducted within the Rhode Island Ocean Special Area Management Plan (OSAMP) study area, which included approximately 1,467 square miles (3,800 square kilometers [$km^2$]) with areas of the Block Island Sound, Rhode Island Sound, and the Atlantic continental shelf (Winiarski et al. 2012). Several methods were used to quantify the distributions and abundances of birds in the OSAMP study area, including land-based surveys, boat-based surveys, and aerial surveys. Survey data show that the use of these waters by coastal and marine birds is heaviest during winter months, peaking in early March to mid-April as birds prepare for and begin their spring migration. In general, coastal waters of less than 65.5 feet (20 m) in depth are important foraging habitat for diving ducks in winter, and nearshore shallow waters are important foraging habitat for locally breeding terns during summer months. Passerines use the air space during migration periods, and Block Island is an important stopover and resting spot for many species. Figures 3-7, 3-10, 3-12, and 3-13 in the Project's COP Appendix AA (BRI 2023) depict shorebirds; herons and egrets; songbirds; and coastal ducks, geese, swans, and grebes observed by season during OSAMP surveys, respectively.

The Marine-life Data and Analysis Team (MDAT) bird models (Curtice et al. 2019; Winship et al. 2018) describe regional-scale patterns of abundance with a range of environmental variables to produce long-term average annual and seasonal models. The MDAT Version 2 relative abundance and distribution models were produced for 47 bird species using U.S. Atlantic waters from Florida to Maine and thus provide an excellent regional context for local relative densities estimated from OSAMP surveys (see Part IV of COP Appendix AA) (BRI 2023). Overall, the MDAT models indicate avian abundance is greater closer to shore than in the Lease Area (see Figure 3-6 in COP Appendix AA) (BRI 2023).

A variety of passerines and other birds migrate along the Atlantic Coast and could fly over the onshore facilities' locations. Although most of the U.S. coastline is disturbed from previous anthropogenic uses, there are several different key habitats present that are suitable to a range of wildlife species. Bird species observed during field investigations and a list of birds that could occur based on habitat preferences within the GAA are listed in Tables C-1 through C-3 in Appendix C in COP Appendix K (VHB 2023).

Overall, birds in the northeastern United States are subject to pressure from ongoing activities, particularly accidental releases of fuel/fluids/hazardous materials (hazmat), sediment, and/or trash and debris; new cable emplacement; interactions with fisheries and fishing gear; and climate change. More than one-third of bird species that occur in North America (37%, 432 species) are at risk of extinction unless significant conservation actions are taken (North American Bird Conservation Initiative [NABCI] 2016). This is likely representative of the conditions of birds within the GAA. The northeastern United States is also home to more than one-third of the human population of the nation. As a result, species that live or migrate through the Atlantic Flyway have historically been, and will continue to be, subject to a variety of ongoing anthropogenic stressors, including hunting pressure (approximately 86,000 sea ducks harvested annually [Roberts 2019]), commercial fisheries bycatch (approximately 2,600 seabirds killed annually on the Atlantic [Hatch 2017; Sigourney et al. 2019]), and climate change, all of which have the potential to adversely impact bird species. According to the NABCI, more than half of the offshore bird species (57%, 31 species) have been placed on the NABCI watch list because of their small ranges, small and declining populations, and threats to required habitats (NABCI 2016). Globally, monitored offshore bird populations have declined by nearly 70% from 1950 to 2010, which may be representative of the overall population trend of seabirds (Paleczny et al. 2015) that may forage, breed, and migrate over the Atlantic OCS. Overall, offshore bird populations are decreasing, although considerable differences in population trajectories of offshore bird families have been documented (NABCI 2016).

Coastal birds, especially those that nest in coastal marshes and other low-elevation habitats, are vulnerable to the rising sea level and the increasing frequency of strong storms due to global warming. According to the NABCI, nearly 40% of the more than 100 bird species that rely on coastal habitats for breeding or migration are on the NABCI watch list. Many of these coastal species have small population sizes and/or restricted distributions, resulting in an increased vulnerability to habitat loss/degradation and other stressors (NABCI 2016). These ongoing impacts on birds would continue regardless of the offshore wind industry. Some of the main drivers of bird population declines include habitat loss, habitat fragmentation, collisions with glass windows and power lines, invasive species, predators, toxic chemicals, and climate change (Mass Audubon 2011, 2013, 2017).

Avian exposure assessments for the Project were conducted for species-season combinations using MDAT and/or OSAMP data (BRI 2023). To assess bird exposure at the local (i.e., MI/RI WEA) and regional scales (i.e., U.S. Atlantic waters), the Lease Area was compared to other similarly sized areas in each dataset for each season and species. Estimated exposure for each season and species was given a final score (see Table 3-4 in BRI [2023]), which was categorized as minimal (a combined score of 0), low (combined score of 1–2), medium (combined score of 3–4), or high (combined score of 5–6). The exposure scores for each species and season, as well as the aggregated scores (e.g., the annual scores for each species and taxonomic group), should be interpreted as a measure of the relative importance of the Lease Area for a species/group, as compared to other surveyed areas in the region and in the northwest Atlantic. Qualitative exposure determinations were developed using the quantitative assessment of exposure (described above), other locally available data, existing literature, and species accounts. Maps showing the results of the exposure assessment can be found in Part VI of COP Appendix AA (BRI 2023).

The Lease Area is generally far enough offshore as to be beyond the range of most breeding terrestrial or coastal bird species. Coastal birds that may forage in the Lease Area occasionally, visit the area sporadically, or pass through on their spring and/or fall migrations include shorebirds (e.g., sandpipers, plovers), waterbirds (e.g., cormorants, grebes), waterfowl (e.g., scoters, mergansers), wading birds (e.g., herons, egrets), raptors (e.g., falcons, eagles), and songbirds (e.g., warblers, sparrows). Overall, except for migratory falcons and songbirds, coastal birds are considered to have minimal exposure to the Lease Area. Falcons, primarily peregrine falcons (*Falco peregrinus*), may be exposed to the Lease Area. Of the marine birds, loons, sea ducks, gulls, terns, and auks received up to a medium overall exposure assessment. Some migratory songbirds, particularly blackpoll warblers (*Setophaga striata*), may also be exposed to the Lease Area during fall migration (BRI 2023).

**Special-Status Species**

Three bird species listed under the ESA are present in the region: piping plover (*Charadrius melodus*) (threatened), rufa red knot (*Calidris canutus rufa*) (threatened), and roseate tern (*Sterna dougallii*) (endangered). The Atlantic population of piping plover nests on beaches in the northeastern U.S. coastal region and will also migrate (spring and fall) through the Lease Area to and from breeding sites. Rufa red knots winter in southern states or in Central or South America and may pass through the Lease Area during migration (spring and fall) in transit to and from Arctic breeding sites. Roseate terns also migrate through the Lease Area in the spring and fall on their way to and from breeding sites in New York, the New England states, and Atlantic Canada.

BOEM prepared a BA to address Project effects to federally listed species under the jurisdiction of the USFWS, pursuant to Section 7 of the ESA (BOEM 2022, 2023a).

BOEM submitted the BA to the USFWS on November 17, 2022, requesting initiation of consultation under Section 7 of the ESA, and the USFWS responded on November 25, 2022, with a letter of consultation initiation. BOEM requested concurrence on its conclusion in the BA that the impacts of the proposed activities are expected to be discountable and insignificant, and thus *may affect but are not likely to adversely affect* piping plover, roseate tern, and rufa red knot. There are no critical habitats designated for these species in the action area (which includes the Lease Area) defined in the BA (BOEM 2022). An addendum to the BA was submitted to the USFWS on January 12, 2023, providing updates to the Stochastic Collision Risk Assessment for Movement (SCRAM) model for the rufa red knot (BOEM 2023a). The updated model output did not change the effect determinations in the November BA (BOEM 2022, 2023a). Another addendum to the BA was submitted to the USFWS on April 13, 2023. In this BA addendum, based on the updated SCRAM model, BOEM’s determinations for roseate tern and piping plover remained the same where the Proposed Action would not likely adversely affect roseate tern and piping plover for both SCRAM modeling scenarios (BOEM 2023b). However, BOEM revised its previous determination for the red knot and determined that the Proposed Action is likely to adversely affect red knot (BOEM 2023a). The USFWS, in its biological opinion (BO) dated May 30, 2023, concurred with BOEM’s determinations for roseate tern and rufa red knot but determined that the Proposed Action is likely to adversely affect piping plover as well (USFWS 2023).

To assess if any special-status species have the potential to occur in the onshore portion of the Lease Area, information from the Rhode Island Department of Environmental Management (DEM) Environmental Resource Map (ERM) was evaluated and an official species list from the USFWS IPaC tool was generated on September 28, 2019, regarding the landfall envelope, the onshore transmission cable routes, the OnSS, and the interconnection cable route (VHB 2023). VHB used the Information for Planning and Consultation (IPaC) tool to generate lists of bird species protected under the MBTA that have been designated as Birds of Conservation Concern (BCC) by the USFWS within the proposed limits of the onshore facilities during development of the *Onshore Natural Resources and Biological Assessment* (VHB 2023). BCC are species that without additional conservation actions are likely to become candidates for listing under the ESA (USFWS 2021). Table 4.3.6-3 in the COP provides the list of BCC with the potential to occur within the limits of the onshore facilities and indicates which of these species were observed during field investigations. According to the Rhode Island DEM ERM, there are no records of state-listed species within the GAA (VHB 2023). Migratory bird species with potential to occur near proposed onshore facilities are also presented in Table 4 of COP Appendix K (VHB 2023).

**Bald and Golden Eagles**

Eagles have additional federal protection (besides under the MBTA) under the Bald and Golden Eagle Protection Act. The general morphology of both bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) dissuades long-distance movements in offshore settings (Kerlinger 1985). These two species generally rely upon thermal formation, which develops poorly over the open ocean, during long-distance movements. The bald eagle is present year-round in Massachusetts and Rhode Island, and its numbers have been slowly increasing over approximately the last 30 years. They are rarely observed in offshore surveys (Williams et al. 2015; all observations < 3.7 miles [6 km] from shore), which supports the notion that bald eagles do not venture far from land. Although bald eagles could be present near the proposed onshore facilities and would most likely be present in late April, no bald eagles were observed during field investigations (VHB 2023). Bald and golden eagles are not expected to occur within the Lease Area, but some potential exists for effects (e.g., displacement due to noise, habitat loss/modification, and injury/mortality due to contact with construction equipment) resulting from the construction and installation, O&M, and decommissioning of the onshore facilities.

## 3.7.2 Environmental Consequences

### 3.7.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). The Project design parameters that would influence the magnitude of the impacts on birds include the number, size, and location of WTGs; the location of the OnSS and ICF; the type of lighting to be used; the location of construction within the landfall work area and within the transmission cable envelope; and the time of year during which construction occurs. Impacts associated with construction of onshore elements of the Proposed Action during the breeding season for birds could be avoided if onshore construction occurs outside of this time frame.

The following EPMs would be implemented to minimize potential impacts to birds (see Appendix F, Table F-1):

- Revolution Wind evaluated siting alternatives for the OnSS using the criteria that included avoidance or minimization of disturbance to ecologically sensitive areas.
- Onshore facilities would be sited within previously disturbed and developed areas to the extent practicable, as follows:
    - The OnSS and ICF would be located on parcels that are already highly altered and include buried demolition waste.
    - The transmission cable would be located primarily in unvegetated and previously disturbed or developed ROWs.
- The onshore transmission cables would be buried and would therefore avoid the risk to avian and bat species associated with overhead lines.
- To the extent feasible, tree and shrub removal for onshore facilities would occur outside the avian nesting and bat roosting period (May 1 through August 15). If tree and shrub removal cannot be avoided during this season, Revolution Wind would coordinate with appropriate agencies to determine appropriate course of action.
- Construction and operational lighting would be limited to the minimum necessary to ensure safety and compliance with applicable regulations.
- Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mile (1-nm) × 1.15-mile (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This wide spacing of WTGs would allow avian and bat species to avoid individual WTGs and minimize risk of potential collision.
- Revolution Wind would comply with FAA and USCG requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimizes impacts on avian species.
- Accidental spill or release of oils or other hazardous materials offshore would be managed through the OSRP.
- All vessels would comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels would also comply with BOEM lease stipulations that require adherence to NTL 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process.
- An SESC plan, including erosion and sedimentation control measures, would be implemented to minimize potential water quality impacts during construction and operation of the onshore facilities.
- Revolution Wind has developed a draft avian and bat postconstruction monitoring plan (see Appendix G and COP Appendix AA [BRI 2023]) for the Project that summarizes the approach to monitoring; describes overarching monitoring goals and objectives; identifies the key avian species, priority questions, and data gaps unique to the region and Lease Area that will be addressed through monitoring; and describes methods and time frames for data collection, analysis, and reporting. Postconstruction monitoring will assess impacts of the Project with the

purpose of filling select information gaps and supporting validation of the Project's avian risk assessment. Focus may be placed on improving knowledge of ESA-listed species occurrence and movements offshore, avian collision risk, species/species-group displacement, or similar topics. Where possible, monitoring conducted by Revolution Wind would build on and align with postconstruction monitoring conducted by the other Orsted/Eversource offshore wind projects in the Northeast. Revolution Wind would engage with federal and state agencies and environmental groups (eNGOs) to identify appropriate monitoring options and technologies and to facilitate acceptance of the final plan.

- Revolution Wind would document any dead (or injured) birds/bats found incidentally on vessels and structures during construction, O&M, and decommissioning and provide an annual report to BOEM and USFWS.
- Revolution Wind would continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies.
- Revolution Wind would use an ADLS (or a similar system), pursuant to approval by the FAA and commercial and technical feasibility at the time of facility design report (FDR)/Fabrication and installation report (FIR) approval.

These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for birds across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E1-3 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.7-1 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations.

The overall impact to birds from any action alternative would be **minor** adverse, as the effects would be small, and the resource would recover completely, with no mitigating action required.

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**Table 3.7-1. Alternative Comparison Summary for Birds**

<table>
<tr><th>Impact-Producing Factor</th><th>No Action Alternative</th><th>Alternative B (Proposed Action)<br>up to 100 WTG</th><th>Alternative C<br>(Habitat Alternative)<br>64–65 WTGs</th><th>Alternative D<br>(Transit Alternative)<br>78–93 WTGs</th><th>Alternative E<br>(Viewshed Alternative)<br>64–81 WTGs</th><th>Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs</th><th>Alternative G<br>(Preferred Alternative)<br>65 WTGs</th></tr>
<tr><td>Accidental releases and discharges</td><td>Future offshore wind and non-wind activities could expose coastal offshore waters to contaminants (e.g., fuel, sewage, solid waste, or chemicals, solvents, oils, or grease from equipment) in the event of a spill or release during routine vessel use. Vessel compliance with USCG regulations would minimize trash or other debris; therefore, BOEM expects accidental trash releases from offshore wind vessels to be rare. All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and BSEE. OSRPs are required for each project and would provide for rapid spill response, cleanup, and other measures that would help to minimize potential impacts on affected resources from spills. Based on the low risk of spills from vessels due to implementation of safe handling, storage, and cleanup procedures, impacts from accidental spills and trash would represent a negligible adverse impact to birds.</td><td>Offshore: Potential adverse impacts to birds from contaminant discharges or releases or from improper disposal of trash or debris during construction would be avoided or minimized with adherence to federal, state, and local regulations regarding disposal of solid and liquid wastes, resulting in short-term negligible to minor adverse impacts. Accidental releases, if any, would occur infrequently at discrete locations and vary widely in space and time; for this reason, BOEM expects localized and temporary negligible adverse impacts on birds.<br>Impacts to birds from this IPF during operation and decommissioning of the offshore facilities would be similar to offshore construction impacts and result in short-term negligible to minor adverse impacts with compliance with USCG requirements and BSEE regulations.<br>In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be likely limited in extent and duration and would result in localized and temporary negligible adverse cumulative impacts on birds.</td><td colspan="4">Offshore: Alternatives C through F would reduce the number of WTGs, potentially resulting in a reduced amount of offshore construction equipment and vessels required, thereby resulting in a negligible decreased risk for accidental releases and discharges. However, no measurable change from Proposed Action construction impacts to birds from this IPF is anticipated, which are expected to be localized and temporary negligible to minor adverse.<br>Impacts to birds from this IPF during operation and decommissioning of the offshore facilities are expected to be similar to offshore construction impacts, and no measurable change from Proposed Action construction impacts to birds from this IPF is anticipated, which are expected to be negligible to minor adverse.<br>Future offshore wind activities would contribute to an increased risk of spills and associated impacts due to fuel, fluid, or hazmat exposure. The contribution from future offshore wind and Alternatives C through F would be a low and non-measurable percentage of the overall spill risk from ongoing activities. In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including Alternatives C through F, would be likely limited in extent and duration of a release and result in localized and temporary negligible adverse cumulative impacts to birds.</td><td>Offshore: Similar to Alternatives C through F, Alternative G would reduce the number of WTGs, resulting in no measurable change from Proposed Action construction, O&M, and decommissioning impacts to birds from this IPF is anticipated, which are expected to be localized and temporary (for construction) negligible to minor adverse.<br>Future offshore wind activities would contribute to an increased risk of spills and associated impacts due to fuel, fluid, or hazmat exposure. The contribution from future offshore wind and Alternative G would be a low and non-measurable percentage of the overall spill risk from ongoing activities. In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including Alternative G, would be likely limited in extent and duration of a release and result in localized and temporary negligible adverse cumulative impacts to birds.</td></tr>
<tr><td></td><td></td><td>Onshore: Onshore, construction and HDD activities could result in the accidental releases of fuel, fluids, or hazmat; sediment; and/or trash and debris. Based on the low risk of spills due to implementation of safe handling, storage, and cleanup procedures, impacts from accidental spills and trash would represent a localized and temporary negligible adverse impact to birds.<br>The OnSS would require various oils, fuels, and lubricants to support its operation. Accidental discharges, releases, and disposal could indirectly cause bird habitat degradation; however, risks would be avoided through spill prevention and control measures and associated BMPs. Therefore, potential adverse impacts associated with discharges and releases are considered short term and localized negligible adverse.</td><td colspan="4">Onshore: Alternatives C through F would not alter impacts to onshore activities; therefore, impacts would be the same as those described for the Proposed Action: temporary to short term negligible adverse.</td><td>Onshore: Alternative G would not alter onshore activities; therefore, impacts would be the same as those described for the Proposed Action: temporary to short term negligible adverse.</td></tr>
</table>

| **Impact-Producing Factor** | **No Action Alternative** | **Alternative B (Proposed Action) up to 100 WTG** | **Alternative C (Habitat Alternative) 64–65 WTGs** | **Alternative D (Transit Alternative) 78–93 WTGs** | **Alternative E (Viewshed Alternative) 64–81 WTGs** | **Alternative F (Higher Capacity Turbine Alternative) 56 WTGs** | **Alternative G (Preferred Alternative) 65 WTGs** |
|---|---|---|---|---|---|---|---|
| | | In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be localized and temporary due to the likely limited extent and duration of a release and result in **negligible** adverse cumulative impacts to birds. | | | | | |
| Anchoring and new cable emplacement/ maintenance | A small amount of infrequent construction impacts associated with onshore power infrastructure would be required over the next 6 to 10 years to tie future offshore wind energy projects to the electric grid. Typically, this would require only small amounts of habitat removal, if any, and would occur primarily in previously disturbed areas. Where future offshore wind activities overlap the GAA, there would be increased anchoring of vessels during survey activities and during the construction and installation, O&M, and decommissioning of offshore components. Disturbed seafloor from construction of future offshore wind projects and anchoring may affect diving birds' foraging success or may affect some prey species (e.g., benthic assemblages); however, impacts would be temporary and localized, and birds would be able to successfully forage in adjacent areas and would not be affected by increased suspended sediments and no population-level impacts would occur. Therefore, adverse impacts would be **minor**. | **Offshore**: Seafloor disturbed by cable installation and dredging prior to cable installation would result in turbidity effects that could reduce marine bird foraging success or have temporary and localized impacts on marine bird prey species. Vessel anchoring during construction would also result in increased turbidity. Individual birds would successfully forage in nearby areas not affected by increased turbidity/sedimentation during anchoring and cable emplacement, and only nonmeasurable **negligible** adverse impacts, if any, on individuals or populations would be expected given the localized and temporary nature of construction activities.<br>Other than temporary increases in turbidity from seafloor disturbance due to occasional vessel anchoring, no impacts to bird species are anticipated during the O&M phase for the offshore RWF or RWEC. Impacts from decommissioning would be similar to construction impacts unless the RWEC is abandoned in place: **negligible** adverse.<br>In the context of reasonably foreseeable environmental trends, the combined cable emplacement impacts from ongoing and planned actions, including the Proposed Action, could occur if impacts are in close temporal and spatial proximity. However, these adverse impacts from anchoring and cable emplacement would be **negligible** and would not be biologically significant. For these reasons, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** cumulative adverse impacts to birds. | **Offshore**: Alternatives C through F would reduce the number of WTG foundations and IACs. Reduced habitat disturbance from foundation and IAC installation could negligibly decrease turbidity that could alter the behavior of bird species. Therefore, BOEM would expect a similar but lower impact to birds than the Proposed Action: temporary, lasting up to 12 hours, localized and nonmeasurable **negligible** adverse impacts.<br>Similar to the Proposed Action, no impacts to bird species are anticipated during the O&M phase for the offshore RWF or RWEC. Impacts from decommissioning would be similar to construction impacts unless the RWEC is abandoned in place: **negligible** adverse.<br>Alternatives C through F would add 5,821 to 6,994 acres of seafloor disturbance from the RWEC and IAC installation and anchoring compared to the No Action Alternative, which represents up to 6% of the total seafloor disturbance estimated under the No Action Alternative. This would result in localized turbidity effects that could reduce marine bird foraging success or impact marine bird prey species. However, individual birds would be expected to successfully forage in nearby areas not affected by increased turbidity, and only nonmeasurable negligible impacts, if any, on individuals or populations would be expected given the localized and temporary nature of the potential impacts. In the context of reasonably foreseeable environmental trends, the combined cable emplacement and anchoring impacts from ongoing and planned actions, including Alternatives C through F, could occur if impacts are in close temporal and spatial proximity. However, these adverse impacts from anchoring and cable emplacement would be negligible and would not be biologically significant. For these reasons, these alternatives in combination with other past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** adverse cumulative impacts to birds. | | | | **Offshore**: Similar to Alternatives C through F, Alternative G would reduce the number of WTG foundations and IACs, resulting in temporary (for construction), lasting up to 12 hours, localized and nonmeasurable **negligible** adverse impacts.<br>Similar to the Proposed Action, no impacts to bird species are anticipated during the O&M phase, and impacts from decommissioning would be similar to construction impacts unless the RWEC is abandoned in place: **negligible** adverse.<br>Alternative G would add 5,498 acres of seafloor disturbance from RWEC and IAC installation and anchoring compared to the No Action Alternative, which represents up to 5% of the total seafloor disturbance estimated under the No Action Alternative. This would result in localized turbidity effects that could reduce marine bird foraging success or impact marine bird prey species. However, individual birds would be expected to successfully forage in nearby areas not affected by increased turbidity, and only nonmeasurable negligible impacts, if any, on individuals or populations would be expected given the localized and temporary nature of the potential impacts. In the context of reasonably foreseeable environmental trends, the combined cable emplacement and anchoring impacts from ongoing and planned actions, including Alternative G, could occur if impacts are in close temporal and spatial proximity. However, these adverse impacts from anchoring and cable emplacement would be negligible and would not be biologically significant. For these reasons, these alternatives in combination with other past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** adverse cumulative impacts to birds. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| | | **Onshore**: Land disturbance and habitat alteration resulting from construction within the landfall work area may result in the direct injury or mortality of bird species. Mitigations like observing time-of-year restrictions on vegetation removal would avoid the breeding season of birds, thus reducing the likelihood of injury and/or mortality from construction activities. Therefore, the impacts (e.g., injury and/or mortality) resulting from land disturbance and habitat alteration would be temporary **negligible** adverse. Additionally, construction work within the landfall work area would occur largely outside of the breeding period of listed species that might nest in the area, and because use of the shoreline by shorebirds within the landfall work area has not been documented (VHB 2023), onshore impacts for listed species from land disturbance would also be **negligible** adverse.<br>Onshore transmission cable installation would also result in temporary ground disturbance. Most of the temporary ground disturbance would occur in previously disturbed areas along paved roads or parking lots and would not result in impacts to bird habitat.<br>Operation of the onshore transmission cable would pose no risk to birds because it would be buried. Land disturbance in the form of vegetation management would occur on a periodic basis to maintain vegetation at shrub height within the perimeters of the onshore facilities. Land disturbance as it relates to vegetation clearing may result in the direct injury or mortality of birds. However, mortality and injury impacts would be mitigated by observing time-of-year restrictions on vegetation removal that would avoid the breeding season of bird species. Therefore, the adverse impacts resulting from this IPF would be **negligible**.<br>The contribution of the Proposed Action on adverse cumulative impacts to birds from new cable emplacement or maintenance in the context of reasonably foreseeable onshore environmental trends within the GAA is expected to be **negligible** adverse. | **Onshore**: Alternatives C through F would not alter impacts to onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** adverse. | | | | **Onshore**: Alternative G would not alter onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** adverse. |
| Climate change | Impacts associated with climate change (i.e., increased storm severity and frequency, ocean acidification, altered | **Offshore**: Construction of the offshore facilities would result in a small temporary increase in GHG emissions within the GAA during the construction | **Offshore**: Alternatives C through F would reduce the number of WTGs, potentially resulting in a reduced number of GHG-emitting construction vessels and/or aircraft. However, no measurable change from Proposed Action construction impacts to birds | | | | **Offshore**: Similar to Alternatives C through F, Alternative G would reduce the number of WTGs, potentially resulting in a reduced |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| | migration patterns, increased disease frequency, habitat conversion, and increased erosion and sediment deposition) could result in long-term **minor** adverse risks to birds and could lead to changes in prey abundance and distribution, changes in nesting and foraging habitat abundance and distribution, and changes to migration patterns and timing. However, future offshore wind development activities may beneficially contribute to a broader combination of actions to reduce future impacts to birds from climate change over the long term due to reduced reliance on fossil fuel–generated energy sources. | phase. As a result, adverse impacts to birds from construction of the Proposed Action associated with climate change would be short term **negligible** adverse.<br>The expected impacts on climate change from operation of the offshore facilities alone would not result in a measurable increase in the adverse impacts to birds beyond those described under the No Action Alternative. In addition, operation of the Proposed Action could also contribute to a long-term net decrease in GHG emissions, but this change would likely not be measurable. Therefore, BOEM expects the impacts from the Proposed Action on climate change would be long term **negligible**.<br>The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action. Therefore, long-term **minor** adverse and long-term **negligible** beneficial cumulative impacts to birds are expected. | from this IPF is anticipated, which are expected to be short term **negligible** adverse. Likewise, no measurable change from Proposed Action operational impacts to birds is anticipated, which are expected to be long term **negligible** adverse.<br>The types of impacts from global climate change described for the No Action Alternative would occur under Alternatives C through F. However, Alternatives C through F could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts. Therefore, long-term **minor** adverse and long-term **negligible** beneficial cumulative impacts to birds are expected. | | | | number of GHG-emitting construction vessels and/or aircraft. However, no measurable change from Proposed Action construction and O&M impacts to birds from this IPF is anticipated, and impacts are expected to be short term **negligible** adverse (construction) and long term **negligible** adverse (O&M).<br>The types of impacts from global climate change described for the No Action Alternative would occur under Alternative G. However, Alternative G could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts. Therefore, long-term **minor** adverse and long-term **negligible** beneficial cumulative impacts to birds are expected. |
| | | **Onshore**: Onshore impacts to birds associated with climate change from construction and decommissioning of the Proposed Action would be similar to those discussed above for offshore facilities and activities: short term **negligible** adverse.<br>No measurable climate change impacts to birds from O&M of the onshore facilities are expected. Therefore, the adverse impacts from this IPF are expected to be long term **negligible** adverse.<br>The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action. Therefore, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action and cumulative impacts, are expected to be long term **minor** adverse. | **Onshore**: Alternatives C through F would not alter onshore activities; therefore, construction and operational impacts would be the same as those described for the Proposed Action: short term to long-term **negligible** adverse.<br>Cumulative impacts would also be the same as those described for the Proposed Action: long term **minor** adverse. | | | | **Onshore**: Alternative G would not alter onshore activities; therefore, construction and operational impacts would be the same as those described for the Proposed Action: short term to long term **negligible** adverse.<br>Cumulative impacts would also be the same as those described for the Proposed Action: long term **minor** adverse. |
| Light | Nighttime lighting associated with offshore structures and vessels could represent a source of bird attraction. Vessel lighting would be temporary and result in a **minor** adverse impact to birds; structure lighting may pose an increased collision or predation risk (Hüppop et al. 2006), although this risk would be localized in extent and minimized using BOEM lighting guidelines (BOEM 2021c; Kerlinger et al. | **Offshore**: Lighting used during construction would be limited to the minimum required for safety during construction activities to minimize potential impacts. Therefore, adverse impacts to birds from lighting during construction would be localized and temporary **negligible** to **minor** adverse.<br>Under the Proposed Action, up to 100 WTGs and up to two OSSs would be lit with USCG navigational and FAA hazard lighting. These lights have some potential to attract birds and result in increased collision risk (Hüppop et al. 2006). However, the mandatory use of | **Offshore**: Although the number and duration of construction vessels and work areas requiring nighttime lighting could be slightly reduced under Alternatives C through F, no measurable change from Proposed Action construction impacts to birds is anticipated, which are expected to be localized and temporary **negligible** to **minor** adverse.<br>Alternatives C through F would reduce nighttime lighting, thereby negligibly decreasing the risk of avian injury or mortality from collision with WTGs as compared to the Proposed Action, and impacts are expected to be long term **negligible** adverse.<br>Alternatives C through F would add 56 to 93 new WTGs with red flashing aviation hazard lighting to the No Action Alternative; these lights could attract birds and result in increased collision risk (Hüppop et al. 2006). Additionally, marine navigation lighting | | | | **Offshore**: Similar to Alternatives C through F, the number and duration of construction vessels and work areas requiring nighttime lighting could be slightly reduced under Alternative G, and no measurable change from Proposed Action construction impacts to birds is anticipated, and impacts would be localized and temporary **negligible** to **minor** adverse.<br>Alternative G would reduce nighttime lighting for operations, negligibly decreasing the risk of avian injury or mortality from collision with |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| | 2010), and therefore would also be a **minor** adverse impact. | red flashing aviation obstruction lights, the avoidance of any steady-burning aviation obstruction lights, and the use of ADLS (see Table F-2 in Appendix F for details) are expected to minimize bird attraction and therefore collision risk (Kerlinger et al. 2010; Orr et al. 2016). For this reason, BOEM expects adverse impacts, if any, to be long term **negligible** adverse from offshore lighting.<br>Ongoing and future non–offshore wind activities are expected to cause short-term impacts, primarily from vessel lights. For these reasons, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** adverse cumulative impacts to birds, and no individual or population-level impacts would be expected. | would include one or more flashing white lights on each WTG and the OSSs and would be directed out and down to the water surface. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from wind farm areas. Ongoing and future non–offshore wind activities are expected to cause short-term impacts, primarily from vessel lights. For these reasons, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** cumulative adverse impacts to birds because no individual or population-level impacts would be expected. | | | | WTGs as compared to the Proposed Action, and impacts are expected to be long term **negligible** adverse.<br>Alternative G would add 65 WTGs with red flashing aviation hazard lighting to the No Action Alternative; these lights could attract birds and result in increased collision risk (Hüppop et al. 2006). Additionally, marine navigation lighting would include one or more flashing white lights on each WTG and the OSSs and would be directed out and down to the water surface. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from wind farm areas. Ongoing and future non–offshore wind activities are expected to cause short-term impacts, primarily from vessel lights. For these reasons, Alternative G when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** cumulative adverse impacts to birds because no individual or population-level impacts would be expected. |
| | | **Onshore**: Most of the onshore construction would occur during the daylight hours, although some overnight lighting may occasionally be necessary during construction of the onshore facilities. However, this is not expected to have a measurable effect on bird behavior, therefore BOEM anticipates temporary **negligible** adverse impacts to birds.<br>During the O&M of the OnSS and ICF, yard lighting would be used for assessment of equipment. Most decommissioning activities would occur during the day, and overnight lighting would only be necessary if there is work in progress on-site or lights are left on for safety and security purposes. Therefore, the adverse impacts resulting from this IPF would be long term **negligible**.<br>Ongoing and future onshore activities could contribute to impacts to birds from light if they occur at the same time within the GAA. However, these effects are also expected to be localized and temporary and would not contribute to adverse cumulative impacts to birds in the GAA. | **Onshore**: Alternatives C through F would not alter impacts to onshore activities; therefore, construction and operational impacts would be the same as those described for the Proposed Action: temporary to long-term **negligible** adverse.<br>Cumulative impacts would also be the same as those described for the Proposed Action: localized and temporary **negligible** to **minor** adverse. | | | | **Onshore**: Alternative G would not alter impacts to onshore activities; therefore, construction and operational impacts would be the same as those described for the Proposed Action: temporary to long-term **negligible** adverse.<br>Cumulative impacts would also be the same as those described for the Proposed Action: localized and temporary **negligible** to **minor** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| Noise | Multiple offshore wind project construction periods are anticipated between 2022 and 2027. Construction noise sources will include, most notably, pile driving as well as geological and geophysical surveys, offshore and onshore construction, and aircraft and vessel traffic. These would create noise and may temporarily impact some bird species by displacing them and changing their behavior. Vessel and aircraft noise could also disturb some individual diving birds, but they would acclimate to the noise or move away, potentially resulting in temporary displacement. Collectively, these noise sources would be temporary and localized, resulting in a **minor** adverse impact to these birds. | **Offshore**: **Negligible** to **minor** adverse impacts to birds would occur from construction noise related to pile driving as well as geological and geophysical surveys and aircraft and vessel traffic. These activities could flush birds in the path of vessels, causing temporary displacement from the area.<br>Impacts to birds from operational noise and decommissioning of the offshore facilities would be similar to offshore construction impacts and result in **negligible** adverse impacts.<br>Pile-driving and other construction noise and activity associated with the Proposed Action could add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative impacts to birds. | **Offshore**: Alternatives C through F would slightly decrease noise associated with pile driving for WTGs and other construction-related noise as compared to the Proposed Action, which are short-term **negligible** to **minor** adverse impacts.<br>No measurable change from Proposed Action O&M impacts is anticipated because operational noise sources and levels would be the same: long-term **negligible** adverse impacts.<br>Pile-driving and other construction noise and activity associated with Alternatives C through F could add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. Potential impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. However, Alternatives C through F's contribution would be limited in duration, negligible, and cease when construction ends. No individual fitness (i.e., a bird's ability to survive and reproduce) or population-level effects would be expected. Therefore, these alternatives when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** cumulative adverse impacts to birds. | | | | **Offshore**: Similar to Alternatives C through F, Alternative G would slightly decrease noise associated with pile driving for WTGs and other construction-related noise impacts as compared to the Proposed Action, which are short-term **negligible** to **minor** adverse impacts.<br>No measurable change from Proposed Action O&M impacts is anticipated because operational noise sources and levels would be the same: long-term **negligible** adverse impacts.<br>Pile-driving and other construction noise and activity associated with Alternative G could add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. Potential impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. However, Alternative G's contribution would be limited in duration, negligible, and cease when construction ends. No individual fitness (i.e., a bird's ability to survive and reproduce) or population-level effects would be expected. Therefore, these alternatives when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** cumulative adverse impacts to birds. |
| | | **Onshore**: Noise from traffic associated with construction and vegetation removal within the landfall work area and other onshore facilities could affect shorebirds, some seabirds, and land birds that use the terrestrial habitats in the immediate vicinity of construction activities through displacement or avoidance behavior of individuals and/or disruptions in communication, mating, and hunting. The impacts associated with construction would be similar to existing sources of noise and traffic in the local area and therefore are considered a temporary **negligible** adverse impact.<br>Temporary noise and construction-related traffic may occasionally be generated due to nonroutine maintenance. Infrequent vehicle usage within the OnSS and ICF may create temporary noise-related disturbance to birds adjacent to the OnSS. However, such disturbance would be short term, and normal avian activity would likely resume after the traffic | **Onshore**: Alternatives C through F would not alter impacts to onshore activities; therefore, impacts would be the same as those described for the Proposed Action: temporary **negligible** adverse. | | | | **Onshore**: Alternative G would not alter impacts to onshore activities; therefore, impacts would be the same as those described for the Proposed Action: temporary **negligible** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| | | ceases. BOEM expects these adverse impacts to be **negligible**.<br>In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be localized and temporary due to the likely limited extent and duration of noise and would result in **negligible** adverse cumulative impacts to birds. | | | | | |
| Presence of structures | Onshore land development or port expansion activities could result in limited loss of nesting and/or foraging habitat for some bird species. The presence of offshore structures can lead to impacts, both beneficial and adverse, on birds through fish aggregation and the associated increase in foraging opportunities as well as entanglement and gear loss/damage, migration disturbances, and WTG strikes and displacement. These impacts may arise from buoys, met towers, foundations, scour/cable protections, and transmission cable infrastructure. Therefore, these impacts would be **minor** adverse. | **Offshore**: The various types of impacts on birds that could result from the presence of structures during construction include fish aggregation and an associated increase in foraging opportunities as well as entanglement and fishing gear loss/damage, migration disturbances, and displacement. These impacts would be temporary, and BOEM expects them to be **negligible** adverse. **Negligible** to **minor** temporary adverse impacts from bird collisions with visible structures could occur during construction, depending on the species and number of individuals involved.<br>The primary impact to avian resources during operation would be collision with rotating turbine blades. The presence and operation of the offshore facilities may also result in displacement of waterbirds, waterfowl, seabirds, and phalaropes that use the area for foraging, resting, or nighttime roosting. Long-term adverse impacts would be **negligible** to **minor**, depending on whether birds are at high risk for collision and/or displacement or are able to access preferred habitat, and these impacts may change over time if birds become habituated to the presence of the WTGs and OSSs. Impacts to birds from decommissioning of the RWF and offshore RWEC would be similar to those described for the construction phase. The Project is not expected to affect special-status species populations.<br>Cumulative impacts on birds from the presence of structures associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be long term **minor** adverse and long term **minor** beneficial. | **Offshore**: Alternatives C through F would reduce the number of WTGs, potentially resulting in a reduced amount of offshore construction equipment and vessels required. However, because bird exposure to vessels and installation infrastructure would be temporally limited to the construction period, the behavioral vulnerability to collision with construction equipment under Alternatives C through F is expected to be the same as described for the Proposed Action, which are **negligible** to **minor** temporary adverse impacts.<br>During operations, Alternatives C through F would reduce the number of WTGs, potentially allowing for improved maneuverability for birds through the Lease Area and negligibly decreasing the risk of injury or mortality from collision with WTGs as compared to the Proposed Action, and impacts are expected to be long term **negligible** to **minor** adverse.<br>Alternatives C through F would add 56 to 93 additional WTGs and up to two OSSs compared to the No Action Alternative. The total cumulative foundations on the Atlantic OCS would be 3,146 to 3,183, and the Project would account for less than 4% of that total number. Adverse impacts to migration patterns or collision risk from these additional turbines would be negligible and persist until decommissioning is complete. Additionally, beneficial impacts to foraging near offshore structures would similarly be negligible and persist for the life of the Project. Therefore, cumulative impacts on birds from the presence of structures associated with these alternatives when combined with past, present, and reasonably foreseeable activities would be long term **minor** adverse and long term **minor** beneficial. | | | | **Offshore**: Similar to Alternatives C through F, Alternative G would reduce the number of WTGs and is expected to result in the same impacts as described for the Proposed Action, which are **negligible** to **minor** temporary adverse during construction and long term **negligible** to **minor** adverse during operations.<br>Alternative G would add 65 WTGs and up to two OSSs compared to the No Action Alternative. The total cumulative foundations on the Atlantic OCS would be 3,155, and the Project would account for less than 3% of that total number. Adverse impacts to migration patterns or collision risk from these additional turbines would be negligible and persist until decommissioning is complete. Additionally, beneficial impacts to foraging near offshore structures would similarly be negligible and persist for the life of the Project. Therefore, cumulative impacts on birds from the presence of structures associated with these alternatives when combined with past, present, and reasonably foreseeable activities would be long term **minor** adverse and long term **minor** beneficial. |
| | | **Onshore**: Impacts from habitat alteration and land disturbance on coastal and terrestrial bird habitats generated from the construction of the onshore facilities would create habitat loss and conversion, | **Onshore**: Alternatives C through F would not alter impacts to onshore activities; therefore, impacts would be the same as those described for the Proposed Action: temporary to long-term **negligible** to **minor** adverse. | | | | **Onshore**: Alternative G would not alter impacts to onshore activities; therefore, impacts would be the same as those described for the Proposed Action: temporary to long-term |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | | affect bird habitat use, and possibly create habitat degradation. During the breeding season, clearing of trees or vegetation could result in destruction of nests, adversely impacting some individuals. However, lasting impacts to local breeding populations are not anticipated. Collisions between birds and vehicles or construction equipment have some limited potential to cause injury and mortality. Therefore, impacts to birds from construction of onshore facilities would be short term **negligible** to **minor** adverse.<br>The OnSS and ICF would be visible structures that would result in permanent bird habitat conversion and loss. The OnSS access road and fenced-in property would become nonhabitat and result in habitat fragmentation. The conversion of forested cover type outside the OnSS and ICF fences would alter the structural diversity within a forested area by adding more edge habitat. Considering the adjacent landscape consists primarily of residential and commercial developments with some undisturbed areas of ruderal forested swamp, the adverse impacts to birds from the OnSS and the ICF on forested habitat fragmentation would be long term **negligible** to **minor**.<br>The potential for avian mortality or injury due to the low risk of collision with the OnSS and related structures would be a long-term **minor** adverse impact. The potential for avian avoidance behavior related to habitat conversion and loss from the OnSS would also be a long-term **minor** adverse impact. Adverse impacts to birds from habitat fragmentation related to a visible change in the landscape during decommissioning would be **negligible** because local populations would have adapted to the landscape changes.<br>The presence of these structures when considered in the context of ongoing and planned actions within the GAA would be a very minor risk of mortality or injury to birds due to collision, and generally, the changes to the habitat conditions would result in avoidance behavior and may influence bird habitat selection. Therefore, BOEM anticipates long-term **negligible** to **minor** adverse cumulative impacts to birds. | | | | | **negligible** to **minor** adverse. |

### 3.7.2.2 Alternative A: Impacts of the No Action Alternative on Birds

#### 3.7.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for birds (see Section 3.7.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA for birds. These IPFs are described and analyzed in Appendix E1.

#### 3.7.2.2.2 Cumulative Impacts

This section discloses potential bird impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

<u>Accidental releases and discharges:</u> Future offshore wind and non-wind activities could expose coastal offshore waters to contaminants (e.g., fuel, sewage, solid waste, or chemicals, solvents, oils, or grease from equipment) in the event of a spill or release during routine vessel use. Ingestion of hard and soft plastic debris could lead to blockages and could result in adverse health effects to birds, such as decreased hematological function, dehydration, drowning, hypothermia, starvation, weight loss, and even death (Briggs et al. 1997; Haney et al. 2017; Paruk et al. 2016). Vessel compliance with USCG regulations would minimize trash or other debris; therefore, BOEM expects accidental trash releases from offshore wind vessels to be rare. Spills could result in small exposures that cause oiling of feathers that can lead to adverse effects such as changes in flight efficiencies and result in increased energy expenditure during daily and seasonal activities (Maggini et al. 2017). All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and BSEE. OSRPs are required for each project and would provide for rapid spill response, cleanup, and other measures that would help to minimize potential impacts on affected resources from spills. WTGs and OSSs are generally self-contained and would not generate discharge (see COP Appendix D). Vessels would also have onboard containment measures that would further reduce the impact of a spill in the event of an allision or collision. Based on the low risk of spills from vessels due to implementation of safe handling, storage, and cleanup procedures, impacts from accidental spills and trash would represent a **negligible** adverse impact to birds.

<u>Anchoring and new cable emplacement/maintenance:</u> Infrequent construction impacts associated with onshore power infrastructure would be required over the next 6 to 10 years to tie future offshore wind energy projects to the electric grid. Typically, this would require only small amounts of habitat removal, if any, and would occur primarily in previously disturbed areas. Up to 109,808 acres of localized temporary seafloor disturbance and associated increased suspended sedimentation could occur during construction of proposed wind farm cables and anchoring (see Table E-4 in Appendix E). Where future offshore wind activities overlap the GAA, there would be increased anchoring of vessels during survey activities and during the construction and installation, O&M, and decommissioning of offshore components. In addition, there could be increased anchoring/mooring of meteorological (met) towers or buoys. Disturbed seafloor from construction of future offshore wind projects and anchoring may affect diving birds' foraging success or may affect some prey species (e.g., benthic assemblages); however, impacts would be temporary and localized, and birds would be able to successfully forage in adjacent

areas and would not be affected by increased suspended sediments and no population-level impacts would occur. Suspended sediment concentrations during activities other than dredging would be within the range of natural variability for this location. Therefore, adverse impacts would be **minor**. See Sections 3.6 and 3.13 for detailed information on potential effects to benthic habitat.

Climate change: Impacts associated with climate change (i.e., increased storm severity and frequency, ocean acidification, altered migration patterns, increased disease frequency, habitat conversion, and increased erosion and sediment deposition) could result in long-term **minor** adverse risks to birds and could lead to changes in prey abundance and distribution, changes in nesting and foraging habitat abundance and distribution, and changes to migration patterns and timing. During construction, future offshore wind development activities may result in a small temporary increase in greenhouse gas (GHG) emissions (see Section 3.4.2.2.2). However, operation of these projects may beneficially contribute to a broader combination of actions to reduce future impacts to birds from climate change over the long term due to reduced reliance on fossil fuel–generated energy sources.

Light: Nighttime lighting associated with offshore structures and vessels could also represent a source of bird attraction. Under the No Action Alternative, offshore WTGs and OSSs would have hazard and aviation lighting that would be added beginning in 2021 and continuing through 2027 (see Table E1-3 in Appendix E1). Construction vessels are also a source of artificial lighting. Vessel lighting would be temporary and result in a **minor** adverse impact to birds; structure lighting may pose an increased collision or predation risk (Hüppop et al. 2006), although this risk would be localized in extent and minimized using BOEM lighting guidelines (BOEM 2021c; Kerlinger et al. 2010), and therefore would also be a **minor** adverse impact.

Noise: Table E-3 in Appendix E indicates that multiple offshore wind project construction periods are anticipated between 2022 and 2027. Construction noise sources will include, most notably, pile driving as well as geological and geophysical surveys, offshore and onshore construction, and aircraft and vessel traffic. These would create noise and may temporarily impact some bird species by displacing them and changing their behavior. Noise generated by construction equipment also has the potential to mask signals used by certain bird species for communication and mating, as well as hunting, which can lead to a decrease in bird density in the affected area (Bottalico et al. 2015). Potential impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. Noise transmitted through water could temporarily displace diving birds in a limited space around each pile and could cause short-term stress and behavioral changes ranging from mild annoyance to escape behavior (BOEM 2014b, 2016). Vessel and aircraft noise could also disturb some individual diving birds, but they would acclimate to the noise or move away, potentially resulting in temporary displacement. Collectively, these noise sources would be temporary and localized, resulting in a **minor** adverse impact to these birds.

Presence of structures: Onshore land development or port expansion activities could result in limited loss of nesting and/or foraging habitat for some bird species. The presence of offshore structures can lead to impacts, both beneficial and adverse, on birds through fish aggregation and the associated increase in foraging opportunities as well as entanglement and gear loss/damage, migration disturbances, and WTG strikes and displacement. These impacts may arise from buoys, met towers, foundations, scour/cable protections, and transmission cable infrastructure.

The primary threat to birds from the presence of structures would be from collision with WTGs. Birds are susceptible to collision with structures, particularly at night and/or during other periods of low visibility (e.g., rain or fog) (Stantec 2018). As discussed above, the Atlantic Flyway is an important migratory pathway for up to 164 species of waterbirds, and a similar number of land birds, with the greatest volume of birds using the Atlantic Flyway during annual migrations between wintering and breeding grounds (Watts 2010). As discussed in BOEM (2012), 55 bird species could encounter operating WTGs on the Atlantic OCS. However, the abundance of birds that overlap with the anticipated development of wind energy facilities on the Atlantic OCS is relatively small (Curtice et al. 2019; Winship et al. 2018). Of 55 bird species, 47 have sufficient survey data to calculate the modeled percentage of a species population that would overlap with the anticipated offshore wind development on the Atlantic OCS (Winship et al. 2018); the relative seasonal exposure is generally very low, ranging from 0.0% to 5.2% (Table 3.7-2). BOEM assumes that the 47 species (85%) with sufficient data to model the relative distribution and abundance are representative of the 55 species that may overlap offshore wind development on the Atlantic OCS.

**Table 3.7-2. Percentage of Atlantic Seabird Populations that Overlap with Anticipated Offshore Wind Energy Development on the Outer Continental Shelf by Season**

| Species | Spring | Summer | Fall | Winter |
|---|---|---|---|---|
| Artic tern (*Sterna paradisaea*) | N/A | 0.2% | N/A | N/A |
| Atlantic puffin (*Fratercula arctica*) | 0.2% | 0.1% | 0.1% | 0.2% |
| Audubon shearwater (*Puffinus lherminieri*) | 0.0% | 0.0% | 0.0% | 0.0% |
| Black-capped petrel (*Pterodroma hasitata*) | 0.0% | 0.0% | 0.0% | 0.0% |
| Black guillemot (*Cepphus grille*) | N/A | 0.3% | N/A | N/A |
| Black-legged kittiwake (*Rissa tridactyla*) | 0.7% | N/A | 0.7% | 0.5% |
| Black scoter (*Melanitta americana*) | 0.2% | N/A | 0.4% | 0.5% |
| Bonaparte’s gull (*Chroicocephalus philadelphia*) | 0.5% | N/A | 0.4% | 0.3% |
| Brown pelican (*Pelecanus occidentalis*) | 0.1% | 0.0% | 0.0% | 0.0% |
| Band-rumped storm-petrel (*Oceanodroma castro*) | N/A | 0.0% | N/A | N/A |
| Bridled tern (*Onychoprion anaethetus*) | N/A | 0.1% | 0.1% | N/A |
| Common eider (*Somateria mollissima*) | 0.3% | 0.1% | 0.5% | 0.6% |
| Common loon (*Gavia immer*) | 3.9% | 1.0% | 1.3% | 2.1% |
| Common murre (*Uria aalge*) | 0.4% | N/A | N/A | 1.9% |
| Common tern (*Sterna hirundo*) | 2.1% | 3.0% | 0.5% | N/A |
| Cory’s shearwater (*Calonectris borealis*) | 0.1% | 0.9% | 0.3% | N/A |
| Double-crested cormorant (*Phalacrocorax auritus*) | 0.7% | 0.6% | 0.5% | 0.4% |
| Dovekie (*Alle alle*) | 0.1% | 0.1% | 0.3% | 0.2% |
| Great black-backed gull (*Larus marinus*) | 1.3% | 0.5% | 0.7% | 0.6% |

| Species | Spring | Summer | Fall | Winter |
|---|---|---|---|---|
| Great shearwater (*Puffinus gravis*) | 0.1% | 0.3% | 0.3% | 0.1% |
| Great skua (*Stercorarius skua*) | N/A | N/A | 0.1% | N/A |
| Herring gull (*Larus argentatus*) | 1.0% | 1.3% | 0.9% | 0.5% |
| Horned grebe (*Podiceps auritus*) | N/A | N/A | N/A | 0.3% |
| Laughing gull (*Leucophaeus atricilla*) | 1.0% | 3.6% | 0.9% | 0.1% |
| Leach's storm-petrel (*Oceanodroma leucorhoa*) | 0.1% | 0.0% | 0.0% | N/A |
| Least tern (*Sternula antillarum*) | N/A | 0.3% | 0.0% | N/A |
| Long-tailed duck (*Clangula hyemalis*) | 0.6% | 0.0% | 0.4% | 0.5% |
| Manx shearwater (*Puffinus puffinus*) | 0.0% | 0.5% | 0.1% | N/A |
| Northern fulmar (*Fulmarus glacialis*) | 0.1% | 0.2% | 0.1% | 0.2% |
| Northern gannet (*Morus bassanus*) | 1.5% | 0.4% | 1.4% | 1.4% |
| Parasitic jaeger (*Stercorarius parasiticus*) | 0.4% | 0.5% | 0.4% | N/A |
| Pomarine jaeger (*Stercorarius pomarinus*) | 0.1% | 0.3% | 0.2% | N/A |
| Razorbill (*Alca torda*) | 5.2% | 0.2% | 0.4% | 2.1% |
| Ring-billed gull (*Larus delawarensis*) | 0.5% | 0.5% | 0.9% | 0.5% |
| Red-breasted merganser (*Mergus serrator*) | 0.5% | N/A | N/A | 0.7% |
| Red phalarope (*Phalaropus fulicarius*) | 0.4% | 0.4% | 0.2% | N/A |
| Red-necked phalarope (*Phalaropus lobatus*) | 0.3% | 0.3% | 0.2% | N/A |
| Roseate tern (*Sterna* dougallii) | 0.6% | 0.0% | 0.5% | N/A |
| Royal tern (*Thalasseus maximus*) | 0.0% | 0.2% | 0.1% | N/A |
| Red-throated loon (*Gavia stellate*) | 1.6% | N/A | 0.5% | 1.0% |
| Sooty shearwater (*Ardenna grisea*) | 0.3% | 0.4% | 0.2% | N/A |
| Sooty tern (*Onychoprion fuscatus*) | 0.0% | 0.0% | N/A | N/A |
| South polar skua (*Stercorarius maccormicki*) | N/A | 0.2% | 0.1% | N/A |
| Surf scoter (*Melanitta perspicillata*) | 1.2% | N/A | 0.4% | 0.5% |
| Thick-billed murre (*Uria lomvia*) | 0.1% | N/A | N/A | 0.1% |
| Wilson's storm-petrel (*Oceanites oceanicus*) | 0.2% | 0.9% | 0.2% | N/A |
| White-winged scoter (*Melanitta deglandi*) | 0.7% | N/A | 0.2% | 1.3% |

Source: Calculated from Winship et al. (2018).

Notes: N/A = not applicable.

The primary operational impact to bird resources would be collision with WTGs. In the contiguous United States, bird collisions with operating WTGs are believed to be a relatively rare event, with an estimated 140,000 to 328,000 (mean = 234,000) birds killed annually by 44,577 onshore turbines (Loss et al. 2013). Robinson Willmott et al. (2013) evaluated the sensitivity of bird resources to collision and/or displacement due to future wind development on the Atlantic OCS and included the 164 species selected by Watts (2010) plus an additional 13 species, for a total of 177 species that may occur on the Atlantic OCS from Maine to Florida during all or some portion of the year. As discussed in Robinson Willmott et al. (2013), species populations with high scores for sensitivity for collision include gulls, jaegers, and the northern gannet (*Morus bassanus*). In many cases, high collision sensitivity was driven by high occurrence on the Atlantic OCS, low avoidance rates with high uncertainty, and time spent in the RSZ. Many of the species addressed in Robinson Willmott et al. (2013) that had low collision sensitivity include migrating passerines that typically fly above the RSZ. As discussed in BOEM (2012), 55 species may be expected to have some level of potential overlap with the WEA and could encounter operating WTGs on the Atlantic OCS. However, generally the abundance of bird species that overlap with the anticipated development of wind energy facilities on the Atlantic OCS is relatively small. As described above, of the 177 species that may occur along the Atlantic coast, 55 are likely to encounter WTGs associated with offshore wind development. Of these, there are a total of 47 marine bird species with sufficient survey data to calculate the modeled percentage of a species population that would overlap with the anticipated offshore wind development on the Atlantic OCS (Winship et al. 2018); the relative seasonal exposure is generally very low, ranging from 0.0% to 5.2% (see Table 3.7-2). BOEM assumes that the 47 species (85%) with sufficient data to model the relative distribution and abundance on the Atlantic OCS are representative of the 55 species that may overlap with offshore wind development on the Atlantic OCS.

It is generally assumed that inclement weather and reduced visibility causes changes to migration altitudes and could potentially lead to large-scale mortality events (BOEM 2021a). However, this has not been shown to be the case in studies of offshore wind facilities in Europe, with oversea migration completely, or nearly so, ceasing during inclement weather (Fox et al. 2006; Hüppop et al. 2006) and with migrating birds avoiding flying through fog and low clouds (Panuccio et al. 2019). Further, many of these passerine species, while detected on the OCS during migration as part of BOEM's Acoustic/Thermographic Offshore Monitoring project (Robinson Willmott and Forcey 2014), were documented in relatively low numbers. In addition, most of the activity (including blackpoll warblers) was during windspeeds less than 10 kilometers per hour—below the turbine cut-in speed (see Figure 109 in Robinson Willmott and Forcey 2014) and therefore pose little risk to migrating passerines.

During migration, many bird species, including songbirds, are likely to fly at heights well above the RSZ (89 to 696 feet [27 to 212 m] above sea level) (BOEM 2021a). As shown in Robinson Willmott et al. (2013), species with low sensitivity scores include many passerines that only cross the Atlantic OCS briefly during migration and typically fly well above the RSZ. Additionally, with the proposed 1-nm (1.9-km) spacing between structures associated with future offshore wind development and the distribution of anticipated projects, only a small percentage of bird species migrating over the Atlantic OCS would encounter WTGs, with most flying above or below spinning turbines. Further, the spacing between turbines would likely permit birds to fly through individual lease areas without changing course or only making minor course corrections to avoid operating WTGs. Course corrections made to avoid a wind energy facility could result in exposure to one or more additional wind energy facilities within the GAA, but again, the 1-nm spacing would allow for migrating individuals to make only small course correction, if any, to avoid operating WTGs. Course corrections made by migratory birds to avoid a project or individual WTG would be relatively minor when compared to the distances traveled during seasonal long-distance migrations. Adverse impacts of additional energy expenditure due to minor course corrections or complete avoidance of lease areas would not be expected to be biologically significant, and no population-level effects would be expected. Therefore, these adverse impacts would be **minor**.

The addition of WTGs to the offshore environment could result in increased functional loss of habitat for those bird species with higher displacement sensitivity. However, substantial foraging habitat for resident birds would remain available. Further, a recent study of long-term data collected in the North Sea found that despite the extensive observed displacement of loons in response to the development of 20 wind farms, there was no decline in the region's loon population (Vilela et al. 2021).

The presence of new structures could result in increased prey items for some marine bird species. WTG foundations could increase the mixing of surface waters and deepen the thermocline, possibly increasing pelagic productivity in local areas (English et al. 2017). The new structures may also create habitat for structure-oriented and/or hard-bottom species. This reef effect has been observed around WTGs, leading to local increases in biomass and diversity (Causon and Gill 2018). Invertebrate and fish assemblages may develop around these reef-like elements within the first year or two after construction (English et al. 2017). Although some studies have noted increased biomass and increased production of particulate organic matter by epifauna growing on submerged foundations, it is not clear to what extent the reef effect results in increased productivity versus simply attracting and aggregating fish from the surrounding areas (Causon and Gill 2018). Recent studies have found increased biomass for benthic fish and invertebrates, and possibly for pelagic fish, marine mammals, and birds as well (Pezy et al. 2018; Raoux et al. 2017; Wang et al. 2019), indicating that offshore wind energy facilities can generate beneficial permanent impacts on local ecosystems, translating to increased foraging opportunities for individuals of some marine bird species. BOEM anticipates that the presence of structures may result in permanent beneficial impacts. Conversely, increased foraging opportunities could attract marine birds, potentially exposing those individuals to increased collision risk associated with operating WTGs. Therefore, these impacts would be **minor** adverse.

#### 3.7.2.2.3 Conclusions

Under the No Action Alternative, birds would continue to follow the current general trends and respond to current and future environmental and societal activities. Although the Project would not be built as proposed under the No Action Alternative, ongoing activities (e.g., commercial fisheries) and future offshore wind development would continue to have temporary to permanent adverse impacts (e.g., disturbance, displacement, injury, mortality, habitat degradation, habitat conversion) on birds primarily through accidental releases, anthropogenic noise, traffic, presence of structures, and climate change. In addition to ongoing activities, the impacts of planned actions other than offshore wind development, including new submarine cables and pipelines, increasing onshore construction, marine minerals extraction, port expansions, and the installation of new structures on the Atlantic OCS, would be **minor** adverse. The combination of ongoing activities and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts on birds in the GAA.

Considering all the IPFs together, the overall impacts associated with offshore wind activities in the GAA would result in **minor** adverse impacts to birds. Most of the offshore structures in the GAA would be attributable to offshore wind development. Migratory birds that use the offshore WEAs during all or parts of the year would either be exposed to new collision risk or would have long-term functional habitat loss due to behavioral avoidance and displacement from WEAs on the Atlantic OCS. The offshore wind development would also be responsible for most of the impacts related to new cable emplacement and pile-driving noise, but impacts on birds resulting from these IPFs would be localized and temporary and would not be biologically significant.

The No Action Alternative would forgo postconstruction avian monitoring for migratory birds and ESA-listed species and annual mortality reporting, the results of which could contribute to an improved understanding of the effects of offshore wind development, benefit the future management of these species, and inform planning of other offshore development. However, ongoing and future surveys and monitoring could still supply similar data.

### 3.7.2.3 Alternative B: Impacts of the Proposed Action on Birds

#### 3.7.2.3.1 Construction and Installation

#### Offshore Activities and Facilities

<u>Accidental releases and discharges:</u> Some potential for mortality, decreased fitness, and health effects exists due to the accidental release of fuel, hazmat, and trash and debris from vessels associated with construction and installation of the Proposed Action. Vessels associated with the Proposed Action may generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris. All vessels associated with the Proposed Action would comply with USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills. Potential adverse impacts to birds from contaminant discharges or releases or from improper disposal of trash or debris during construction would be avoided or minimized with adherence to federal, state, and local regulations regarding disposal of solid and liquid wastes, resulting in short-term **negligible** to **minor** adverse impacts. Accidental spills or releases of oils or other hazardous materials offshore would be managed through the OSRP (see COP Appendix D [Orsted 2023]). Additionally, training and awareness of BMPs proposed for waste management and mitigation of marine debris would be required of Project personnel, reducing the likelihood of occurrence to a very low risk. These accidental releases, if any, would occur infrequently at discrete locations and vary widely in space and time; for this reason, BOEM expects localized and temporary **negligible** adverse impacts on birds.

<u>Anchoring and new cable emplacement/maintenance:</u> Construction of the WTG foundations and the installation of the submarine cables could result in short-term habitat disturbance for foraging birds. Seafloor disturbed by cable installation and dredging prior to cable installation would result in turbidity effects that could reduce marine bird foraging success or have temporary and localized impacts on marine bird prey species. These impacts would be temporary, lasting up to 12 hours, and localized to the emplacement corridor. Vessel anchoring during construction would also result in increased turbidity. Individual birds would successfully forage in nearby areas not affected by increased turbidity/sedimentation during anchoring and cable emplacement, and only nonmeasurable **negligible** adverse impacts, if any, on individuals or populations would be expected given the localized and temporary nature of construction activities.

<u>Climate change:</u> Construction of the offshore facilities would result in a small temporary increase in GHG emissions within the GAA during the construction phase. However, these emissions could be reduced by staggering construction time frames and implementing applicant-proposed EPMs (see Table G-1 in

Appendix G). As a result, adverse impacts to birds from construction of the Proposed Action associated with climate change would be short term **negligible** adverse.

Light: Lighting used during construction would be limited to the minimum required for safety during construction activities to minimize potential impacts. Therefore, adverse impacts to birds from lighting during construction would be localized and temporary **negligible** to **minor** adverse.

Noise: **Negligible** to **minor** adverse impacts to birds would occur from construction noise related to pile driving as well as geological and geophysical surveys and aircraft and vessel traffic. These activities could flush birds in the path of vessels, causing temporary displacement from the area. However, these impacts would be temporary and similar to baseline conditions as vessel traffic already occurs, resulting in similar temporary displacement of birds in the GAA (Stantec 2018). These impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. As described in Section 4.1.2.2 of the BA (BOEM 2022), underwater noise from monopile installation would be unlikely to measurably affect prey availability for birds.

Presence of structures: The various types of impacts on birds that could result from the presence of structures during construction include fish aggregation and an associated increase in foraging opportunities as well as entanglement and fishing gear loss/damage, migration disturbances, and displacement. These impacts would be temporary, and BOEM expects them to be **negligible** adverse. **Negligible** to **minor** temporary adverse impacts from bird collisions with visible structures could occur during construction, depending on the species and number of individuals involved.

### Onshore Activities and Facilities

Accidental releases and discharges: Onshore, construction and HDD activities could result in the accidental releases of fuel, fluids, or hazmat; sediment; and/or trash and debris. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time. Revolution Wind would prepare a construction SPCC plan in accordance with applicable requirements and would outline spill prevention training, plans, and steps to take to contain and clean up spills that could occur. Based on the low risk of spills due to implementation of safe handling, storage, and cleanup procedures, impacts from accidental spills and trash would represent a localized and temporary **negligible** adverse impact to birds.

Climate change: Onshore impacts to birds associated with climate change from construction of the Proposed Action would be similar to those discussed above for offshore facilities and activities: short term **negligible** adverse.

Light: Most of the onshore construction would occur during the daylight hours, although some overnight lighting may occasionally be necessary during construction of the onshore facilities. However, this is not expected to have a measurable effect on bird behavior, therefore BOEM anticipates temporary **negligible** adverse impacts to birds.

New cable emplacement/maintenance: Land disturbance and habitat alteration resulting from construction within the landfall work area may result in the direct injury or mortality of bird species. Mobile individuals would be able to temporarily vacate an area of disturbance and therefore would be less susceptible to mortality or injury compared to less mobile (pre-volant) individuals. Mitigations like observing time-of-year restrictions on vegetation removal would avoid the breeding season of birds, thus reducing the likelihood of injury and/or mortality from construction activities. Therefore, the impacts (e.g., injury and/or mortality) resulting from land disturbance and habitat alteration would be temporary **negligible** adverse. Further, HDD would be employed to make the connection between the onshore transmission cable and the landfall work area, which would limit or completely avoid impacts to the human-made shoreline and the ruderal grassland/shrubland because the onshore transmission cable would be installed under these resources. Because construction work within the landfall work area would occur largely outside of the breeding period of listed species that might nest in the area, and because use of the shoreline by shorebirds within the landfall work area has not been documented (VHB 2023), onshore impacts for listed species from land disturbance would be **negligible** adverse. A detailed impacts analysis to federally listed birds from construction activities is in the USFWS BA (BOEM 2022, 2023a).

The temporary onshore construction work area for HDD operations would likely be situated within a previously developed area (e.g., an existing parking lot) and would not impact the human-made shoreline and/or the ruderal grassland/shrubland. Because the landfall work area is limited to anthropogenically made or disturbed features of the human-made shoreline and the ruderal grassland/shrubland, the potential for land disturbance and habitat alteration to significantly affect birds is **negligible** adverse. Additional land disturbance and habitat alteration would result from the installation of the onshore transmission cable from the transition joint bays to the OnSS. The onshore transmission cable installation would result in temporary ground disturbance. Most of the temporary ground disturbance would occur in previously disturbed areas along paved roads or parking lots and would not result in impacts to bird habitat.

Onshore transmission cable installation would also result in temporary ground disturbance. Most of the temporary ground disturbance would occur in previously disturbed areas along paved roads or parking lots and would not result in impacts to bird habitat.

<u>Noise:</u> Noise from traffic associated with construction and vegetation removal within the landfall work area and other onshore facilities could affect shorebirds, some seabirds, and land birds that use the terrestrial habitats in the immediate vicinity of construction activities through displacement or avoidance behavior of individuals and/or disruptions in communication, mating, and hunting. Displacement and avoidance behavior are expected to only occur during construction, which would occur primarily in already developed areas where birds are habituated to these types of activities. The impacts associated with construction would be similar to existing sources of noise and traffic in the local area and therefore are considered a temporary **negligible** adverse impact.

<u>Presence of structures:</u> Impacts from habitat alteration and land disturbance on coastal and terrestrial bird habitats generated from the construction of the onshore facilities would create habitat loss and conversion, affect bird habitat use, and possibly create habitat degradation. The OnSS and ICF parcels include ruderal forested swamp, shrub marsh, ruderal mixed oak/white pine forest, ruderal pitch pine barren, and a landfill. Vegetation clearing and ongoing vegetation management would convert some of these cover types to permanently developed land or shrubland within the areas that would undergo vegetation maintenance. This habitat conversion may be detrimental to species reliant on forest habitat but beneficial to other species that are more suited to the newly converted habitat (e.g., passerines adapted to grassland and shrubland). The OnSS would result in a permanent loss of 3.8 acres of mixed oak/white pine forest and 0.6 acre of ruderal pitch pine barren. However, the portion of forested habitat removal would be small relative to the available forested habitat in the surrounding area. During the breeding season, clearing of trees or vegetation could result in destruction of nests, adversely impacting some individuals. However, lasting impacts to local breeding populations are not anticipated. Tree and shrub removal work would

occur before May 1 and after August 15, as feasible (see COP Table ES-1), to avoid the potential disturbance of birds during the breeding season. If tree and shrub removal cannot be avoided during this season, Revolution Wind would coordinate with the appropriate agencies to determine the appropriate course of action. Visible structures (i.e., construction equipment) would be present during construction of the onshore facilities. Collisions between birds and vehicles or construction equipment have some limited potential to cause injury and mortality. However, these impacts, if any, would be temporary **negligible** adverse, as most individuals would avoid noisy construction areas (Bayne et al. 2008; Goodwin and Shriver 2010; McLaughlin and Kunc 2013). Therefore, impacts to birds from construction of onshore facilities would be short term **negligible** to **minor** adverse.

#### 3.7.2.3.2 Operations and Maintenance and Decommissioning

#### Offshore Activities and Facilities

<u>Accidental releases and discharges:</u> Impacts to birds from this IPF during operation and decommissioning of the offshore facilities are expected would be similar to offshore construction impacts and result in short-term **negligible** to **minor** adverse impacts with compliance with the USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills and adherence to federal, state, and local regulations regarding disposal of solid and liquid wastes.

<u>Anchoring and new cable emplacement/maintenance:</u> Other than temporary increases in turbidity from seafloor disturbance due to occasional vessel anchoring, no impacts to bird species are anticipated during the O&M phase for the offshore RWF or RWEC. Impacts from decommissioning would be similar to construction impacts unless the RWEC is abandoned in place: **negligible** adverse.

<u>Climate change:</u> The expected impacts on climate change from operation of the offshore facilities alone would not result in a measurable increase in the adverse impacts to birds beyond those described under the No Action Alternative. In addition, operation of the Proposed Action could also contribute to a long-term net decrease in GHG emissions and may beneficially contribute to a broader combination of actions to reduce future impacts to birds from climate change over the long term due to reduced reliance on fossil fuel–generated energy sources, but this change would likely not be measurable. Therefore, BOEM expects the impacts from the Proposed Action on climate change would be long term **negligible**.

<u>Light:</u> Under the Proposed Action, up to 100 WTGs and up to two OSSs would be lit with USCG navigational and FAA hazard lighting. These lights have some potential to attract birds and result in increased collision risk (Hüppop et al. 2006). However, the mandatory use of red flashing aviation obstruction lights, the avoidance of any steady-burning aviation obstruction lights, and the use of ADLS (see Table F-2 in Appendix F for details) are expected to minimize bird attraction and therefore collision risk (Kerlinger et al. 2010; Orr et al. 2016). For this reason, BOEM expects adverse impacts, if any, to be long term **negligible** adverse from offshore lighting.

<u>Noise:</u> Impacts to birds from operational noise and decommissioning of the offshore facilities would be similar to offshore construction impacts and result in **negligible** adverse impacts.

<u>Presence of structures:</u> Within the Atlantic Flyway along the North American Atlantic coast, much of the bird activity is concentrated along the coastline (Watts 2010). Waterbirds use a corridor between the coast and several kilometers out onto the Atlantic OCS, whereas land birds tend to use a wider corridor extending from the coastline to tens of kilometers inland (Watts 2010). However, operation of the

Proposed Action would result in impacts on some individuals of offshore bird species and possibly some individuals of coastal and inland bird species during spring and fall migration. These impacts could arise through direct mortality from collisions with WTGs and/or through behavioral avoidance and habitat loss (Drewitt and Langston 2006; Fox et al. 2006; Goodale and Millman 2016). To reduce the collision risk with WTGs, Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with a spacing of approximately 1.15 miles (1 nm) × 1.15 miles (1 nm) that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This wide spacing of WTGs is expected to allow birds to avoid individual WTGs and minimize risk of potential collision (see COP Table ES-1).

In COP Appendix AA (BRI 2023), vulnerability was assessed to determine how sensitive a bird population is to mortality or habitat loss related to the presence of a wind farm and in terms of collision vulnerability and displacement vulnerability. Factors considered in vulnerability assessments include vital rates, existing population trends, relative abundance, nocturnal flight activity, diurnal flight activity, avoidance, proportion of time within the RSZ, maneuverability in flight, percentage of time flying, and habitat flexibility. Avian flight heights were important in the assessment of behavioral vulnerability. Flight heights used in the assessment were gathered from OSAMP boat-based surveys (local) and datasets in the Northwest Atlantic Seabird Catalog (regional). Final exposure and vulnerability assessments for each taxonomic group and species are provided in Sections 3.4 through 3.10 of COP Appendix AA (BRI 2023) and in Table 3-38 of COP Appendix AA (BRI 2023).

The presence and operation of the offshore facilities may result in displacement of waterbirds, waterfowl, seabirds, and phalaropes that use the area for foraging, resting, or nighttime roosting. Some species can be displaced several kilometers outside the Lease Area (Welcker and Nehls 2016). Generally, the relative abundance of bird species that are most sensitive to displacement is low within the offshore portion of the Project during all seasons (BRI 2023). These long-term adverse impacts would be **negligible** to **minor**, depending on whether birds are at high risk for displacement or are able to access preferred habitat, and these impacts may change over time if birds become habituated to the presence of the WTGs and OSSs. Impacts to birds from decommissioning of the RWF and offshore RWEC would be similar to those described for the construction phase.

The Lease Area is generally beyond the range of most breeding terrestrial or coastal bird species. Coastal birds that may forage in the Lease Area occasionally, visit the area sporadically, or pass through on their spring and/or fall migrations include shorebirds (e.g., sandpipers, plovers), waterbirds (e.g., cormorants, grebes), waterfowl (e.g., scoters, mergansers), wading birds (e.g., herons, egrets), raptors (e.g., falcons, eagles), and songbirds (e.g., warblers, sparrows). Overall, with the exception of migratory falcons and songbirds, coastal birds are considered to have minimal exposure to the Lease Area. Falcons, primarily peregrine falcons, may be exposed to the Lease Area. Some migratory songbirds, particularly the blackpoll warbler, may also be exposed to the Lease Area during fall migration, but population-level impacts are unlikely because exposure of the population to the Lease Area is expected to be minimal to low and limited to migration. Of the marine birds, loons, sea ducks, gulls, terns, and auks received up to a medium overall exposure assessment. Loons, sea ducks, gannets, and auks are documented to avoid wind farms, but displacement from the Lease Area is unlikely to affect populations because there is likely available foraging habitat outside the Lease Area (BRI 2023).

Special-status bird species were also assessed, including golden eagle, bald eagle, red knot, piping plover, and roseate tern. The Project is not expected to affect special-status species populations. Golden and bald eagle exposure to the Lease Area is considered minimal because these species are rarely detected in the offshore environment. Red knots and piping plovers have the potential to be exposed only during migration, and vulnerability to collision is considered low because shorebirds fly substantially above the RSZ during migrations. Although tracked roseate terns were estimated to have passed through the northern portion of the Lease Area (BRI 2023), individual impacts are unlikely because the birds were not detected in the Lease Area during surveys, and they would be primarily flying below the RSZ. A detailed analysis of the impacts from O&M and decommissioning of the offshore facilities on federally listed birds can be found in the BA (BOEM 2022, 2023a).

### Onshore Activities and Facilities

Accidental releases and discharges: The OnSS would require various oils, fuels, and lubricants to support its operation. As described above in Section 3.7.2.2.1, accidental discharges, releases, and disposal could indirectly cause bird habitat degradation; however, risks would be avoided through spill prevention and control measures and associated BMPs. Therefore, potential adverse impacts associated with discharges and releases are considered short term and localized **negligible** adverse.

Climate change: No measurable climate change impacts to birds from O&M of the onshore facilities are expected. Climate change impacts from decommissioning would be similar to those described for construction. Therefore, the adverse impacts from this IPF are expected to be long term **negligible** adverse.

Light: During the O&M of the OnSS and ICF, yard lighting would be used for assessment of equipment. In general, operational lighting would be limited to the minimum necessary to ensure safety and compliance with applicable regulations (see COP Table ES-1). Most decommissioning activities would occur during the day, and overnight lighting would only be necessary if there is work in progress on-site or lights are left on for safety and security purposes. Therefore, the adverse impacts resulting from this IPF would be long term **negligible**.

New cable emplacement/maintenance: Operation of the onshore transmission cable would pose no risk to birds because it would be buried. Land disturbance in the form of vegetation management would occur on a periodic basis to maintain vegetation at shrub height within the perimeters of the onshore facilities. Hazard tree removal would be performed on a cyclical basis to inspect and remove trees that may fail that are outside the edge of the maintained ROW. Land disturbance as it relates to vegetation clearing may result in the direct injury or mortality of birds. However, mortality and injury impacts would be mitigated by observing time-of-year restrictions on vegetation removal that would avoid the breeding season of bird species. Therefore, the adverse impacts resulting from this IPF would be **negligible**. Impacts from land disturbance during decommissioning would be similar to those described in Section 3.7.2.2.1, though the impacts would likely be less because new vegetation clearing, and grading would not be necessary.

Noise: According to the VHB (2023) onshore acoustic assessment, during O&M, the proposed OnSS and ICF would introduce new sources of sound, which is modeled to be 45.5 dBA (Leq) or less when measured at the nearest anthropogenic sensitive receptors and falls within the ambient sound range measured at baseline conditions. Temporary noise and construction-related traffic may occasionally be generated due to nonroutine maintenance. Pickup trucks or other automobiles would be used to make routine visits to the OnSS and ICF during O&M. Occasional maintenance and operational emergency visits may necessitate bucket trucks, cranes, and similar vehicles to facilitate these activities. Infrequent vehicle usage within the OnSS and ICF may create temporary noise-related disturbance to birds adjacent to the OnSS. However, such disturbance would be short term, and normal avian activity would likely resume after the traffic ceases. BOEM expects these adverse impacts to be **negligible**.

Presence of structures: The OnSS and ICF would be visible structures that would result in permanent bird habitat conversion and loss. The OnSS access road and fenced-in property would become nonhabitat and result in habitat fragmentation. The conversion of forested cover type outside the OnSS and ICF fences would alter the structural diversity within a forested area by adding more edge habitat. Considering the adjacent landscape consists primarily of residential and commercial developments with some undisturbed areas of ruderal forested swamp, the adverse impacts to birds from the OnSS and the ICF on forested habitat fragmentation would be long term **negligible** to **minor**.

This change in the visible landscape would present a very minor risk of mortality or injury to birds due to collision with the OnSS or ICF, and, generally, the changes to the habitat conditions would result in avoidance behavior and may influence bird habitat selection near these structures (e.g., breeding habitat for some forest-dependent species may be less suitable). These impact risks would exist throughout the O&M phase of the Project. The potential for avian mortality or injury due to the low risk of collision with the OnSS and related structures would be a long-term **minor** adverse impact. The potential for avian avoidance behavior related to habitat conversion and loss from the OnSS would also be a long-term **minor** adverse impact. If the footprint of the OnSS and ICF yards are left in place after they have been decommissioned and equipment has been removed, the remaining development would still be considered a visible structure because it would remain a hard structure within a forested area. Adverse impacts to birds from habitat fragmentation related to a visible change in the landscape during decommissioning would be **negligible** because local populations would have adapted to the landscape changes.

#### 3.7.2.3.3 Cumulative Impacts

### Offshore Activities and Facilities

Accidental releases and discharges: Future offshore wind activities would contribute to an increased risk of spills and associated impacts due to fuel, fluid, or hazmat exposure. The contribution from future offshore wind and the Proposed Action would be a low and non-measurable percentage of the overall spill risk from all ongoing offshore activities. In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be likely limited in extent and duration and would result in localized and temporary **negligible** adverse cumulative impacts on birds.

Anchoring and new cable emplacement/maintenance: The Proposed Action would add 7,213 acres of seafloor disturbance from RWEC and IAC installation and anchoring to the No Action Alternative, which equates to 7% of the total seafloor disturbance estimated under the No Action Alternative. This would result in localized turbidity effects that could reduce marine bird foraging success or impact marine bird prey species. However, individual birds would be expected to successfully forage in nearby areas not affected by increased turbidity, and only non-measurable **negligible** adverse impacts, if any, on individuals or populations would be expected given the localized and temporary nature of the potential impacts. In the context of reasonably foreseeable environmental trends, the combined cable emplacement impacts from ongoing and planned actions, including the Proposed Action, could occur if impacts are in close temporal and spatial proximity. However, these adverse impacts from anchoring and cable emplacement would be **negligible** and would not be biologically significant. For these reasons, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** cumulative adverse impacts to birds.

<u>Climate change:</u> The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action. However, the Proposed Action could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts. Therefore, long-term **minor** adverse and long-term **negligible** beneficial cumulative impacts to birds are expected.

<u>Light:</u> The Proposed Action would add up to 100 new WTGs with red flashing aviation hazard lighting to the No Action Alternative; these lights could attract birds and result in increased collision risk (Hüppop et al. 2006). Additionally, marine navigation lighting would include one or more flashing white lights on each WTG and the OSSs and would be directed out and down to the water surface. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from wind farm areas. Ongoing and future non–offshore wind activities are expected to cause short-term impacts, primarily from vessel lights. For these reasons, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** adverse cumulative impacts to birds, and no individual or population-level impacts would be expected.

<u>Noise:</u> Pile-driving and other construction noise and activity associated with the Proposed Action could add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. Potential impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. However, the Proposed Action’s contribution to adverse noise impacts would be limited in duration, negligible, and cease when construction ends. No individual fitness (i.e., a bird’s ability to survive and reproduce) or population-level effects would be expected. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative impacts to birds.

<u>Presence of structures:</u> The Proposed Action would add up to 100 additional WTGs and up to two OSSs compared to the No Action Alternative. The total cumulative foundations on the Atlantic OCS would be 3,190, and the Project would account for less than 4% of that total number. Adverse impacts to migration patterns or collision risk from these additional turbines would be negligible and would persist until decommissioning is complete. Additionally, beneficial impacts to foraging near offshore structures would similarly be negligible and persist for the life of the Project. Therefore, cumulative impacts on birds from the presence of structures associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be long term **minor** adverse and long term **minor** beneficial.

### Onshore Activities and Facilities

<u>Accidental releases and discharges:</u> Onshore construction activities and operation of the OnSS under the Proposed Action could result in the accidental releases of fuel, fluids, or hazmat; sediment; and/or trash and debris. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time. Ongoing and future onshore activities could contribute to impacts to birds from accidental releases if they occur at the same time within the GAA. However, incidences such as these would be mitigated by implementation of project-specific SPCC plans. In the context of reasonably foreseeable

environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be localized and temporary due to the likely limited extent and duration of a release and result in **negligible** adverse cumulative impacts to birds.

Climate change: The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action, but no measurable change from the operational impacts of onshore activities and facilities to birds under the No Action Alternative is anticipated. Therefore, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action and cumulative impacts, are expected to be long term **minor** adverse.

Light: Lighting used during construction of the Proposed Action would be limited to the minimum required for safety. Operational lighting would be limited to the minimum necessary to ensure safety and compliance with applicable regulations (see COP Table ES-1). Decommissioning activities would primarily occur during the day, and overnight lighting is not expected. Therefore, impacts to birds from the Proposed Action would be localized and temporary **negligible** to **minor** adverse. Ongoing and future onshore activities could contribute to impacts to birds from light if they occur at the same time within the GAA. However, these effects are also expected to be localized and temporary and would not contribute to adverse cumulative impacts to birds in the GAA.

New cable emplacement/maintenance: The Proposed Action would result in temporary ground disturbance from installation of the onshore transmission cable and construction at the landfall work area. Most of this temporary ground disturbance would occur in previously disturbed areas along paved roads or parking lots and would not result in impacts to bird habitat. Operation of the onshore transmission cable would pose no risk to birds because it would be buried, and no other impacts to bird species are anticipated during routine onshore operations. Therefore, the contribution of the Proposed Action on adverse cumulative impacts to birds from new cable emplacement or maintenance in the context of reasonably foreseeable onshore environmental trends within the GAA is expected to be **negligible** adverse.

Noise: Onshore construction activities would add to onshore noise, resulting in localized and temporary impacts to birds (i.e., avoidance and displacement), particularly if ongoing and planned onshore activities overlap with the Proposed Action in space and time. Normal operation of the OnSS would generate continuous noise. However, BOEM expects long-term **negligible** adverse impacts when considered in the context of the other commercial and industrial noises nearby. Therefore, in the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be localized and temporary due to the likely limited extent and duration of noise and would result in **negligible** adverse cumulative impacts to birds.

Presence of structures: The Proposed Action would result in the permanent conversion, loss, and fragmentation of onshore bird habitat through the removal of forested cover types for construction of the OnSS and the ICF. These actions could result in localized and temporary impacts to birds, including avoidance and displacement, although no individual fitness or population-level effects would be expected. These changes would have a **negligible** adverse effect on birds because forested habitat is common within the surrounding area. In addition, the permanent onshore facilities (ICF and OnSS) would be located on the edge of previously developed areas. The presence of these structures when considered in the context of ongoing and planned actions within the GAA would be a very minor risk of mortality or injury to birds due to collision, and generally, the changes to the habitat conditions would result in avoidance behavior and may influence bird habitat selection. Therefore, BOEM anticipates long-term **negligible** to **minor** adverse cumulative impacts to birds.

#### 3.7.2.3.4 Conclusions

Project construction and installation and decommissioning would introduce noise, lighting, human activity, debris and contaminants, and new structures and vessels (increasing potential collision risk) to the GAA as well as alter existing bird habitat. Noise, lighting, and human activity impacts from Project O&M would occur, although at lower levels than those produced during construction and decommissioning. Offshore structures would also represent a long-term collision risk. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **minor** adverse for the duration of the Project. Therefore, BOEM expects the overall impact on birds from the Proposed Action alone to be long term **minor** adverse; however, the resource would recover completely after decommissioning without remedial or mitigating action.

In the context with other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from temporary to long term **negligible** to **minor** adverse as well as long term **negligible** beneficial. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** cumulative adverse impacts to birds. This determination is because the impacts would not be expected to result in noticeable change to the condition of birds in the GAA, and the populations would recover completely without remedial or mitigating action.

### 3.7.2.4 Alternatives C, D, E, and F

Table 3.7-1 provides an analysis of all evaluated IPFs for birds across these alternatives.

#### 3.7.2.4.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated IACs, which would have an associated reduction in potential collision risk, BOEM expects that the impacts to birds resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **minor** adverse. Therefore, BOEM expects the overall impact on birds from the Proposed Action alone to be long term **minor** adverse; however, the resource would recover completely after decommissioning without remedial or mitigating action.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor** adverse and **minor** beneficial). The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** adverse.

### 3.7.2.5 Alternative G: Impacts of the Preferred Alternative on Birds

Table 3.7-1 provides a summary of IPF findings for this alternative.

#### 3.7.2.5.1 Conclusions

Although Alternative G would reduce the number of WTGs and their associated IACs, which would have an associated reduction in potential collision risk, BOEM expects that the impacts to birds resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **minor** adverse. Therefore, BOEM expects the overall impact on birds from the Proposed Action alone to be long term **minor** adverse; however, the resource would recover completely after decommissioning without remedial or mitigating action.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternative G's impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor** adverse and **minor** beneficial). The overall impacts of Alternative G when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** adverse.

### 3.7.2.6 Mitigation

Mitigation measures resulting from agency consultations for birds are identified in Appendix F, Table F-2, and addressed in Table 3.7-3. Conservation recommendations proposed to BOEM by the USFWS on May 30, 2023, are identified in Appendix F, Table F-3, and addressed in Table 3.7-4.

**Table 3.7-3. Mitigation and Monitoring Measures Resulting from Consultations for Birds (Appendix F, Table F-2)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Bird-perching deterrent devices | To minimize attracting birds to operating turbines, the Lessee must install anti-perching devices on WTGs and the OSS. The location of anti-perching devices must be proposed by the Lessee based on BMPs applicable to the appropriate operation and safe installation of the devices. The Lessee must confirm the locations of anti-perching devices with a monitoring plan to track the efficacy of the anti-perching devices as part of the as-built documentation it must submit with the facility design report. | Anti-perching devices would discourage birds from perching on WTGs and the OSS, which would reduce the risk of collision with WTGs as well as minimize the perching of avian predators. |
| Annual bird and bat mortality reporting | The Lessee must submit an annual report covering each calendar year, due by January 31 of the following year, documenting any dead (or injured) birds or bats found on vessels and structures during construction, operations, and decommissioning. The report must be submitted to BOEM (at renewable_reporting@boem.gov) and BSEE (at OSWSubmittals@bsee.gov) and the USFWS. The report must contain the following information: species name, date found, location, a picture to confirm species identity (if possible), and any other relevant information. Carcasses with federal or research bands must be reported to the USGS Bird Band Laboratory (https://www.usgs.gov/labs/bird-banding-laboratory). Any occurrence of dead ESA-listed birds or bats must be reported to BOEM, BSEE, and the USFWS as soon as practicable (taking into account crew and vessel safety), but no later than 24 hours after the sighting, and if practicable, the dead specimen must be carefully collected to preserve the material in the best possible state. | This measure would not reduce impacts; however, the data gathered from the mortality reporting would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)). |
| Annual bird and bat mortality reporting | Any occurrence of dead ESA birds or bats must be reported to BOEM, BSEE, and USFWS as soon as practicable (taking into account crew and vessel safety), but no later than 24 hours after the sighting, and if practicable, carefully collect the dead specimen and preserve the material in the best possible state. | This measure would not reduce impacts; however, the data gathered from the mortality reporting would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)). |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Avian and bat monitoring program | At least 45 calendar days before beginning surveys, the Lessee must complete, obtain concurrence from the DOI, and adopt an avian and bat monitoring plan (ABMP), as described in Revolution Wind's *Avian and Bat Post-Construction Monitoring Framework* (see Appendix G and COP Appendix AA), including coordination with interested stakeholders. The DOI will review the ABMP and provide any comments on the plan within 30 calendar days of its submittal. The Lessee must resolve all comments on the ABMP to the DOI's satisfaction before implementing the plan. The Lessee may conclude that the DOI has concurred in the ABMP if the DOI provides no comments on the plan within 30 calendar days of its submittal date. a. Monitoring. The Lessee must 1) install acoustic monitoring devices for bats for 2 years, 2) install Motus receivers within the wind farm, 3) refurbish up to two onshore Motus receiver stations, 4) provide funding for up to 150 Motus tags per year for up to 3 consecutive years, and 5) conduct a 1- to 2-year cross-Project radar study to measure migrant flux rates and flight heights and marine bird avoidance.<br>b. Annual monitoring reports. The Lessee must submit to BOEM (at renewable_reporting@boem.gov), the USFWS, and BSEE (at OSWSubmittals@bsee.gov) a comprehensive report after each full year of monitoring (preconstruction and postconstruction) within 6 months of completion of the last avian survey. The report must include all data, analyses, and summaries regarding ESA-listed and non-ESA-listed birds and bats. The DOI will use the annual monitoring reports to assess the need for reasonable revisions (based on SME analysis) to the ABMP. The DOI reserves the right to require reasonable revisions to the ABMP and may require new technologies as they become available for use in offshore environments.<br>c. Postconstruction quarterly progress reports. The Lessee must submit quarterly progress reports during the implementation of the ABMP to BOEM (at | This measure would not reduce impacts; however, the data gathered from the monitoring would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)). |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | renewable_reporting@boem.gov) and the USFWS by the fifteenth day of the month following the end of each quarter during the first full year that the Project is operational. The progress reports must include a summary of all work performed, an explanation of overall progress, and any technical problems encountered.<br>d. Monitoring plan revisions. Within 15 calendar days of submitting the annual monitoring report, the Lessee must meet with BOEM and the USFWS to discuss the following: the monitoring results; the potential need for revisions to the ABMP, including technical refinements or additional monitoring; and the potential need for any additional efforts to reduce impacts. If the DOI determines after this discussion that revisions to the ABMP are necessary, the DOI may require the Lessee to modify the ABMP. If the reported monitoring results deviate substantially from the impact analysis included in the Final EIS, the Lessee must transmit to DOI recommendations for new mitigation measures and/or monitoring methods.<br>e. Operational reporting (operations). The Lessee must submit to BOEM (at renewable_reporting@boem.gov) and BSEE (at OSWSubmittals@bsee.gov) an annual report summarizing the following monthly operational data calculated from 10-minute SCADA for all turbines together in tabular format: the proportion of time the turbines were operational (spinning at > x rpm) each month, the average rotor speed (monthly rpms) of spinning turbines plus 1 standard deviation, and the average pitch angle of blades (degrees relative to rotor plane) plus 1 standard deviation. The DOI will use this information as inputs for avian collision risk models to assess whether the results deviate substantially from the impact analysis included in the Final EIS.<br>f. Raw data. The Lessee must store the raw data from all avian and bat surveys and monitoring activities according to | |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | accepted archiving practices. Such data must remain accessible to the DOI and USFWS, upon request for the duration of the lease. The Lessee must work with BOEM to ensure the data are publicly available. The USFWS may specify third-party data repositories that must be used, such as the Motus Wildlife Tracking System or MoveBank, and such parties and associated data standards may change over the duration of the monitoring plan. | |
| Adaptive mitigation for birds and bats | If the reported postconstruction bird and bat monitoring results (generated as part of Revolution Wind's *Avian and Bat Post-Construction Monitoring Framework* [BRI 2023]) indicate bird and bat impacts deviate substantially from the impact analysis included in this EIS, then Revolution Wind must make recommendations for new mitigation measures or monitoring methods. | This mitigation measure, if adopted, ensures that Project activities would not impact birds beyond the negligible to minor range of impacts discussed in this EIS. |
| Marine debris elimination | Materials, equipment, tools, containers, and other items used in Atlantic OCS activities that could be lost or discarded overboard must be marked to clearly identify the owner and must be durable enough to resist the effects of the environmental conditions to which they may be exposed. | This mitigation measure, if adopted, ensures that Project activities would not impact birds beyond the negligible to minor range of impacts discussed in this EIS. |
| USFWS Biological Opinion RPM 1 to minimize take of piping plovers and rufa red knots* | Periodically review current technologies and methods for minimizing collision risk of migratory birds with WTGs, including but not limited to: WTG coloration/marking, lighting, avian deterrents, remote sensing such as radar and thermal cameras, and limited WTG operational changes.*† | This measure would provide incremental reductions in impacts for two listed birds species, would improve accountability, and reduce uncertainty associated with estimated rates of collision mortality, but would not alter the overall impact determination of the Proposed Action. |
| USFWS Biological Opinion RPM 2 to minimize take of piping plovers and rufa red knots* | Implement those technologies and methods deemed reasonable and prudent to minimize collision risk.*‡ | This measure would provide incremental reductions in impacts for two listed birds species, would improve accountability, and reduce uncertainty associated with estimated rates of collision mortality, but would not alter the overall impact determination of the Proposed Action. |
| USFWS Biological Opinion Terms and Conditions 1: Collision | Periodically review current technologies and methods for minimizing collision risk of listed birds. | This measure would provide incremental reductions in impacts for two listed birds species, would improve accountability, and reduce uncertainty associated with estimated rates of collision |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| risk minimization and monitoring* | • Prior to the start of WTG operations at Revolution Wind, BOEM must compile, from existing project documentation (e.g., the BA, other consultation documents, the final EIS, the COP), a stand-alone summary of technologies and methods that BOEM evaluated to reduce or minimize bird collisions at the Revolution Wind WTGs.<br>• Within 5 years of the start of WTG operation, and then every 5 years for the life of the project, BOEM must prepare a Collision Minimization Report (CMR), reviewing best available scientific and commercial data on technologies and methods that have been implemented, or are being studied, to reduce or minimize bird collisions at offshore and onshore WTGs. The review must be global in scope.<br>• BOEM must distribute a draft CMR to the USFWS, Revolution Wind, and appropriate state agencies for a 60-day review period. BOEM must address all comments received during the review period and issue the final report within 60 days of the close of the review period.<br>• Within 60 days of issuing the final CMR, BOEM must convene a meeting with the USFWS, Revolution Wind, and appropriate state agencies to discuss the report and seek consensus on whether implementation of any technologies/methods are reasonable and prudent. If consensus cannot be reached, the USFWS will consider input from the meeting participants and make the final determination of whether any measures are reasonable and prudent and should be implemented under RPM 2.* | mortality, but would not alter the overall impact determination of the Proposed Action. |
| USFWS Biological Opinion Terms and | Implement those technologies and methods deemed reasonable and prudent. | This measure would provide incremental reductions in impacts for two listed birds species, would improve accountability, and |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Conditions 2: Implementation of measures to minimize take of piping plovers and rufa red knots* | • BOEM will require Revolution Wind to adopt and deploy reasonable and prudent technologies and methods to avoid or minimize take of the piping plover and rufa red knot. BOEM will specify the USFWS-approved timeframe in which any required minimization measure(s) must be implemented, as well as any requirements to monitor, maintain, or adapt the measure(s) over time.<br>• BOEM will require Revolution Wind to provide periodic reporting on the implementation of any minimization measure(s) according to a schedule developed by BOEM and approved by the USFWS.* | reduce uncertainty associated with estimated rates of collision mortality, but would not alter the overall impact determination of the Proposed Action. |

* Information in these rows was taken directly from the final biological opinion (USFWS 2023) has not been edited.

† Operational changes may include, but are not limited to, feathering, which involves adjusting the angle of the blades to slow or stop them from turning under certain conditions.

‡ Reasonable and prudent minimization measures will include only actions that occur within the action area, involve only minor changes to the project, and reduce the projected level of take. Measures are reasonable and prudent when they (and their implementing terms and conditions) are consistent with the project's basic design, location, scope, duration, and timing (50 CFR 402.14(i)(i)(2)). The reasonableness determination will consider both technical and economic factors; the test for reasonableness is whether the proposed measure would cause more than a minor change to the project. The prudency determination will consider the likelihood, based on best available information, of successfully and appreciably reducing bird collisions relative to the cost and technical difficulty of the measure. The BOEM and the Service will ensure that any reasonable and prudent measures and terms and conditions are within the legal authority and jurisdiction of the BOEM and Revolution Wind to carry out.

### Table 3.7-4. Additional Mitigation and Monitoring Measures under Consideration for Birds (Appendix F, Table F-3)

| Mitigation Measure* | Description* | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| USFWS Biological Opinion Conservation Recommendation 1: Adopt compensatory mitigation ratios greater than 1:1 | Estimated levels of collision mortality are associated with high uncertainty. Future advancements in SCRAM are expected to substantially reduce, but not eliminate, uncertainty. In addition, compensatory mitigation actions will likely be associated with their own levels of uncertainty (e.g., probability of success, actual number of bird mortalities offset), and may occur later in time that the project-induced mortality. Thus, the USFWS recommends a compensatory | Pursuant to 50 CFR 402.14(j), conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information |

| Mitigation Measure* | Description* | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | mitigation ratio greater than 1:1, particularly given the extent of full buildout of WTGs anticipated on the OCS. | |
| USFWS Biological Opinion Conservation Recommendation 2: Establish an Offshore Wind Adaptive Monitoring and Impact Minimization Framework to guide and coordinate monitoring, research and avian impacts assessment coastwide. | To address Service concerns related to potential effects of WTG operation on listed and other species of concern, at both the project and coastwide scales, the USFWS recommends that the BOEM develop and adopt an Offshore Wind Adaptive Monitoring and Impact Minimization Framework (Framework) for flying wildlife. Many details will need to be worked out, but here the USFWS provides some basic principles for establishment, adoption, and operation of the Framework.<br>• Establish a Framework Principals Group to consist of representatives from the BOEM, the BSEE, the USFWS, State natural resource agencies responsible for management of birds, bats, and insect, and offshore wind energy developers/operators.<br>• Develop and adopt a written Framework foundational document specifying:<br>○ the governance structure of the Principals Group;<br>○ the geographic coverage of the Framework;<br>○ the species covered by the Framework; and<br>○ the duration of the Framework.<br>• Establish an annual operating budget for the Framework to be funded by offshore wind energy developers/operators.<br>• Arrange for the Principals Group to meet at least annually, and for the Framework foundational document to be updated at least every 5 years.<br>• Provide for experts (both internal and external to the Principals Group) to regularly assess new and improved technologies and methods for estimating collision risk of covered species and measuring or | Pursuant to 50 CFR 402.14(j), conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information |

| Mitigation Measure* | Description* | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | detecting collisions. Adopt and deploy such methods deemed most promising by the Principals Group.<br>• Coordinate monitoring and research across wind energy projects. Share and pool data and research results coastwide.<br>• Provide for experts (both internal and external to the Principals Group) to regularly assess new and improved technologies and methods for minimizing collision risk of covered species. Adopt and deploy such technologies/methods deemed most promising by the Principals Group.<br>• Provide for experts (both internal and external to the Principals Group) to periodically assess new and improved technologies and methods for evaluating indirect effects to covered species from WTG avoidance behaviors (e.g., impacts to time and energy budgets).<br>• Periodically assess the level and type of compensatory mitigation necessary to offset any unavoidable direct and indirect effects of WTG operation on covered species. Adopt and require the levels and types of mitigation deemed appropriate by the Principals Group.<br>• Consider partnering with other stakeholders or cross-sector organizations to provide administrative, institutional, and technical support to the Principals Group. | |
| USFWS Biological Opinion Conservation Recommendation 3: Conduct a coastwide buildout analysis that considers all existing, proposed, and future | The definition of "cumulative effects" at 50 CFR 402.02 excludes future Federal actions because such actions will be subject to their own consultations under section 7 of the ESA. Further, the analysis of environmental baseline conditions for each subsequent consultation would be limited to the action area of that particular project. While we can use the Status of the Species section of a biological opinion to capture the | Pursuant to 50 CFR 402.14(j), conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information |

| Mitigation Measure* | Description* | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| offshore wind energy development on the Atlantic OCS | anticipated effects of completed consultations, we cannot consider additive effects of concurrent, ongoing consultations. Even this creates a situation where the effects analysis for each individual offshore wind energy project cannot fully account for synergistic effects that may occur with nearby projects and especially not full build-out of offshore wind infrastructure along the coast.<br>Besides the two existing offshore wind energy facilities (Block Island Wind offshore Rhode Island and Coastal Virginia Offshore Wind), we understand there are 26 additional projects in various stages of development offshore the U.S. coast from Maine to Virginia. As the Department of the Interior continues moving toward the national goal of deploying 30 gigawatts of offshore wind by 2030, we anticipate still more projects beyond those 26 (e.g., within the New York Bight, Central Atlantic, and Gulf of Maine). While the Service will complete a thorough assessment of potential direct and indirect effects for each individual offshore wind project, a coastwide analysis may indicate or suggest additive and/or synergistic effects among projects. Therefore, the Service recommends that BOEM analyze potential aggregate effects from WTG operation at a coastwide scale. A coastwide analysis will work in concert with the Offshore Wind Adaptive Monitoring and Impact Minimization Framework to comprehensively assess, monitor, and manage avian impacts from wind energy development along the U.S. Atlantic coast. A Programmatic consultation for wind energy development in the New York Bight is already underway and could set the stage for a full coastwide analysis. Ultimately, a coastwide programmatic Opinion may emerge as the most effective and efficient mechanism for assessing, monitoring, minimizing, and offsetting effects to listed birds from WTG operation on the OCS. | |

Note: The USFWS acknowledges that the manner and extent to which these recommendations are implemented are at the discretion of BOEM/BSEE.

* Information in these rows was taken directly from the final biological opinion (USFWS 2023) and has not been edited.

#### 3.7.2.6.1 Measures Incorporated into the Preferred Alternative

Mitigation measures resulting from consultations, authorizations, and permits listed in Table 3.7-3 and in Appendix F, Table F-2 are incorporated into Alternative G (Preferred Alternative). The anti-perching devices would reduce the risk of collision with WTGs as well as minimize the perching of avian predators. The additional measures would further define how the effectiveness and enforcement of EPMs would be ensured and improve accountability for compliance with EPMs by implementing an avian and bat monitoring program. Because these measures ensure the effectiveness of and compliance with EPMs that are already analyzed as part of the Proposed Action, implementation of these measures would not further reduce the impact level of the Proposed Action but would ensure that Project activities would not impact birds beyond the negligible to minor range of impacts discussed in this EIS, and the data gathered from avian mortality reporting would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)).

# 3.8 Coastal Habitats and Fauna

## 3.8.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Coastal Habitats and Fauna

Geographic analysis area: The GAA for coastal habitats and fauna (Figure 3.8-1) comprises the construction footprints for the following onshore Project components: the onshore transmission cable, landfall work area, OnSS, and ICF. The coastal habitats within the GAA include the area from state waters inland to the mainland, including the foreshore, backshore, dunes, and interdunal areas. Aquatic habitats are discussed in Section 3.21 and Section 3.6. Offshore components of the Project would not impact coastal habitat and fauna other than certain avian and bat species, which are discussed in Section 3.7 and Section 3.5, respectively.

Affected environment: Appendix K of the COP includes the results of field investigations conducted for the Project's onshore facilities as well as descriptions of habitats, delineations of freshwater and coastal wetlands, identification of plant and wildlife species, records of rare species observations, and observations of invasive species (VHB 2023). Plant communities were documented by VHB and compared to the key habitat profiles provided in the RIWAP (Rhode Island DEM et al. 2015) to assign the appropriate plant communities within the GAA. These plant communities are provided in Table 3.8-1 and described below. "Native coastal fauna" is defined herein as terrestrial mammals, reptiles, amphibians, and terrestrial and intertidal invertebrates. Most of the GAA for coastal habitats and fauna is disturbed from previous anthropogenic uses. Therefore, habitat quality and the potential suitability for use by fauna have been degraded. However, several key habitats, as identified in the RIWAP (Rhode Island DEM et al. 2015), suitable to a range of wildlife and plant species are present in the GAA. Invasive plant species are prevalent throughout the GAA because of prior anthropogenic disturbance (VHB 2023). VHB identified habitat for a variety of terrestrial mammals, reptiles, and amphibians during habitat assessment surveys conducted on July 30, August 14, September 3, and December 10, 2019, and March 27 and July 13, 2020.

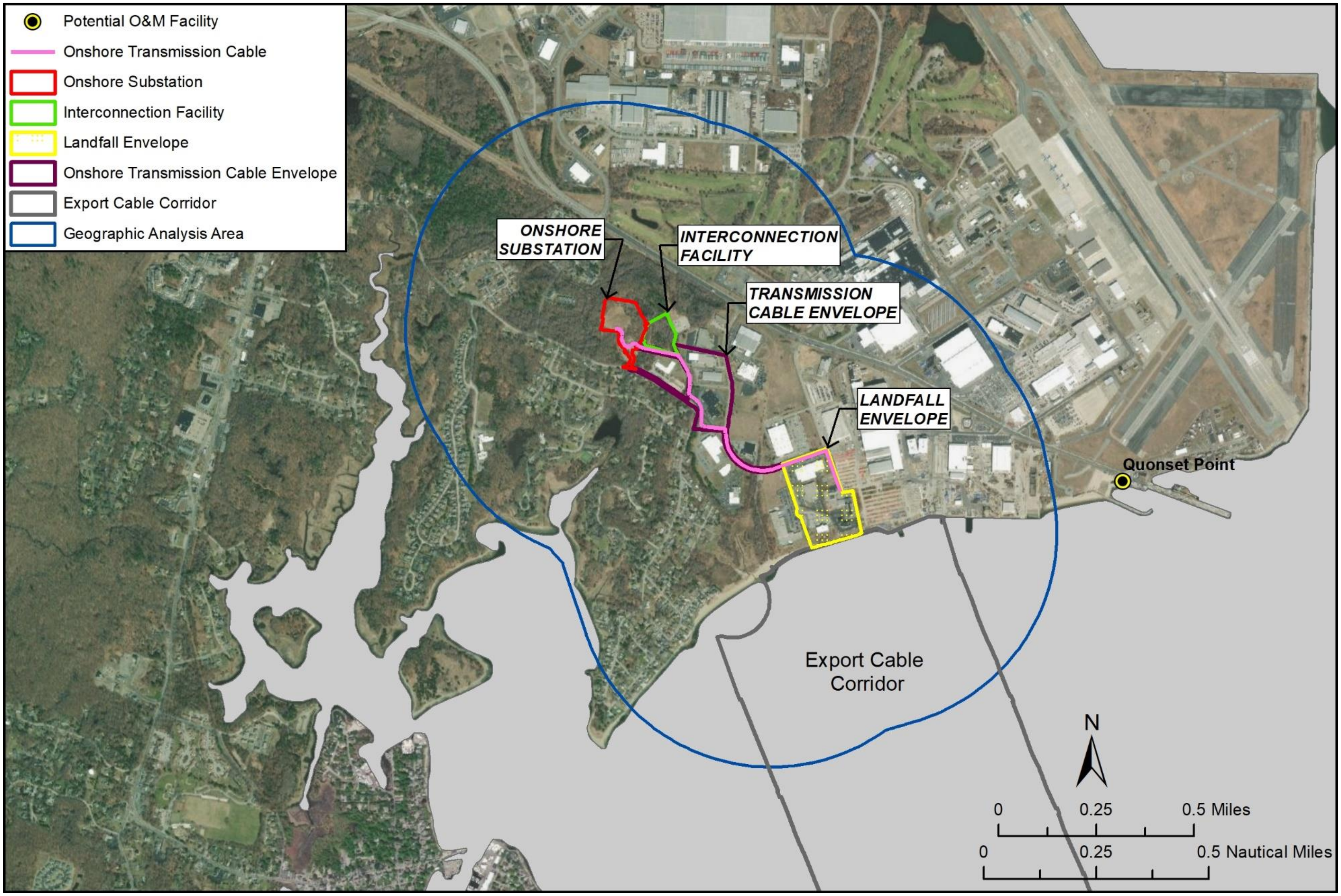


**Figure 3.8-1. Geographic analysis area for coastal habitats and fauna.**

**Table 3.8-1. Plant Communities in the Geographic Analysis Area for Coastal Habitats and Fauna**

| Plant Community | Area in the Geographic Analysis Area (acres) |
|---|---|
| **Landfall Work Area** | |
| Modified coastal beach | 0.330 |
| Ruderal grassland/shrubland | 1.300 |
| **OnSS** | |
| Mixed oak/white pine forest | 3.800 |
| Capped landfill | 2.600 |
| Pitch pine barren | 0.600 |
| Ruderal shrub marsh | 0.001 |
| **ICF** | |
| Mixed oak/white pine forest | 3.500 |
| Ruderal forested swamp | 0.100 |
| Ruderal grassland/shrubland | 0.050 |
| Ruderal shrub marsh | 0.010 |
| **Transmission Cable Envelope** | |
| Mixed oak/white pine forest | 0.560 |
| Softwood forest | 0.320 |
| Mowed lawn | 0.020 |
| Ruderal grassland/shrubland | 0.020 |
| Oak forest | 0.008 |
| Pitch pine barren | 0.006 |

Source: VHB (2023); Rhode Island DEM et al. (2015).

### Landfall Work Area

The modified coastal beach plant community comprises areas within the landfall work area that have been altered by placement of seawalls and riprap revetments, which expose the sandy beach during low tides. Vegetation at the base of the seawall and along the top of the seawall includes spotted knapweed (*Centaurea maculosa*), an invasive species; common milkweed (*Asclepias syriaca*); prickly lettuce (*Lactuca serriola*); and American pokeweed (*Phytolacca americana*). Adjacent to areas of modified coastal beach, the landfall work area contains ruderal grassland/shrubland. Ruderal grasslands/shrublands constitute early successional habitats defined by Anderson et al. (1976) as uplands where the potential natural vegetation is predominantly grasses, grass-like plants, forbs, or shrubs. Such habitats are typically anthropogenically created or maintained due to management strategies. The vegetation within ruderal grassland/shrubland areas is similar to the species composition along the seawall described above and also includes northern bayberry (*Myrica pensylvanica*) and eastern red cedar (*Juniperus virginiana*) (VHB 2023).

**Transmission Cable Envelope**

The transmission cable envelope is comprised primarily of industrial and residential land uses and consists of lots with managed lawns. Although managed lawn is not considered a key habitat by the RIWAP, it provides limited utility to some species of wildlife (e.g., passerines and rodents) in an otherwise heavily developed industrial and commercial area. It should be noted that some of these lots containing only managed lawn may be designated for future development (VHB 2023). The preferred transmission cable route is an approximate 1 mile (1.6 km) route that would predominantly follow along paved roads or previously disturbed areas such as parking lots.

Some of the alternative routes under consideration within the transmission cable envelope contain segments that would pass through undeveloped, vegetated areas and would be approximately the same length. Alternative transmission cable routes would pass a vacant lot that supports a dry ruderal grassland/shrubland field that gently slopes downward toward an access path. This plant community supports a mix of shrubs and herbaceous forbs and grasses, including eastern red cedar, pitch pine (*Pinus rigida*), *Yucca* sp., Virginia creeper (*Parthenocissus quinquefolia*), and common milkweed. The ruderal grassland/shrubland supports some invasive species, including autumn olive (*Elaeagnus umbellate*), Morrow's honeysuckle (*Lonicera morrowii*), Asiatic bittersweet (*Celastrus orbiculatus*), and mugwort (*Artemisia* sp.). Alternative onshore cable transmission routes would also pass through upland forest and shrubland. Vegetation within this area shows signs of anthropogenic disturbance and is composed of a ruderal mixed oak/white pine forest with a shrubby understory. Dominant vegetation within the canopy layer includes eastern white pine (*Pinus strobus*), red oak (*Quercus rubra*), white oak (*Quercus alba*), and eastern red cedar. Dominant species within the shrub and herb stratum include autumn olive, Morrow's honeysuckle, Asiatic bittersweet, multiflora rose (Rosa multiflora), green briar (*Smilax rotundifolia*), garlic mustard (*Alliaria petiolata*), and poison ivy (*Toxicodendron radicans*) (VHB 2023).

**Onshore Substation and Interconnection Facility**

The primary plant community within the footprint of both the OnSS and the ICF is mixed oak/white pine forest. Dominant species within the canopy include red oak, black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), and eastern white pine, and other canopy species include red maple, black cherry *(Prunus serotina*), and black birch (*Betula lenta*). Understory vegetation includes Morrow's honeysuckle, green briar, Virginia creeper, and spotted wintergreen (*Chimaphila maculata*). As with the adjoining ruderal forested swamp that occurs within the OnSS footprint (described below), the oak and white pine forest shows signs of human disturbance from its previous use as a landfill.

Ruderal forested swamp is also present within the OnSS footprint. The dominant canopy species within the forested swamp is red maple (*Acer rubrum*) with scattered patches of black gum (*Nyssa sylvatica*), swamp white oak (*Quercus bicolor*), red oak, and eastern white pine. The understory contains scattered sapling recruitment from the canopy layer and shrub thickets of sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), and alder (*Alnus* sp.). Poison ivy, green briar, sensitive fern (*Onoclea sensibilis*), and skunk cabbage (*Symplocarpus foetidus*) are common in the herbaceous stratum. A ruderal shrub marsh is present in the northern part of the OnSS footprint. The southern boundary of the marsh is highly altered, with demolition debris stacked along slopes above the marsh. The northern limit of the marsh extends beyond the OnSS footprint based on available topographic mapping and aerial photographs. The ruderal shrub marsh has a forested perimeter, and open water seasonally inundates the shrubland cover type (VHB 2023).

A large area (2.6 acres) within the OnSS footprint is considered capped landfill because of the alterations associated with the former Camp Avenue Dump, which is listed on the Superfund Enterprise Management System database as a State Hazardous Waste Site. From approximately 1949 to 1953, and as late as 1970, the Camp Avenue Dump was used as a general landfill by the U.S. Navy before the Quonset Point Naval Air Station was deactivated in 1974. Previous studies conducted at the dump, as well as field observations during Project surveys, reported wastes such as construction debris, roofing tar, ship parts, and unspecified industrial waste (VHB 2020). Evidence of the site's past use as a landfill is present throughout with fill artifacts, disturbed topography that indicates previous cutting and filling, and pervasive invasive vegetation that includes glossy buckthorn (*Frangula alnus*), Asiatic bittersweet, Morrow's honeysuckle, black locust (*Robinia pseudoacacia*), multiflora rose, privet (*Ligustrum* sp.), tree of heaven (*Ailanthus altissima*), black swallow-wort (*Cynanchum louiseae*), mugwort, and garlic mustard (VHB 2023).

General wildlife records for the GAA are based on observations made during VHB's field investigations in July, August, September, and December 2019 and March and July 2020; the review of the RIWAP for species tied to specific key habitats within the GAA; and other pertinent literature, including *New England Wildlife: Habitat, Natural History, and Distribution* (DeGraaf and Yamasaki 2001). Appendix C in COP Appendix K (VHB 2023) provides a list of wildlife species observed during field investigations and species with the potential to occur within the GAA based on habitat preferences and habitat availability.

VHB evaluated information from the USFWS IPaC tool and the Rhode Island DEM ERM to assess if any federal or state-listed species; rare, threatened, or endangered species; or species of greatest conservation need were present within the analysis area. During field investigations for the onshore transmission cable, butterfly milkweed (*Asclepias tuberosa*), a Rhode Island state species of concern was recorded. Butterfly milkweed has showy orange flowers in umbels and occurs within disturbed habitats, grassland, meadows, and fields. As with other milkweed species, this plant provides important food sources for the larval form of butterfly species. This includes the monarch butterfly (*Danaus plexippus*), which is a candidate species under the federal ESA (Monarch Joint Venture 2019; USFWS 2019). In accordance with Rhode Island Natural Heritage Program (RINHP) policy, the occurrence of butterfly milkweed within these habitats will be reported to the RINHP during the state permitting process. No other federal or state-listed species; rare, threatened, or endangered species; species of greatest conservation need; or associated critical habitats, other than those discussed in Sections 3.5 and 3.7, were identified as having the potential to occur within the GAA for coastal habitats and fauna (BOEM 2022, 2023; VHB 2023).

## 3.8.2 Environmental Consequences

### 3.8.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the Project build-out, as defined in the PDE (see Appendix D). The Project design parameters that would influence the magnitude of the impacts on coastal habitats and fauna include the location of the OnSS and ICF, the location of construction within the landfall work area and within the transmission cable envelope, and the time of year during which construction occurs. For example, the summer and fall months (May through October) constitute the most active season for coastal fauna in this area, especially reptiles and amphibians. Therefore, construction during months in which coastal fauna are not present, not breeding, or less active would have fewer impacts than construction during more active times.

The following EPMs would be implemented to minimize potential impacts to coastal habitats and fauna:

- Onshore facilities would be sited within previously disturbed and developed areas to the extent practicable, as follows:
    - Revolution Wind evaluated siting alternatives for the OnSS using the criteria that included avoidance or minimization of disturbance to ecologically sensitive areas.
    - The OnSS and ICF would be located on parcels that are already highly altered and include buried demolition waste.
    - The transmission cable would be located primarily in unvegetated and previously disturbed or developed ROWs.
- Accidental spills or releases of oils or other hazardous materials offshore would be managed through the OSRP.
- At the landfall location, drilling fluids would be managed within a contained system to be collected for reuse, as necessary. An HDD contingency plan would be prepared and implemented to minimize the potential risks associated with release of drilling fluids.
- Revolution Wind would comply with the RIPDES General Permit for Stormwater Discharges associated with construction activity, which requires the implementation of a soil erosion and sedimentation control (SESC) plan and spill prevention and control measures.
- An SESC plan, including erosion and sedimentation control measures, would be implemented to minimize potential water quality impacts during construction and operation of the onshore facilities. Revolution Wind would implement the site-specific SESC plan and maintain it during the entire construction process until the entire worksite is permanently stabilized by vegetation or other means. The measures employed in the SESC plan use BMPs to minimize the opportunity for turbid discharges leaving a construction work area.
- The spill prevention and control measures mandate that the operator identifies all areas where spills can occur and their accompanying drainage points. The operator must also establish spill prevention and control measures to reduce the chance of spills, stop the source of spills, contain and clean up spills, and dispose of materials contaminated by spills. Spill prevention and control training would be provided for relevant personnel.
- The perimeter surrounding onshore facilities would be managed to encourage the growth of native grasses, ferns, and low-growing shrubs. This management strategy would include the removal of invasive plants in compliance with state and federal regulations (e.g., herbicide use would not be permitted within regulated wetlands).
- In accordance with Section 2.9(B)(1)(d) of the Freshwater Wetland Rules, the onshore facilities would be designed to avoid and minimize impacts to freshwater wetlands to the maximum extent practicable. Any wetlands that would be impacted as a result of the Project would be mitigated via

the federal and state permitting process in accordance with Section 404 of the CWA and the Freshwater Wetland Rules.

- The documented sickle-leaved golden aster (*Pityopsis falcata*) population on the OnSS parcel would be protected during construction.

These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for coastal habitats and fauna across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E2-1 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.8-2 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action.

The Conclusion section within each alternative analysis discussion includes rationale for the overall effect call determination for that alternative. The overall impact of any alternative would be **minor** adverse because the effects on coastal habitats and fauna would be small, and the resource would be expected to recover completely, with no mitigation required.

**Table 3.8-2. Alternative Comparison Summary for Coastal Habitats and Fauna**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| Climate change | **Onshore**: Impacts of climate change could contribute to impacts on coastal habitats and fauna primarily according to existing global and regional climate trends. Although the impacts resulting from climate change on coastal habitats and fauna are uncertain, BOEM anticipates that future offshore wind activities, without the Proposed Action, could have **negligible** adverse impacts on onshore coastal habitats and fauna. | **Onshore**: Climate change would contribute to impacts on coastal habitats and fauna primarily according to existing global and regional climate trends. The Proposed Action could contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts. Although the impacts resulting from climate change on coastal habitats and fauna are uncertain, BOEM anticipates that the Proposed Action would have no measurable influence on climate change and therefore the resulting impacts to coastal habitats and fauna would be **negligible** adverse.<br>No additional impacts from climate change beyond those discussed under the impacts analysis for construction and installation are expected during O&M and Project decommissioning.<br>The types of cumulative impacts from global climate change to coastal habitats and fauna described under the No Action Alternative would occur under the Proposed Action. However, the Project could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts (although effects would still be **negligible** to **minor** adverse). | **Onshore**: Alternatives C through F would not alter impacts to onshore activities. Therefore, construction, O&M and Project decommissioning impacts would be the same as the Proposed Action: **negligible** adverse. Cumulative impacts would also be the same as the Proposed Action: **negligible** to **minor** adverse. | | | | **Onshore**: Alternative G would not alter impacts to onshore activities. Therefore, construction, O&M, and Project decommissioning impacts would be the same as the Proposed Action: **negligible** adverse. Cumulative impacts would also be the same as the Proposed Action: **negligible** to **minor** adverse. |
| Presence of structures | **Onshore**: In addition to electrical infrastructure, some habitat conversion may result from port expansion activities required to meet the demands for fabrication, construction, transportation, and installation of wind energy structures as well as onshore substations and associated facilities. Land disturbance for construction of | **Onshore**: The operational footprints of the OnSS and ICF would create habitat loss when forested upland is cleared and replaced with hard structures and crushed gravel yards that are not capable of supporting plants or wildlife. The ICF would result in a loss of approximately 1.6 acres of mixed oak/white pine forest, which is reflective of the operational footprint of the ICF. The OnSS would result in a loss of 3.8 acres of mixed oak/white pine forest. Together, these losses represent a relatively small fraction of the 52 acres of contiguous habitat identified in the RIWAP (Rhode Island DEM et al. 2015) and represent a **negligible** to **minor** adverse impact to coastal habitats. Overall, the habitat loss that would result from the construction of the OnSS and ICF would be considered negligible because | **Onshore**: Alternatives C through F would not alter impacts to onshore activities. Therefore, construction, O&M and Project decommissioning impacts would be the same as the Proposed Action: **negligible** to **minor** adverse. Cumulative impacts would also be the same as the Proposed Action: **negligible** to **minor** adverse. | | | | **Onshore**: Alternative G would not alter impacts to onshore activities. Therefore, construction, O&M, and Project decommissioning impacts would be the same as the Proposed Action: **negligible** to **minor** adverse. Cumulative impacts would also be the same as the Proposed Action: **negligible** to **minor** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTGs | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | onshore substations, associated facilities, and port expansion activities in the GAA is expected to result in **negligible** to **minor** adverse impacts to coastal habitat and fauna. | this loss would be small relative to the unimpacted similar habitat in the general region.<br>At the OnSS and ICF, land disturbance in the form of vegetation management would occur on a periodic basis to maintain vegetation at shrub height. Presence of structures as it relates to vegetation clearing may result in the direct injury or mortality of wildlife as well as habitat alteration or removal. Impacts from vegetation management may include reduction in habitat quality via the spread of invasive species and temporary displacement of individuals. However, the spread of invasive species would be controlled with periodic vegetation management, and wildlife displacement could occur only during vegetation removal activities. The impact of habitat degradation and wildlife displacement resulting from vegetation management of the OnSS and ICF is expected to be short term **negligible** adverse. The impact of habitat degradation and/or loss, wildlife displacement, and wildlife injury and/or mortality resulting from land disturbance during decommissioning of the OnSS and ICF would be short term **negligible** adverse.<br>Because of the small amount of affected onshore habitat, land disturbance from the Proposed Action when added to other past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts to coastal habitats and fauna. | | | | | |

Note: Each cell includes analysis for the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

### 3.8.2.2 Alternative A: Impacts of the No Action Alternative on Coastal Habitats and Fauna

#### 3.8.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for coastal habitats and fauna (see Section 3.8.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.8.2.2.2 Cumulative Impacts

**Onshore Activities and Facilities**

This section discloses potential impacts to coastal habitats and fauna associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

Climate change: Impacts of climate change could contribute to impacts on coastal habitats and fauna primarily according to existing global and regional climate trends. Activities that contribute to climate change are provided in the Air emissions and climate change section in Section 3.4.1.1. Although sources of GHG emissions contributing to regional and global climate change mostly occur outside the GAA for coastal habitats and fauna, these resources may be affected by climate change, sea level rise, more frequent and intense storms, and altered habitat. Although the impacts resulting from climate change on coastal habitats and fauna are uncertain, BOEM anticipates that future offshore wind activities, without the Proposed Action, could have **negligible** adverse impacts on onshore coastal habitats and fauna.

Presence of structures: In addition to electrical infrastructure, some habitat conversion may result from port expansion activities required to meet the demands for fabrication, construction, transportation, and installation of wind energy structures as well as onshore substations and associated facilities. The general trend along the coastal region from Virginia to Maine is that port activity will increase modestly and require some conversion of undeveloped land to meet port demand and will result in permanent loss of forested habitat for local bat populations. However, the increase from future offshore wind development would be a minimal contribution in the port expansion required to meet increased commercial, industrial, and recreational demand (BOEM 2019). The current bearing capacity of existing ports is considered suitable for wind turbines, requiring no port modifications for supporting offshore wind energy development (DOE 2014). Land disturbance for construction of onshore substations, associated facilities, and port expansion activities in the GAA is expected to result in **negligible** to **minor** adverse impacts to coastal habitat and fauna.

#### 3.8.2.2.3 Conclusions

Under the No Action Alternative, coastal habitats and fauna would continue to follow current regional trends and respond to current and future environmental and societal activities. The current state of local coastal habitat and fauna resources is generally stable, although some fauna may be subject to disturbance from ongoing activities in the GAA. For example, land disturbance from onshore construction of cables and structures periodically causes temporary and permanent habitat loss, temporary displacement, injury, and mortality, resulting in small short-term impacts on certain coastal fauna species. Climate change, influenced in part by GHG emissions, is altering the seasonal timing and patterns of certain species' distribution and ecological relationships, likely causing permanent impacts of unknown intensity. Considering current conditions and the modest pace of development in the GAA, coastal fauna resources are expected to remain generally stable under the No Action Alternative.

BOEM anticipates that the impacts of ongoing activities, especially onshore construction and climate change, would be negligible. In addition to ongoing activities, planned actions other than offshore wind may also contribute to impacts on coastal habitats and fauna. Planned actions other than offshore wind primarily consist of increasing onshore construction, although no future construction projects were identified within the GAA. BOEM anticipates that the impacts of planned actions other than offshore wind would be **negligible** adverse.

If any onshore components of future offshore wind activities overlap the GAA, impacts such as displacement, mortality, and/or habitat loss would be similar to those resulting from the Project alone. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with future offshore wind activities combined with ongoing activities, reasonably foreseeable environmental trends, and planned actions other than offshore wind in the GAA would result in **negligible** to **minor** adverse impacts, primarily through onshore construction (most are attributable to ongoing activities) and climate change.

### 3.8.2.3 Alternative B: Impacts of the Proposed Action on Coastal Habitats and Fauna

#### 3.8.2.3.1 Construction and Installation

##### Onshore Activities and Facilities

<u>Climate change:</u> Climate change would contribute to impacts on coastal habitats and fauna primarily according to existing global and regional climate trends. Although sources of GHG emissions contributing to regional and global climate change mostly occur outside the GAA for coastal habitats and fauna, these resources may be affected by climate change, sea level rise, more frequent and intense storms, and altered habitat. The Proposed Action could contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts. Although the impacts resulting from climate change on coastal habitats and fauna are uncertain, BOEM anticipates that the Proposed Action would have no measurable influence on climate change and therefore the resulting impacts to coastal habitats and fauna would be **negligible** adverse.

<u>Presence of structures:</u> The OnSS would occupy an operational footprint measuring up to 3.8 acres and would connect to the ICF with two 115-kV underground transmission cables up to 527 feet long. Additionally, the OnSS would include a compacted gravel driveway, stormwater management features, and associated landscaped or managed vegetated areas totaling up to 7.1 acres inclusive of the up-to-4-acre operational footprint of the facility. The adjacent ICF would have an operational footprint of 1.6 acres and would also include a paved access road, stormwater management features, and associated landscaped or managed vegetated areas within the approximate 4.0-acre construction footprint. Construction of these facilities would result in habitat loss and habitat conversion in the areas surrounding the RWEC, the OnSS, and the ICF. The operational footprints of the OnSS and ICF would create habitat loss when forested upland is cleared and replaced with hard structures and crushed gravel yards that are

not capable of supporting plants or wildlife. The ICF would result in a loss of approximately 1.6 acres of mixed oak/white pine forest, which is reflective of the operational footprint of the ICF. The OnSS would result in a loss of 3.8 acres of mixed oak/white pine forest. Together, these losses represent a relatively small fraction of the 52 acres of contiguous habitat identified in the RIWAP (Rhode Island DEM et al. 2015) and represent a **negligible** to **minor** adverse impact to coastal habitats.

In addition to impacts on the mixed oak and white pine forest, the OnSS would develop 0.6 acre of pitch pine barren. The OnSS has been designed to avoid occurrences of sickle-leaved golden aster, a plant species of state concern within Rhode Island that were observed within the pitch pine barren outside of the footprint of the OnSS (VHB 2023). In accordance with the state environmental permitting needed for the Project, the occurrence of this state-listed species must be reported to the Rhode Island DEM, which will advise if a mitigation plan will be needed. Overall, the habitat loss that would result from the construction of the OnSS and ICF would be considered negligible because this loss would be small relative to the unimpacted similar habitat in the general region. As previously described in the impacts discussion for the landfall work area, land disturbance and habitat alteration from the construction of the OnSS and ICF could cause habitat degradation through the spread of invasive species. As noted previously, invasive plant growth within the OnSS parcels is pervasive. Invasive plant species were also observed throughout the forested portion of the ICF parcel (VHB 2023). This observation indicates that invasive species are likely to become further established in these areas if proper management techniques are not followed.

#### 3.8.2.3.2 Operations and Maintenance and Decommissioning

#### Onshore Activities and Facilities

<u>Climate change:</u> No additional impacts from climate change beyond those discussed under the impacts analysis for construction and installation described in Section 3.8.2.2.1 are expected during O&M and Project decommissioning. BOEM anticipates that the Proposed Action would have no measurable influence on climate change and therefore the resulting impacts to coastal habitats and fauna would be **negligible** adverse.

<u>Presence of structures:</u> At the OnSS and ICF, land disturbance in the form of vegetation management would occur on a periodic basis to maintain vegetation at shrub height. Vegetation control methods would employ integrated vegetation management practices, including manual cutting, mowing, the prescriptive use of herbicides, and the use of environmental and cultural controls (Eversource 2018). The method of control would be determined following inspections of the site scheduled for maintenance. The current maintenance cycle for vegetation control using integrated vegetation management practices is 3 or 4 years depending on the vegetation composition, facilities, and site conditions (Eversource 2018). Hazard tree removal would also be performed on a cyclical basis to inspect and remove trees that may fall that are outside the edge of maintained ROWs. Presence of structures as it relates to vegetation clearing may result in the direct injury or mortality of wildlife as well as habitat alteration or removal. Impacts from vegetation management may include reduction in habitat quality via the spread of invasive species and temporary displacement of individuals. However, the spread of invasive species would be controlled with periodic vegetation management, and wildlife displacement could occur only during vegetation removal activities. The impact of habitat degradation and wildlife displacement resulting from vegetation management of the OnSS and ICF is expected to be short term **negligible** adverse.

At the end of the Project's operational life, the OnSS and ICF would be decommissioned in accordance with a detailed Project decommissioning plan that would be developed at that time. OnSS and ICF equipment may be removed while keeping the substation yard and fencing intact. Under such a scenario, land disturbance and habitat alteration activities may be similar to those described under the construction impact analysis, although the impacts would likely be less because new vegetation clearing and grading would not be necessary. The impact of habitat degradation and/or loss, wildlife displacement, and wildlife injury and/or mortality resulting from land disturbance during decommissioning of the OnSS and ICF would be short term **negligible** adverse.

#### 3.8.2.3.3 Cumulative Impacts

#### Onshore Activities and Facilities

Climate change: The types of cumulative impacts from global climate change to coastal habitats and fauna described under the No Action Alternative would occur under the Proposed Action. However, the Project could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts (although effects would still be **negligible** to **minor** adverse).

Presence of structures: Construction and installation, O&M, and decommissioning of the OnSS under the Proposed Action would contribute to the habitat conversion and habitat loss described under the No Action Alternative, potentially changing the composition and abundance of faunal assemblages through the removal of forested habitat at the OnSS and ICF. Because of the small amount of affected onshore habitat, land disturbance from the Proposed Action when added to other past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts to coastal habitats and fauna.

#### 3.8.2.3.4 Conclusions

In summary, the activities associated with the Proposed Action may affect coastal habitats and fauna through temporary land disturbance, injury or mortality of individuals, and permanent conversion of a small proportion of the overall habitat available regionally. Considering the avoidance, minimization, and mitigation measures proposed, construction of the Proposed Action alone would likely have **negligible** to **minor** impacts on coastal habitats and fauna. The Proposed Action would contribute to the cumulative impact rating primarily through the temporary displacement, mortality, temporary to permanent habitat loss, and noise generated from construction of the OnSS and ICF. Considering all the IPFs together, BOEM anticipates that the impacts to coastal habitats and fauna from ongoing and planned actions, including the Proposed Action, would likely be **minor** adverse in the GAA because the measurable impacts expected would be small and/or the resource would likely recover completely when the impacting agent is gone and remedial or mitigating action is taken. The main drivers for this impact rating are ongoing and future land disturbance and ongoing climate change.

### 3.8.2.4 Alternatives C, D, E, and F

Table 3.8-2 provides a summary of IPF findings for these alternatives.

#### 3.8.2.4.1 Conclusions

Considering the avoidance, minimization, and mitigation measures proposed, construction of the Proposed Action alone would likely have **negligible** to **minor** impacts on coastal habitats and fauna. The overall impacts of Alternatives C through F to coastal habitats and fauna when combined with past, present, and reasonably foreseeable activities would be the same as under the Proposed Action: **minor** adverse.

### 3.8.2.5 Alternative G: Impacts of the Preferred Alternative on Coastal Habitats and Fauna

Table 3.8-2 provides a summary of IPF findings for this alternative.

#### 3.8.2.5.1 Conclusions

Considering the avoidance, minimization, and mitigation measures proposed, construction of t Alternative G alone would likely have **negligible** to **minor** impacts on coastal habitats and fauna. The overall impacts of Alternative G to coastal habitats and fauna when combined with past, present, and reasonably foreseeable activities would be the same as the Proposed Action: **minor** adverse.

### 3.8.2.6 Mitigation

No mitigation measures resulting from agency consultations for coastal habitats and fauna are identified in Table F-2 in Appendix F.

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## 3.9 Commercial Fisheries and For-Hire Recreational Fishing (see section in main EIS)

# 3.10 Cultural Resources (see section in main EIS)

# 3.11 Demographics, Employment, and Economics (see section in main EIS)

# 3.12 Environmental Justice (see section in main EIS)

## 3.13 Finfish and Essential Fish Habitat (see section in main EIS)

# 3.14 Land Use and Coastal Infrastructure

## 3.14.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Land Use and Coastal Infrastructure

Geographic analysis area: The GAA for land use and coastal infrastructure includes the town of North Kingstown, Rhode Island, and the ports potentially used for Project construction and installation, O&M, and decommissioning. The ports included as part of the GAA include port facilities and surrounding areas at Sparrow's Point, Paulsboro Marine Terminal, Port of Brooklyn, Port Jefferson, Port of Montauk, Port of New London, Port of Davisville at Quonset Point, Port of Galilee, Port of Providence, and the New Bedford Marine Commerce Terminal. The Proposed Action and other reasonably foreseeable wind energy projects may use the port facilities shown in Figure 3.14.1. Although the extent of port facilities and upgrades are unknown at this time, land use impacts could occur at these 10 port facilities and surrounding areas, which is why they are included in the land use and coastal infrastructure GAA.

The GAA also includes the 18 BOEM OCS lease areas that range from the offshore Norfolk, Virginia, area in the south to the offshore Rhode Island area in the north (see Figure 3.14-1). Appendix E contains detailed descriptions of these port facilities and lease areas. These areas encompass locations where BOEM anticipates direct and indirect impacts associated with proposed onshore facilities and ports.

Affected environment: The town of North Kingstown, one of 10 towns in Washington County, is located south of Providence, Rhode Island, and is bordered on the south by the towns of South Kingstown and Narragansett, on the north by East Greenwich, on the west by Exeter, and on the east by Narragansett Bay. North Kingstown is the second-largest Washington County town, with a population of 26,323 in 2019 (U.S. Census Bureau 2019). It is part of the Providence metropolitan area, with a land area of approximately 58 square miles.

North Kingstown is a primarily residential community characterized by a mixture of farms, natural areas, cultural centers, villages, historic districts and towns, and countryside (Interface Studio 2019). There are several unique points of interest in the town, including the Davis Memorial Wildlife Refuge, Smith's Castle, and Quonset Point, among others. Land use within the town of North Kingstown largely comprises small areas of low-density residential enclaves surrounded by forests, brushland, and pastures. North Kingstown also contains areas with mines, quarries, and gravel pits, as well as industrial and commercial hubs. The waterfront areas of North Kingstown include transportation facilities such as the Port of Davisville at Quonset Point, open space, high-density residential, wetlands, and other uses.

The proposed RWEC landing site would be within the landfall envelope described in the COP (see COP Figure 2.2.1-3), which totals approximately 20 acres, located at the Port of Davisville at Quonset Point in North Kingstown (see COP Figure 1.1-1). The landfall envelope is generally bounded by Whitecap Drive on the west, the Electric Boat property on the east, and Circuit Drive on the north. Within the landfall envelope is a landfall work area measuring up to 3.1 acres. The landfall work area is part of the Port of Davisville at Quonset Point, which is the location of the former Naval Air Station Quonset Point. The landfall work area consists of several onshore elements:

- Up to two underground transmission circuits (called the onshore transmission cable), co-located within a single corridor
- An OnSS and ICF located adjacent to the existing Davisville Substation

- An underground ROW connecting the OnSS to the ICF (Interconnection ROW)
- An overhead ROW connecting the ICF to the Davisville Substation (TNEC ROW)

Land uses in the landfall envelope are primarily commercial and industrial. This area of the Port of Davisville at Quonset Point is part of the Quonset Business Park and contains several large businesses, including boat and pool manufacturers, medical laboratories, distribution centers, lumber distributors, and office space, among others (*SO Rhode Island* 2014). The landfall envelope area contains a few manufacturing and industrial buildings, associated parking lots, and access roads. Blue Beach, a public beach, is approximately 500 feet west of the southwest corner of the landfall envelope. Blue Beach is accessed via a trail located to the west of the Hayward Industries, Inc., building, which is just outside the landfall envelope. Compass Rose Beach, another public beach, is approximately 2,600 feet east of the southeast corner of the landfall envelope. The Martha's Vineyard Fast Ferry dock is located directly east of Compass Rose Beach. The eastern edge of the Quonset State Airport is also approximately 2,600 feet east of the landfall envelope. The North Kingstown Golf Course is approximately 2,000 feet north of the northern edge of the landfall envelope and is separated from the landfall envelope by Roger Williams Way.

Regardless of the landfall site selected, the preferred onshore transmission cable route is an approximate 1-mile (1.6-km) route that would predominantly follow along paved roads or previously disturbed areas such as parking lots. There are alternative onshore transmission cable routes under consideration within the onshore transmission cable envelope, as depicted on Figure 4.3.1-2 in the COP. Some of the routes under consideration have segments that would be installed in undeveloped, vegetated areas within parcels 179-003 and 179-005 (the Davisville Substation parcel), although most would be installed within paved roads and parking lots, as with the preferred onshore transmission cable route, and would be approximately the same length. Regardless of the exact route chosen, impact determinations would not be affected for any IPF (COP Figure 4.3.1-2). Land uses around the onshore Project footprint consist of low-density residential, commercial, and public lands on the south side of Camp Avenue, and other commercial and industrial uses. There are two public beaches in the Project vicinity, Blue Beach and Compass Rose Beach, as well as three small schools. Based on the Town of North Kingstown's Assessors' Data (Interface Studio 2019), the segment of the RWEC from the mean high water level to the transition joint bays (TJBs), landfall work area, and onshore transmission cable are located within an area that is predominantly industrial but also consists of some large business commercial, low-medium residential (including single-family residences and duplexes), and undeveloped land uses. The property hosting the OnSS and ICF is surrounded by low-medium residential, medium-high-density residential, utility (i.e., the existing Davisville Substation), and undeveloped land uses. The OnSS would be located on two adjacent parcels (179-030 and 179-001) totaling 15.7 acres, both owned by the Rhode Island Commerce Corporation. The ICF would be located on an adjacent 6.1-acre parcel (179-005) owned by TNEC. COP Figure 4.6.7-1 (VHB 2023a) depicts land uses near the onshore components of the Project.

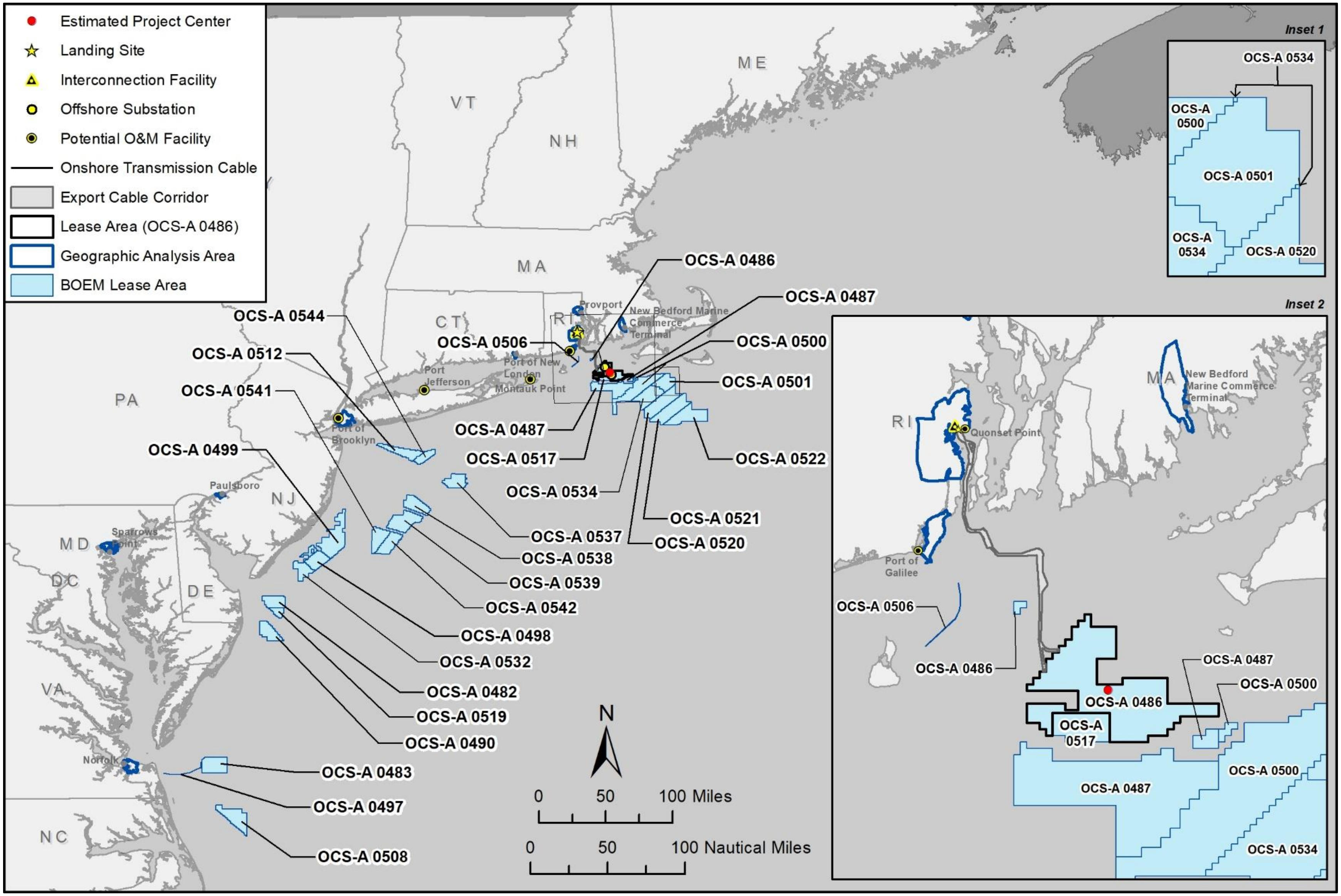


**Figure 3.14-1. Geographic analysis area for land use and coastal infrastructure.**

An OnSS and ICF would be constructed to support interconnection to the existing Davisville Substation, which is located within the Quonset Business Park in North Kingstown. The Davisville Substation operates at 115 kV and connects to the regional transmission grid via two 115-kV transmission tap lines. The existing substation is within North Kingstown Assessor's Plat 179 Lot 005. The OnSS location is on the north side of Camp Avenue in an undeveloped area. The Town of North Kingstown has designated the undeveloped area as a planned village development that is surrounded by the Quonset Business Park District (Town of North Kingstown, Rhode Island 2021a). The RWEC would enter the landfall work area underground, pass through the TJBs, and continue underground as the onshore transmission cable to the OnSS. The connection cables running from the OnSS to the ICF would be underground. The cables connecting from the ICF to the existing Davisville Substation would be the only aboveground and overhead cables (VHB 2023a).

The Port of Davisville at Quonset Point, a port located in North Kingstown, is a former naval air station that was subsequently redeveloped into a modern industrial park (Interface Studio 2019). The industrial park, known as Quonset Point/Davisville Business Park, is on a peninsula in Narragansett Bay. The port is a multimodal transportation area with deepwater piers used for both shipping and ship repairs, an airport with the longest runway in the state, freight and passenger rail facilities, and interstate highway connections. The availability of a variety of industrially zoned land with full-service networks provides opportunities for new industries (Maguire Group, Inc. 2008). The Port of Davisville at Quonset Point is served by Rhode Island Route 403 and a railroad spur from Amtrak's Northeast Corridor, along with freight service provided by the Providence and Worcester Railroad. It is also the home of the Port of Davisville at Quonset Point, a golf course, four public beaches, ferry service to Martha's Vineyard, and two museums.

Other port facilities in New York, Rhode Island, Connecticut, Virginia, Massachusetts, Maryland, and New Jersey could also support construction of the RWF and offshore components of the RWEC (see COP Table 3.3.10-1). These ports are generally industrial in character and are typically adjacent to other industrial or commercial land uses and major transportation corridors. Before construction begins, Revolution Wind would finalize mobilization plans and arrangements at port facilities to support Proposed Action activities, including logistic support for fabrication, as needed (VHB 2023a). See Section 3.9, Section 3.11, and Section 3.18 for discussions of recreational vessel and commercial fishing activity in these ports.

### 3.14.2 Environmental Consequences

#### 3.14.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

The analysis presented in this section considers the impacts resulting from the maximum design scenario under the PDE approach developed by BOEM to support offshore wind project development (Rowe et al. 2017). The maximum design size specifications defined in Appendix D, Table D-1, are PDE parameters used to conduct this analysis. Several project parameters could change during the development of the final project configuration, potentially reducing the extent and/or intensity of impacts resulting from the associated IPFs.

The following design parameters would result in reduced impacts relative to those generated by the design elements considered under the PDE:

- The use of a casing pipe method to construct the RWEC sea-to-shore transition would eliminate the need for a temporary cofferdam, resulting in less extensive acoustic and vibration impacts than vibratory pile driving to construct a cofferdam thus reducing onshore noise and vibration impacts to coastal land uses (Zeddies 2021).
- The selection of an 8-MW WTG design would reduce the total WTG height from 873 to 648 feet, reducing the visual impact of the facility on coastal land uses.
- The selection of an alternate route for the onshore component of the RWEC could alter the location and increase or decrease the extent of construction-related ground disturbance, but the nature and overall significance of these impacts on land use would remain unchanged.

See Appendix E2 for a summary of IPFs analyzed for land use and coastal resources across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E1, Table E2-13. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.14-1 provides a summary of IPF findings carried forward for analysis. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers the implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts on land use. These EPMs are summarized in Appendix F, Table F-1.

A detailed analysis of the Proposed Action is provided following the table. A detailed analysis of other considered action alternatives is also provided below the table if the analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations. Overall, impacts to land use and coastal infrastructure from any action alternative would be **minor** adverse because they would be small, and the resource would be expected to recover completely with no mitigating action required.

**Table 3.14-1. Alternative Comparison Summary for Land Use and Coastal Infrastructure**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| Accidental releases and discharges | **Offshore**: Future offshore activities could result in accidental releases of trash or water quality contaminants (see Section 3.21 for quantities and details). These impacts, however, would generally be localized and short term. On this basis, the effects of accidental releases and discharges on land use under the No Action Alternative would be long term and **minor** adverse. | **Offshore**: Accidental releases and discharges of fuels, lubricants, and hydraulic fluids could occur during the construction and installation phase. Accidental releases would be minimized by containment and cleanup measures detailed in the emergency response plan/OSRP. Therefore, there would be a **negligible** adverse impact from accidental releases and discharges on land use and coastal infrastructure.<br>The Proposed Action and other reasonably foreseeable projects would be expected to comply with any applicable permit requirements to implement erosion, stormwater, and spill controls to minimize, reduce, or avoid impacts on water and air quality. As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in **negligible** adverse cumulative impacts on land use and coastal infrastructure because there would be no impact on land use and coastal infrastructure. | **Offshore**: Alternative C to F would require fewer vessel trips relative to the Proposed Action, reducing the risk of accidental releases and discharges from vessels. However, given the likelihood of such releases is low, the difference in level of risk would likely be undetectable. Likewise, risk of accidental releases and discharges could be slightly reduced from the reduced risk of vessel collisions/allisions. Because accidental releases and discharges in the offshore environment of the scale anticipated are not expected to measurably impact land use and coastal infrastructure, these impacts would similarly be **negligible** adverse. | | | | **Offshore**: Alternative G would require fewer vessel trips relative to the Proposed Action, reducing the risk of accidental releases and discharges from vessels. However, given the likelihood of such releases is low, the difference in level of risk would likely be undetectable. Likewise, risk of accidental releases and discharges could be slightly reduced from the reduced risk of vessel collisions/allisions. Because accidental releases and discharges in the offshore environment of the scale anticipated are not expected to measurably impact land use and coastal infrastructure, these impacts would similarly be **negligible** adverse. |
| | **Onshore**: Future onshore activities could result in accidental releases of trash or water quality contaminants (see Section 3.21 for quantities and details). These impacts, however, would generally be localized and short term. On this basis, the effects of accidental releases and discharges on land use under the No Action Alternative would be long term and **minor** adverse. | **Onshore**: Although accidental releases and discharges could impact land use and coastal infrastructure by introducing air or water quality contamination into areas undergoing construction and installation, O&M and decommissioning, it is anticipated that containment would prevent or mitigate discharges before they can impact land uses. Therefore, there would be a temporary, **negligible** adverse impact due to accidental releases and discharges on land use and coastal infrastructure. | **Onshore**: Alternatives C through F would consist of the same onshore facilities and activities as the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from accidental releases and discharges would be the same as the Proposed Action: **negligible** adverse. | | | | **Onshore**: Alternative G would consist of the same onshore facilities and activities as those described for the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from accidental releases and discharges would be the same as the Proposed Action: **negligible** adverse. |
| Light | **Offshore**: Permanent aviation warning lighting on any offshore wind WTGs proposed as part of future offshore wind activities would be visible from south-facing beaches and coastlines. However, land use would not be expected to be measurably changed, nor would light itself impact land uses or alter land use patterns. On this basis, the effects of light on land use under the No Action Alternative would be long term and **minor** adverse. | **Offshore**: There would be a temporary increase in the amount of lighting during construction and installation due to the presence of work vessels. Given that offshore elements of the Proposed Action would be located approximately 12 to 15 miles from shore, it is anticipated that there would be very little lighting impact on land use and coastal infrastructure from construction and installation of offshore elements of the Proposed Action. Therefore, there would be a temporary, **negligible** adverse light impact on land use and coastal infrastructure. | **Offshore**: Although Alternatives C through F could result in a slight reduction in construction lighting, the effects of this IPF on land use and coastal infrastructure would otherwise be similar to the Proposed Action, ranging from **negligible** adverse to **minor** adverse. | | | | **Offshore:** Although Alternative G could result in a slight reduction in construction lighting, the effects of this IPF on land use and coastal infrastructure would otherwise be similar to the Proposed Action, ranging from **negligible** adverse to **minor** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | | During operations, offshore structures would require lighting that conforms to FAA and BOEM guidelines, and USCG requirements. The visibility of WTGs and potentially the OSSs would result in a small impact to onshore land uses and coastal infrastructure by increasing light in the offshore environment that could be visible onshore and could slightly increase visible light in coastal communities. Decommissioning impacts would be similar to impacts from the Proposed Action construction and installation. Therefore, there would be a long-term, **minor** adverse light impact on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action.<br>The Proposed Action and other reasonably foreseeable projects would be expected to comply with applicable permit conditions and lighting requirements to minimize, reduce, or avoid light impacts on onshore land uses and coastal infrastructure. Therefore, the cumulative impact would be **negligible** adverse. | | | | | |
| | **Onshore:** Future offshore activities could result in onshore lighting associated with supporting infrastructure for offshore wind development. These lighting sources would be minor adverse and short term in nature. On this basis, the effects of light on land use under the No Action Alternative would be long term and **minor** adverse**.** | **Onshore**: Nighttime lighting could have a temporary adverse impact on land use and coastal infrastructure by increasing artificial lighting that could be visible by residences and businesses nearby.<br>Operational lighting onshore would be limited to the OnSS and ICF. In general, lighting would be minimal and directed downward. Lighting would be removed as part of decommissioning. Therefore, there would be a long-term, **minor** adverse light impact on land use and coastal infrastructure from construction, O&M, and decommissioning of onshore elements of the Proposed Action.<br>Temporary and permanent lighting would require compliance with local development regulations at the port facilities and locations where reasonably foreseeable future projects would experience onshore lighting impacts. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on land use and coastal infrastructure. | **Onshore:** Alternatives C through F would consist of the same onshore facilities and activities as the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from lighting would be the same as the Proposed Action: **minor** adverse. | | | | **Onshore**: Alternative G would consist of the same onshore facilities and activities as the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from lighting would be the same as the Proposed Action: **minor** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action)<br>Up to 100 WTGs | Alternative C<br>(Habitat Alternative)<br>64 or 65 WTGs | Alternative D<br>(Transit Alternative)<br>78 to 93 WTGs | Alternative E<br>(Viewshed Alternative)<br>64 or 81 WTGs | Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs | Alternative G<br>(Preferred Alternative)<br>65 WTGs |
|---|---|---|---|---|---|---|---|
| New Cable Emplacement/Maintenance | **Onshore**: Future offshore activities could result in onshore land disturbances to accommodate supporting cable infrastructure for offshore wind development. Onshore, neighboring or adjacent land to cable placement could also temporarily be disturbed by future offshore wind project–related noise, vibration, and dust, as well as travel delays along impacted roads. All construction and operational impacts from land disturbance would be regulated through local land use and zoning regulations and would therefore comply with applicable laws. On this basis, the effects of land disturbance on land use under the No Action Alternative would be short term and **negligible** adverse. | **Onshore**: All Proposed Action–related construction and installation would take place within areas zoned for industrial and commercial development and would be subject to land use and zoning regulations that limit impacts. Therefore, there would be a short-term, **minor** adverse land disturbance impact on land use and coastal infrastructure.<br>Once installed, the onshore components of the RWEC would be located underground and disturbed areas would be restored to preconstruction conditions or improved. Due to the temporary and intermittent nature of O&M activities, O&M of onshore facilities would have a **negligible** adverse impact on land use over the 35-year lifespan of the Project.<br>The Project and other reasonably foreseeable future projects would be required to comply with local land use and zoning regulations, which would reduce impacts to land use and coastal infrastructure. Therefore, cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on land use and coastal infrastructure. | **Onshore**: Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from new cable emplacement/maintenance would be the same as the Proposed Action, ranging from **negligible** adverse to **minor** adverse. | | | | **Onshore**: Alternative G would consist of the same onshore facilities and activities as the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from new cable emplacement/maintenance would be the same as the Proposed Action, ranging from **negligible** adverse to **minor** adverse. |
| Noise | **Offshore**: Future offshore wind activities could result in increased noise during the construction and installation phases. These noise impacts would be subject to state and local noise regulations and ordinances. On this basis, the effects of noise on land use under the No Action Alternative would be long term and **negligible** adverse. | **Offshore**: Although offshore noise associated with the Proposed Action construction could be audible onshore, it would be below ambient noise levels and therefore would have a minimal impact on land use and coastal infrastructure. Therefore, there would be a temporary, **negligible** adverse noise impact on land use and coastal infrastructure.<br>There would be no noise impacts on land use and coastal infrastructure from O&M of offshore facilities. Therefore, the impact on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action would be **negligible** adverse.<br>Noise associated with the Project and reasonably foreseeable offshore wind activities are not expected to generate noise levels that would be audible onshore. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and | **Offshore**: Under Alternatives C through F, fewer monopiles would be constructed and installed. Although Alternatives C through F could result in a slight reduction in construction noise, the effects of this IPF on land use and coastal infrastructure would otherwise be similar to the Proposed Action. Therefore, the impact on land use and coastal infrastructure would be **negligible** adverse, which is the same impact determination as the Proposed Action. | | | | **Offshore**: Under Alternative G, fewer monopiles would be constructed and installed. Although this alternative could result in a slight reduction in construction noise, the effects of this IPF on land use and coastal infrastructure would otherwise be similar to the Proposed Action. Therefore, the impact on land use and coastal infrastructure would be **negligible** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action)<br>Up to 100 WTGs | Alternative C<br>(Habitat Alternative)<br>64 or 65 WTGs | Alternative D<br>(Transit Alternative)<br>78 to 93 WTGs | Alternative E<br>(Viewshed Alternative)<br>64 or 81 WTGs | Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs | Alternative G<br>(Preferred Alternative)<br>65 WTGs |
|---|---|---|---|---|---|---|---|
| | | reasonably foreseeable activities would be **negligible** adverse. | | | | | |
| | **Onshore**: Future offshore activities could result in onshore noise associated with clearing and grading, construction and installation of aboveground and underground utility infrastructure and impervious surfaces, and other disturbances. These noise sources would be **minor** adverse and short term in nature. | **Onshore**: Noise and traffic would result from construction and installation of the onshore facilities. EPMs would minimize, but not eliminate, noise effects on surrounding land uses. However, these effects would be short term and generally consistent with noise impacts associated with general development under zoned land uses (VHB 2023b). Therefore, there would be short term, **minor** adverse noise impact on land use and coastal infrastructure from construction and installation of onshore elements of the Proposed Action.<br>Noise generated by onshore facilities and O&M and decommissioning activities would be managed under existing local ordinances and regulations as permitted for the approved zoning. As such, noise impacts on land use from the O&M and decommissioning of onshore facilities would have a **negligible** adverse effect on land use.<br>It is expected that noise impacts generated by other planned and foreseeable future actions would similarly be consistent with local ordinances applicable to zoned land uses. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would have a **negligible** adverse effect on land use and coastal infrastructure. | **Onshore**: Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from noise would be the same as the Proposed Action, ranging from **negligible** adverse to **minor** adverse. | | | | **Onshore**: Alternative G would consist of the same onshore facilities and activities as the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from noise would be the same as the Proposed Action, ranging from **negligible** adverse to **minor** adverse. |

### 3.14.2.2 Alternative A: Impacts of the No Action Alternative on Land Use and Coastal Infrastructure

#### 3.14.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for land use and coastal infrastructure (see Section 3.14.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.14.2.2.2 Cumulative Impacts

This section discloses potential land use and coastal infrastructure impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E2.

<u>Accidental releases and discharges:</u> Future offshore and onshore activities could result in accidental releases of trash or water quality contaminants (see Section 3.21 for quantities and details). Trash and contaminant spills would be minimized by vessel compliance with USCG regulations. In the event of a spill, adjacent properties and coastal infrastructure could be temporarily restricted. The exact extent of restrictions and other impacts would depend on the locations of landfall, substations, and cable routes, as well as the ports used to support future offshore wind energy projects. These impacts, however, would generally be localized and short term. On this basis, the effects of accidental releases and discharges on land use under the No Action Alternative would be long term and **minor** adverse.

<u>New cable emplacement/maintenance:</u> Future offshore activities could result in onshore land disturbances to accommodate supporting cable infrastructure for offshore wind development. Land disturbance impacts would largely be limited to the construction and installation phase of any such projects and would be localized in nature.

Onshore, neighboring or adjacent land to cable placement could temporarily be disturbed by future offshore wind project–related noise, vibration, and dust, as well as travel delays along impacted roads. The simultaneous construction and installation of two or more onshore development projects and/or landing sites and onshore cable routes would generate cumulative short-term impacts to land use. State and local agencies would be responsible for managing actions to help minimize and avoid noise, air quality, and other impacts on nearby neighborhoods during construction and installation. All construction and operational impacts from land disturbance would be regulated through local land use and zoning regulations and would therefore comply with applicable laws. On this basis, the effects of land disturbance on land use under the No Action Alternative would be short term and **negligible** adverse**.**

<u>Light:</u> Future offshore activities could result in onshore lighting associated with supporting infrastructure for offshore wind development. These lighting sources would be minor adverse and short term in nature. All construction and operational impacts from land disturbance would be regulated through local land use and zoning regulations and would therefore comply with applicable laws. On this basis, the effects of light on land use under the No Action Alternative would be long term and **minor** adverse**.**

Permanent aviation warning lighting on any offshore wind WTGs proposed as part of future offshore wind activities would be visible from south-facing beaches and coastlines. Visibility would depend on distance from shore, topography, and atmospheric conditions but would be long term. If this lighting alters visitor behavior, land use in the form of tourism, recreation, and property values could subsequently be impacted. Lighting from substations could also affect the adjacent property use and residential development. However, new substations constructed as part of future offshore wind activities would likely be constructed near existing energy infrastructure or where land development regulations, such as zoning and land use plan designations, allow such uses. Therefore, land use would not be expected to be measurably changed, nor would light itself impact land uses or alter land use patterns. On this basis, the effects of light on land use under the No Action Alternative would be long term and **minor** adverse**.**

Noise: Future offshore activities could result in onshore noise associated with clearing and grading, construction and installation of aboveground and underground utility infrastructure and impervious surfaces, and other disturbances. These noise sources would be **minor** adverse and short term in nature.

Future offshore wind activities could result in increased noise during the construction and installation phases. Given the location of these projects within the RI/MA WEA (see Figure 1.1-2), there would be no noise impacts on land use from construction and installation, O&M, and decommissioning of the offshore components of future offshore wind activities. Future offshore wind activities could result in onshore noise impacts during construction and installation, O&M, and decommissioning of onshore elements of future offshore wind activities due to increased construction, traffic, dust, vibration, and other impacts. These noise impacts would be subject to state and local noise regulations and ordinances and therefore would have limited adverse impacts on land use due to the impacts occurring under regulatory thresholds. On this basis, the effects of noise on land use under the No Action Alternative would be long term and **negligible** adverse.

#### 3.14.2.2.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on land use and coastal infrastructure associated with the Project would not occur. However, ongoing and future offshore wind activities would have continuing temporary to long-term impacts on land use and coastal infrastructure, primarily through onshore construction and installation and port activities.

BOEM anticipates that impacts for reasonably foreseeable offshore wind activities would be **minor** adverse. Impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be **minor** adverse, as discussed in Appendix E, Table E2-13. Accidental releases, electromagnetic fields (EMF), land disturbance, light, noise, and port utilization could have temporary adverse impacts on local land uses, but as a whole, ongoing use and development would support the region’s diverse mix of land uses and provide support for continued maintenance and improvement of coastal infrastructure.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA, combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind, would result in **minor** adverse impacts because the overall effect would be localized and short term.

### 3.14.2.3 Alternative B: Impacts of the Proposed Action on Land Use and Coastal Infrastructure

#### 3.14.2.3.1 Construction and Installation

##### Offshore Activities and Facilities

Accidental releases and discharges: Accidental releases and discharges of fuels, lubricants, and hydraulic fluids could occur during the construction and installation phase. These impacts are covered in Section 3.21. A draft OSRP has been prepared for the Project and consists of processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. A release during construction and installation of the Proposed Action would generally be localized, short term, and **minor** adverse, resulting in little change to water quality.

Offshore accidental releases and discharges during construction and installation would not result in land use and coastal infrastructure impacts, as incorporation of water quality EPMs described in Appendix F would aid in reducing the chances of accidental releases and discharges; accidental releases and discharges would be contained and mitigated according to federal, state, and local law. Applicable EPMs in Appendix F include compliance with regulatory requirements related to the prevention and control of spills and discharges, implementation of an OSRP to manage accidental spills or releases of oils or other hazardous materials, and compliance with USCG and EPA regulations. Therefore, potential offshore accidental releases and discharges would be unlikely to result in onshore land use and coastal infrastructure impacts, as these impacts would be mitigated prior to any impacts affecting onshore resources. Therefore, there would be a **negligible** adverse impact from accidental releases and discharges on land use and coastal infrastructure during construction and installation of offshore elements of the Proposed Action, as there would be no effect from offshore accidental releases and discharges on land use and coastal infrastructure.

Light: There would be a temporary increase in the amount of lighting during construction and installation due to the presence of work vessels. In general, lights would be required on offshore platforms and structures, vessels, and construction equipment during construction and installation of the RWF. In addition, temporary work lighting would illuminate work areas on vessel decks or service platforms of adjacent WTGs or OSS platforms during nighttime construction. Project construction lighting would meet USGS requirements, when required by federal regulations.

The RWEC would also require USCG-approved navigation lighting for all vessels during construction and installation of the RWEC. All vessels operating between dusk and dawn would be required to turn on navigation lights. Cable laying could occur 24 hours a day during certain periods, and these vessels would be illuminated at night for safe operations. Given that offshore elements of the Project would be located approximately 12 to 15 miles from shore, it is anticipated that there would be very little lighting impact on land use and coastal infrastructure from construction and installation of offshore elements of the Project. Therefore, there would be a temporary, **negligible** adverse light impact on land use and coastal infrastructure from construction and installation of offshore elements of the Proposed Action.

Noise: Construction and installation of offshore elements of the Project would result in increased noise. The proposed Project would be approximately 15 miles west of the town of New Shoreham, Rhode Island, (Block Island) and 15 to 20 miles south of several other coastal towns in Rhode Island including South Kingstown, Narragansett, Jamestown, Newport, Middletown, and Little Compton. The Project would be approximately 12 miles east/southeast of Martha's Vineyard, Massachusetts, and 13 to 16 miles south of other coastal towns in Massachusetts such as Westport, Dartmouth, and Gosnold. The maximum pile-driving noise from construction and installation of offshore Project elements audible from coastal towns would be 11.2 dBA, which is below ambient noise levels at towns in the vicinity, which range from 25 to 45 dBA during the night and 35 to 55 dBA during the day (VHB 2020). Although offshore noise associated with the Proposed Action could be audible onshore, it would be below ambient noise levels and therefore would have a minimal impact on land use and coastal infrastructure. Therefore, there would be a temporary, **negligible** adverse noise impact on land use and coastal infrastructure from construction and installation of offshore elements of the Proposed Action.

### Onshore Activities and Facilities

Accidental releases and discharges: Installation of the RWEC at the landfall location would use an HDD approach to install the cables under the beach and intertidal water areas. The use of drilling fluid, which typically consists of a water and bentonite mud mixture or another non-toxic drilling fluid, would be required. Bentonite is a natural clay that is mined from the earth. Although these fluids are considered non-toxic, Revolution Wind would implement applicable EPMs listed in Appendix F during construction to minimize potential releases of the drilling fluid associated with HDD activities.

Solid wastes and construction debris would be generated predominately during construction and installation of onshore facilities. Per requirements outlined in 30 CFR 585.626, maximum quantities of and disposal methods for liquids and solid wastes, including hazardous materials, are summarized in COP Section 3.3.9.4 for construction. COP Table 3.3.1-2 also outlines maximum quantities of disposal methods for liquids and solid wastes, including hazardous materials for the OnSS. A spill prevention control and countermeasures plan would be developed in support of NPDES compliance and the potential for discharges and releases from onshore construction and installation would be governed by Rhode Island regulations and the Project's COP. It is anticipated that construction and installation of the OnSS would generate approximately 3,000 cy of solid waste that would be disposed of in a landfill and/or recycling center (VHB 2023a).

In accordance with applicable federal, state, and local laws, comprehensive measures would be implemented prior to and during construction and installation activities to avoid, minimize, and mitigate impacts related to trash and debris disposal. Construction and installation of onshore elements could result in accidental releases and discharges of solid wastes and construction debris that could impact land use; however, the Project would implement applicable EPMs (see Appendix F) and comply with federal, state, and local regulations to reduce the impacts to land use and coastal infrastructure. Some of the EPMs listed in Appendix F include containing drilling fluids for later reuse, creating an HDD contingency plan and SESC plan, and compliance with the RIPDES General Permit for Stormwater Discharges associated with Construction Activities.

Although accidental releases and discharges could impact land use and coastal infrastructure by introducing air or water quality contamination into areas undergoing construction and installation, containment measures outlined above would prevent or mitigate discharges before they can impact land uses. Therefore, there would be a temporary, **negligible** adverse impact due to accidental releases and discharges on land use and coastal infrastructure from construction and installation of onshore elements of the Proposed Action.

<u>New cable emplacement/maintenance:</u> Airborne noise, vibration and dust, and increased vehicle traffic associated with construction and installation of the RWEC landing site and onshore export cable components would temporarily disturb neighboring land uses along the RWEC route. Portions of the development footprint could also be fenced and inaccessible at various points during construction and installation. Construction and installation activities causing these impacts consist of HDD for the RWEC, preparation and installation of TJBs that connect the RWEC and onshore transmission cable, and installation of the onshore transmission cable.

The onshore transmission cable would be installed within an underground duct bank between the TJBs and the OnSS and would be installed within or along previously disturbed areas including the shoulders of existing public roadways, lands owned by Quonset Development Corporation, and private properties. The onshore transmission cable would result in 3.1 acres (1.3 hectares) of land disturbance but would be located outside wetlands and other waterbodies. The landfall work area would require clearing, grading, and hardening to support the installation of the TJBs and would temporarily result in up to 3.1 acres (1.3 ha) of land disturbance. The TJBs would be excavated and installed underground within the landfall work area and access inside the TJBs would be provided by manholes. Therefore, land disturbance associated with the TJB area would be temporary. As discussed above, the onshore transmission cable, landfall work area, and TJBs would result in temporary impacts only. In addition, work would be sited in uplands and all activities would be conducted in compliance with the RIPDES General Permit for the Discharge of Stormwater Associated with Construction Activities and an approved SESC plan. Therefore, with the implementation of the EPMs outlined in Appendix F, land disturbance activities during construction and installation of the onshore transmission cable are expected to result in direct and short-term water quality impacts (VHB 2023a).

Construction and installation of the Project’s onshore components would require construction staging in parking lots adjacent to or near the landing site. Although most of the construction staging would occur on private property, construction could reduce public parking available at the Blue Beach parking lot during construction and installation. These disturbances would be short term, with construction expected to begin in Quarter 1 of 2023 and last approximately 8 months (see COP Section 3.2). Construction along public roadways would be completed in a matter of days or weeks. At the landing site, the Project would make the physical connection between the offshore RWEC and the onshore RWEC in two underground TJBs. The only long-term, visible components of the cable system would be the manhole covers (VHB 2023c).

Onshore construction and installation would include trench excavation and placement of the onshore RWEC within existing paved roads. Revolution Wind would abide by local construction ordinances. Construction and installation would occur primarily during normal daylight hours except for certain activities associated with cable installation at the chosen landing site (VHB 2023c) that could require nighttime activity to meet rapid construction timelines and to reduce the chances of equipment failure. Revolution Wind would work with the Town of North Kingstown to develop a detailed plan that includes traffic and other control measures prior to beginning major construction. The traffic plan with North Kingstown would identify appropriate alternative routes that would accommodate projected traffic loading during construction and installation activities. BOEM assumes that the Project would avoid permanent disruption to existing underground utilities, such as water, sewer, and electrical lines. However, depending on the exact placement of the onshore RWEC cable, the physical size and location of the cable could hamper future installation of public utilities such as water, sewer, and stormwater lines, which are typically placed beneath roadway travel lanes. Vehicular and construction equipment emissions would be similar to those described for offshore development. The potential impacts from construction and diesel-generating equipment would be reduced through EPMs related to fuel-efficient engines and dust control plans, as outlined in Section 3.4.1.

All Project-related construction and installation would take place within areas zoned for industrial and commercial development and would be subject to land use and zoning regulations that limit impacts. Therefore, there would be a short-term, **minor** adverse land disturbance impact on land use and coastal infrastructure from construction and installation of onshore elements of the Proposed Action.

Light: Most onshore construction and installation would be completed during daytime hours. Typical construction work hours for the Project would be 7:00 a.m. to 6:00 p.m. Monday through Friday when daylight permits and 7:00 a.m. to 5:00 p.m. on Saturdays. This is consistent with the Town of North Kingstown noise ordinance (Town Code Article VI). However, some work tasks, such as concrete pours, landfall installation, and cable pulling or splicing, once started, require completion without interruption and could go beyond normal work hours. In addition, the nature of transmission line construction and installation requires line outages for certain procedures such as transmission line connections, equipment cutovers, or stringing under or over other transmission lines. These outages are dictated by ISO New England and can be very limited based on regional system load and weather conditions. Work requiring scheduled outages and crossings of certain transportation and utility corridors may be required on a limited basis outside of normal work hours, including Sundays and holidays.

For nighttime construction and installation work, portable floodlights with a maximum height of approximately 18 feet would be used. All lights on portable lightstands would be downward facing. Any nighttime lighting used during construction and installation would comply with safety and security and local requirements.

Construction equipment, the OnSS, the ICF, and structures within the TNEC ROW would be visible during construction and installation. Although construction is expected to take place primarily during the daylight hours between 7:00 a.m. and 6:00 p.m., some temporary lighting may be required outside those hours. Certain activities associated with cable installation at the chosen landing site (VHB 2023a) could require nighttime activity and lighting to meet rapid construction timelines and to reduce the chances of equipment failure. Nighttime lighting could have a temporary adverse impact on land use and coastal infrastructure by increasing artificial lighting that could be visible by residences and businesses nearby. Therefore, there would be a temporary, **minor** adverse light impact on land use and coastal infrastructure from construction and installation of onshore elements of the Proposed Action.

Noise: Noise and traffic would result from construction and installation of the onshore facilities. As described within the *Onshore Acoustic Assessment* in COP Appendix P2, long-term ambient sound measurements conducted within the proposed layout of the onshore facilities ranged from 44 to 45 dBA (Leq) at night (10:00 p.m. to 7:00 a.m.) and from 49 to 50 dBA during the day (7:00 a.m. to 10:00 p.m.) (VHB 2023b). Operation of construction equipment and construction-related traffic would increase the ambient noise between the typical construction hours of 7:00 a.m. and 6:00 p.m. during the approximately 1-year construction period. The onshore facilities construction noise sources would include equipment used to support the HDD operations at the landfall work area, equipment used to support trenching and cable pulling, and construction vehicles such as excavators, dump trucks, and paving equipment (VHB 2023b).

Temporary construction and facility installation noise would be consistent with noise sources typically associated with a working industrial park. Short-term construction noise impacts would be generated during HDD onshore for the RWEC. A cofferdam could be used to ensure a dry environment during construction and installation and to manage sediment and would align with HDD exit pits. If the cofferdam is required, the cofferdam could be installed as either a sheet piled structure into the seafloor or a gravity cell structure placed on the seafloor using ballast weight. If the cofferdam is installed using sheet pile, a vibratory hammer would be used to drive the sidewalls and endwalls into the seafloor. Installation of the sheet pile cofferdam could take approximately up to 14 days. Noise associated with possible sheet pile installation would produce the maximum amount of noise compared to other construction methods. In general, noise generated by RWEC construction and installation activities would occur during daytime hours (7:00 a.m. to 8:30 p.m.), and would be largely generated by an excavator, crane, and sheet pile driver. If the HDD methodology is selected for construction of the RWEC, HDD operations would occur continuously to minimize the risk of soil settlement and equipment failures and would create noise during nighttime hours (VHB 2023b). Noise generated by construction and installation activities is expected to comply with the Town of North Kingstown noise code. The closest residences to the construction and installation of the onshore transmission cable, ICF, and OnSS are the residences on the south side of Camp Avenue and east side of Mill Creek Drive, which are within a few hundred feet of the construction area. The *Onshore Acoustic Assessment* in COP Appendix P2 (VHB 2023b) analyzes onshore construction noise and found that sound levels around the onshore transmission cable, ICF, and OnSS would be between 40 and 45 dB at residences along the south side of Camp Avenue and east side of Mill Creek Drive, which would be below ambient levels, measured between 44 and 45 dBA (Leq) at night and 49 to 50 dBA during the day at the time of the analysis.

During construction and installation of the onshore elements of the RWEC, construction noise could approach or exceed the Town of North Kingstown’s noise code limit for construction and installation activities at receptors immediately adjacent to the road ROW. EPMs for onshore construction and installation activities include coordination with local governments and compliance with appropriate local ordinances governing noise, light, and traffic impacts consistent with zoned land uses (see Appendix F). These EPMs would minimize, but not eliminate, noise effects on surrounding land uses. However, these effects would be short term and generally consistent with noise impacts associated with general development under zoned land uses. Therefore, there would be short term, **minor** adverse noise impact on land use and coastal infrastructure from construction and installation of onshore elements of the Proposed Action.

#### 3.14.2.3.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

<u>Accidental releases and discharges:</u> The WTGs and OSSs would be designed to contain any potential leakage of fluids, thereby preventing the discharge fluids into the ocean. During WTG operations, small accidental leaks could occur because of broken hoses, pipes, or fasteners. During WTG maintenance, small releases could occur during servicing of hydraulic units or gearboxes. Any accidental leaks within the WTGs would be contained within the hub and main bed frame or tower. During operations, the only

discharges to the sea that are anticipated are those associated with vessels performing maintenance. (see Appendix D of the COP) (VHB 2023a). Decommissioning impacts would be similar to construction and installation impacts discussed above. Any offshore leakage of fluids would not impact land use and coastal infrastructure due to the design feature of WTGs to capture accidental releases and discharges and because implementation of EPMs in Appendix F would minimize the potential for spills. Therefore, there would be a **negligible** adverse impact from accidental releases and discharges on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action.

Light: During operations, offshore structures would require lighting that conforms to FAA and BOEM guidelines, and USCG requirements. BOEM has indicated that offshore lighting should meet standard specifications in FAA Advisory Circulars 70/7460-1L, Change 2 (FAA 2018), and 150/5345-43H (FAA 2016), and USCG standards for marine navigation lighting.

Lighting associated with the Proposed Action would follow lighting and marking design parameters as identified in BOEM's draft proposed *Guidelines for Providing Information on Lighting and Marking of Structures Supporting Renewable Energy Development*, released April 2021 (BOEM 2021). Control, lighting, marking, and safety systems would be installed on each WTG; the specific systems would vary depending on the turbine selected and would be reviewed as part of the federal approval process.

Offshore turbines must be visible not only to pilots in the air, but also mariners navigating on water. In daylight, offshore wind turbines do not require lighting if the tower and components are painted white. The FAA and USCG consider white-colored turbines to be the most effective early warning technique for both pilots and mariners (Patterson 2005). Marine navigation lighting is regulated by the USCG through 33 CFR 67. Structures must be fitted with lights for nighttime periods. The OSSs would be lit and marked in accordance with FAA and USGS requirements for aviation and navigation obstruction lighting, respectively. Lighting on the RWEC during the O&M phase would be short term and limited to the lighting required on vessels while operating along the corridor. As described above for RWF construction and installation, USCG-approved navigation lighting is required for all vessels operating between dusk and dawn.

Although WTGs and the OSSs would be lit, only a relatively small portion of the onshore locations would have open views of the Project. A viewshed analysis of the Project determined that only 44.9 square miles of land within the 6,113 square mile visual study area could have potential views of the Project from ground level (EDR et al. 2023). The visibility of WTGs and potentially the OSSs would result in a small impact to onshore land uses and coastal infrastructure by increasing light in the offshore environment that could be visible onshore and could slightly increase visible light in coastal communities. Decommissioning impacts would be similar to impacts from Project construction and installation. Therefore, there would be a long-term, **minor** adverse light impact on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action.

Noise: There would be no noise impacts on land use and coastal infrastructure from O&M of offshore facilities. Operational noise would not be audible onshore. Decommissioning impacts would be similar to impacts from Project construction and installation. Therefore, because there would be no effect, the impact on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action would be **negligible** adverse.

### Onshore Activities and Facilities

Accidental Releases and Discharges: The OnSS and ICF would require various oils, fuels, and lubricants to support its operations (see COP Table 3.3.1-2 and COP Table 3.3.1-3). Equipment would be mounted on concrete foundations with concrete secondary fluid containment designed for 110% containment and in accordance with industry and local utility standards. With EPMs, accidental release and discharge impacts to land use and coastal infrastructure from onshore O&M would be minimal. Decommissioning would incur similar impacts to those during the construction and installation phase. Therefore, there would be a temporary, **negligible** adverse impact from accidental releases and discharges on land use and coastal infrastructure from O&M and decommissioning of onshore elements of the Proposed Action due to implementation of containment measures and compliance with industry and utility standards.

New cable emplacement/maintenance: Once installed, the onshore components of the RWEC would be located underground, and disturbed areas would be restored to preconstruction conditions or improved. Buried Project features would have no effect on adjacent land uses or coastal infrastructure. Revolution Wind has designed the Project to account for site-specific oceanographic and meteorological conditions within the analysis area, effectively avoiding the potential for beach erosion to expose the RWEC at the sea to shore transition zone.

Due to the temporary and intermittent nature of O&M activities, O&M of onshore facilities would have a **negligible** adverse impact on land use over the 35-year lifespan of the Project.

Impacts during decommissioning would be similar to the impacts during construction and installation. For onshore decommissioning, any removal of the underground, onshore cables (if not decommissioned in place) could result in temporary construction disturbances and delays along the affected roads and near the landing sites. The length and extent of these delays would be shorter in duration compared to those experienced during installation. However, all O&M activities would be consistent with local land use and zoning regulations and would be typical activities associated with industrial and commercial land uses. Therefore, there would be a temporary, **negligible** adverse land disturbance impact on land use and coastal infrastructure from decommissioning of onshore elements of the Proposed Action.

Light: Operational lighting onshore would be limited to the OnSS and ICF. Lighting at these facilities would include 1) yard lighting and 2) task lighting. Both categories would be switched lights and would only be used during yard-based activity. The mounting heights for the lighting would range from 10 to 25 feet off the ground, and the lights would be mounted on lamp posts, substation buildings, fire walls, or steel substation structures. The wattage for the individual lamps would range from 35 to 300 watts depending on the use. Operational lighting for the OnSS and ICF would comply with Quonset Development Corporation lighting regulations and would be mounted with the lamp horizontal to the ground (light facing straight down) or with a lamp tilt no more than 25° from the horizon. The task lighting at both the OnSS and ICF would support emergency maintenance or repairs to the station equipment outside of normal business hours. The task lights would be mounted to direct light toward substation equipment to ensure adequate lighting for workers to perform emergency maintenance or repairs.

Considering the presence of an existing electrical substation and industrial uses of the area, new lighting associated with the OnSS and ICF could adversely affect residences directly adjacent to these facilities. These effects could be reduced through the use of EPMs such as visual screening. Lighting for the OnSS and ICF would be designed to the minimum standard necessary for substation safety and security per utility operational requirements, as well as state and local regulations. General yard lighting would be provided within the OnSS and ICF area for assessment of equipment. In general, yard lighting would be off at night unless lighting is necessary for in-progress site work or for safety and security.

In general, lighting would be minimal and directed downward. Lighting would be removed as part of decommissioning. Therefore, there would be a long-term, **minor** adverse light impact on land use and coastal infrastructure from O&M and decommissioning of onshore elements of the Proposed Action.

Noise: Operational noise of the underground cables is expected have no impacts to current land uses because there would be no permanent noise-generating equipment associated with the onshore transmission cable. The OnSS and ICF, as designed, would generate sound similar to or below existing ambient sound levels; therefore, operational noise levels would have a direct but small impact on land use and coastal infrastructure. The proposed OnSS would introduce new sources of sound including transformers, shun reactors, harmonic filters, and cooling and ventilation associated with the outdoor substation equipment, as well as condensers, pumps, skids, and auxiliary transformers associated with the synchronous condenser building. Sound from the substation would be 43.9 dBA or lower at the closest noise sensitive receptors, which would be below the EPA guideline for noise exposure (48.6 dBA Leq) and below the Town of North Kingston, Rhode Island, nighttime noise ordinance limit for residential properties (50 dBA). Operational sound from the OnSS would also be below 50 dBA at the nearest residential property lines and below 70 dBA at the nearest commercial/industrial property lines, which is below the noise ordinance noise limits (VHB 2023b). O&M vehicles and certain maintenance activities performed during O&M could also periodically generate noise audible to surrounding land uses throughout the life of the Project; generated noise would be similar to typical traffic noise and noise from general construction and installation activities. These continuous and intermittent impacts would be permanent. Noise generated by onshore facilities and O&M activities would be managed under existing local ordinances and regulations as permitted for the approved zoning. Given this, noise impacts on land use from the O&M of onshore facilities would have a **negligible** adverse effect on land use. Decommissioning would generate noise similar to that during the construction and installation phase. Therefore, there would be a long-term **negligible** adverse noise impact on land use and coastal infrastructure from O&M and decommissioning of onshore elements of the Proposed Action.

#### 3.14.2.3.3 Cumulative Impacts

#### Offshore Activities and Facilities

Accidental releases and discharges: The Proposed Action and other reasonably foreseeable future projects could result in accidental release of contaminants, trash, and debris that could add to releases from other reasonably foreseeable projects. The combined offshore accidental release impacts on land use and coastal infrastructure could increase the risk of and potential impacts from accidental releases in the GAA. The Proposed Action and other reasonably foreseeable projects would be expected to comply with any applicable permit requirements to implement erosion, stormwater, and spill controls to minimize, reduce, or avoid impacts on water and air quality. Land use and coastal infrastructure would be unlikely to be impacted by offshore accidental releases, as accidental releases would be mitigated offshore. As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in **negligible** adverse cumulative impacts on land use and coastal infrastructure because there would be no impact on land use and coastal infrastructure.

Light: The Proposed Action would add permanent lighting for up to 102 WTGs and two OSSs. Although this lighting would be visible, in part, from south-facing beaches and coastlines, this represents a small but noticeable (3%) increase over total estimated WTG and OSS foundations providing long-term lighting under the No Action Alternative if all projected offshore wind projects are constructed. BOEM estimates a maximum cumulative total of 3,190 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects. The land use impacts from the Proposed Action in the context of reasonably foreseeable future actions would be more extensive than impacts for the Proposed Action alone. However, the Proposed Action and other reasonably foreseeable projects would be expected to comply with applicable permit conditions and lighting requirements to minimize, reduce, or avoid light impacts on onshore land uses and coastal infrastructure. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be similar to those impacts described under the No Action Alternative and would be **negligible** adverse impacts.

Noise: There would be no noise impacts on land use and coastal infrastructure from offshore facilities. Noise associated with construction and installation, O&M, and decommissioning would not be audible onshore. Similarly, reasonably foreseeable activities are not expected to generate noise levels that would be audible onshore. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be similar to those impacts described under the No Action Alternative, which are described as having no onshore impacts from offshore facilities and would be **negligible** adverse impacts.

### Onshore Activities and Facilities

Accidental releases and discharges: Installation of the RWEC at the landfall location would use an HDD approach to install the cables under the beach and intertidal water areas. Discharge of drilling fluids, solid wastes, and construction debris is possible during construction and installation. Additionally, discharge of oils, fuels, and lubricants is possible at the OnSS and ICF during Project operations and during maintenance activities. The Project would implement EPMs (see Appendix F) and comply with federal, state, and local regulations to reduce the impact to land use and coastal infrastructure. Reasonably foreseeable future projects would also require the construction of onshore facilities at identified ports along the Atlantic coast. Installation of onshore elements of reasonably foreseeable future projects could also result in the discharge of drilling fluids, solid wastes, construction debris, lubricants, oils, fuels, and other hazardous materials during construction, installation, and decommissioning. In context of reasonably foreseeable future actions, the combined offshore accidental release impacts on land use and coastal infrastructure could increase the risk of and potential impacts from accidental releases in the GAA. Other reasonably foreseeable actions would also be required to implement EPMs and adhere to federal, state, and local regulations to ensure that accidental releases and discharges are minimized and mitigated appropriately. Therefore, cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on land use and coastal infrastructure.

<u>New cable emplacement/maintenance:</u> The Proposed Action would result in increased onshore land disturbance during the construction and installation phase of the Project. It would result in temporary increases in construction noise, vibration and dust, and intermittent delays in travel along impacted roads. O&M activities would include periodic inspections and repairs at cable access manholes, which would require minimal use of worker vehicles and construction equipment. Reasonably foreseeable projects are expected to also result in land disturbances consistent with the Proposed Action in terms of scale, intensity, and duration at the ports and other facilities across the Atlantic Coast where these projects are expected to occur. Assuming that new substations for future offshore wind projects would be in locations designated for industrial or utility uses, and underground cable conduits would primarily be co-located with roads or other utilities, operation of substations and cable conduits would not affect the established and planned land uses for a local area. Additionally, the Project and other reasonably foreseeable future projects would be required to comply with local land use and zoning regulations, which would reduce impacts to land use and coastal infrastructure. Therefore, cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on land use and coastal infrastructure.

<u>Light:</u> There would be temporary and permanent light impacts under the Proposed Action. Temporary lighting impacts would occur with Project construction, installation, and decommissioning. While most onshore construction and installation would be completed during daytime hours, some tasks could extend beyond daylight work hours and would require the use of portable floodlights that would face downward. There would also be long-term permanent light impacts associated with O&M. Operational lighting would be limited to the OnSS and ICF. All operational lighting would be required to comply with Quonset Development Corporation lighting regulations. Other reasonably foreseeable projects would also generate onshore lighting impacts similar in nature to the Proposed Action. While many of these lighting impacts would be short term and temporary during Project construction and installation, some lighting associated with onshore facilities would be permanent, resulting in long-term lighting impacts in the vicinity of the OnSS and ICF. Temporary and permanent onshore lighting impacts are expected during construction, installation, O&M, and decommissioning of reasonably foreseeable future projects, including any port upgrades at port facilities described in Appendix E. These impacts are expected to be similar in scale to the lighting impacts for the Proposed Action but distributed across port facilities along the Atlantic coast. Temporary and permanent lighting would require compliance with local development regulations at the port facilities and locations where reasonably foreseeable future projects would experience onshore lighting impacts. Therefore, cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on land use and coastal infrastructure.

<u>Noise:</u> There would be noise impacts associated with the construction and installation of the Proposed Action. Construction and installation would be limited to daylight hours and noise impacts would consist of noise generated from heavy equipment used for clearing, grading, excavation, foundation installation, and heavy lifting of substation components. Noise modeling conducted for operations of the OnSS (VHB 2023b) indicates that predicted noise levels would be below the minimum disturbance thresholds specified by code (Article VI, Sec. 8-87[a]) (Town of North Kingstown, Rhode Island 2021b). No permanent noise-generating equipment would be associated with the onshore transmission cable, resulting in no impacts to current land uses from operational noise. The OnSS and ICF, as designed, would generate sound similar to or below existing ambient sound levels, as described in Section 3.14.2.2.2;

therefore, operational noise levels would have a direct but small impact on land use and coastal infrastructure by increasing noise levels in the vicinity of onshore elements of the Proposed Action. Additionally, O&M and maintenance vehicles could result in increased noise in the vicinity when maintenance is being performed. However, all equipment and O&M activities would be designed for and consistent with zoned land uses and appropriate ordinance restrictions, as described in Section 3.14.2.2.2. It is expected that noise impacts generated by other planned and foreseeable future actions would be generally similar to those generated under the Proposed Action, and those actions would similarly manage impacts consistent with local ordinances applicable to zoned land uses. Therefore, cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would have a **negligible** adverse effect on land use and coastal infrastructure.

#### 3.14.2.3.4 Conclusions

Proposed Action construction, installation, and decommissioning would temporarily generate noise, vibration, and vehicular traffic. Impacts during O&M would be expected to be similar, but in lower duration and extent. Therefore, BOEM expects the overall impact on land use and coastal infrastructure from the Proposed Action alone to be **minor** adverse. Proposed Action O&M would also generate long-term, **minor** beneficial impacts by supporting designated uses at ports and potentially promoting port improvements and/or redevelopment, though no port improvements are currently proposed as part of the Project.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to land use and coastal infrastructure. BOEM made this call because, although port use during construction and installation could result in moderate adverse impacts, the overall effect when impacts are considered over the entire GAA and analysis duration would be small and the resource would be expected to recover completely.

### 3.14.2.4 Alternatives C, D, E, and F

Table 3.14-1 provides a summary of IPF findings for these alternatives.

#### 3.14.2.4.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and possibly reduce the miles of IAC, these changes would not measurably affect land use and coastal infrastructure. Therefore, BOEM expects that the impacts to land use and coastal infrastructure resulting from the alternative would be similar to the Proposed Action and would result in **minor** adverse and **minor** beneficial impacts, which is the same impact determination as the Proposed Action.

The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as the Proposed Action: **minor** adverse.

### 3.14.2.5 Alternative G: Impacts of the Preferred Alternative on Land Use and Coastal Infrastructure

Table 3.14-1 provides a summary of IPF findings for this alternative.

#### 3.14.2.5.1 Conclusions

Although Alternative G would reduce the number of WTGs and the miles of IAC, these changes would not measurably affect land use and coastal infrastructure. Therefore, BOEM expects that the impacts to land use and coastal infrastructure resulting from Alternative G would be similar to the Proposed Action and would result in **minor** adverse and **minor** beneficial impacts, which is the same impact determination as the Proposed Action.

### 3.14.2.6 Mitigation

No potential additional mitigation measures for land use and coastal infrastructure are identified in Table F-2 or F-3 in Appendix F.

# 3.15 Marine Mammals (see section in main EIS)

# 3.16 Navigation and Vessel Traffic (see section in main EIS)

# 3.17 Other Marine Uses (see section in main EIS for Scientific Research and Surveys)

## 3.17.1 Description of the Affected Environment for Other Marine Uses

Geographic analysis area: The GAAs for Other Marine Uses are as follows (Figure 3.17-1):

Aviation and air traffic: Airspace and airports used by regional air traffic.

Land-based radar: Includes air space used by regional traffic.

Marine mineral resources and dredged material disposal: Areas within 0.25 mile of the Project and footprints of other cables and wind lease areas in the RI/MA WEA.

Military and national security: An area roughly bounded by Montauk, New York; Providence, Rhode Island; Provincetown, Massachusetts; and within a 10-mile buffer from wind lease areas in the RI/MA WEA.

Offshore energy uses: Other known wind energy project locations.

Undersea cables: Area within 1 mile of the Project and other undersea facilities and wind lease areas in the RI/MA WEA.

These areas encompass locations where BOEM anticipates direct and indirect impacts associated with Project construction and installation, O&M, and decommissioning. The scientific research survey area encompasses the locations where scientific research and surveys are anticipated to occur.

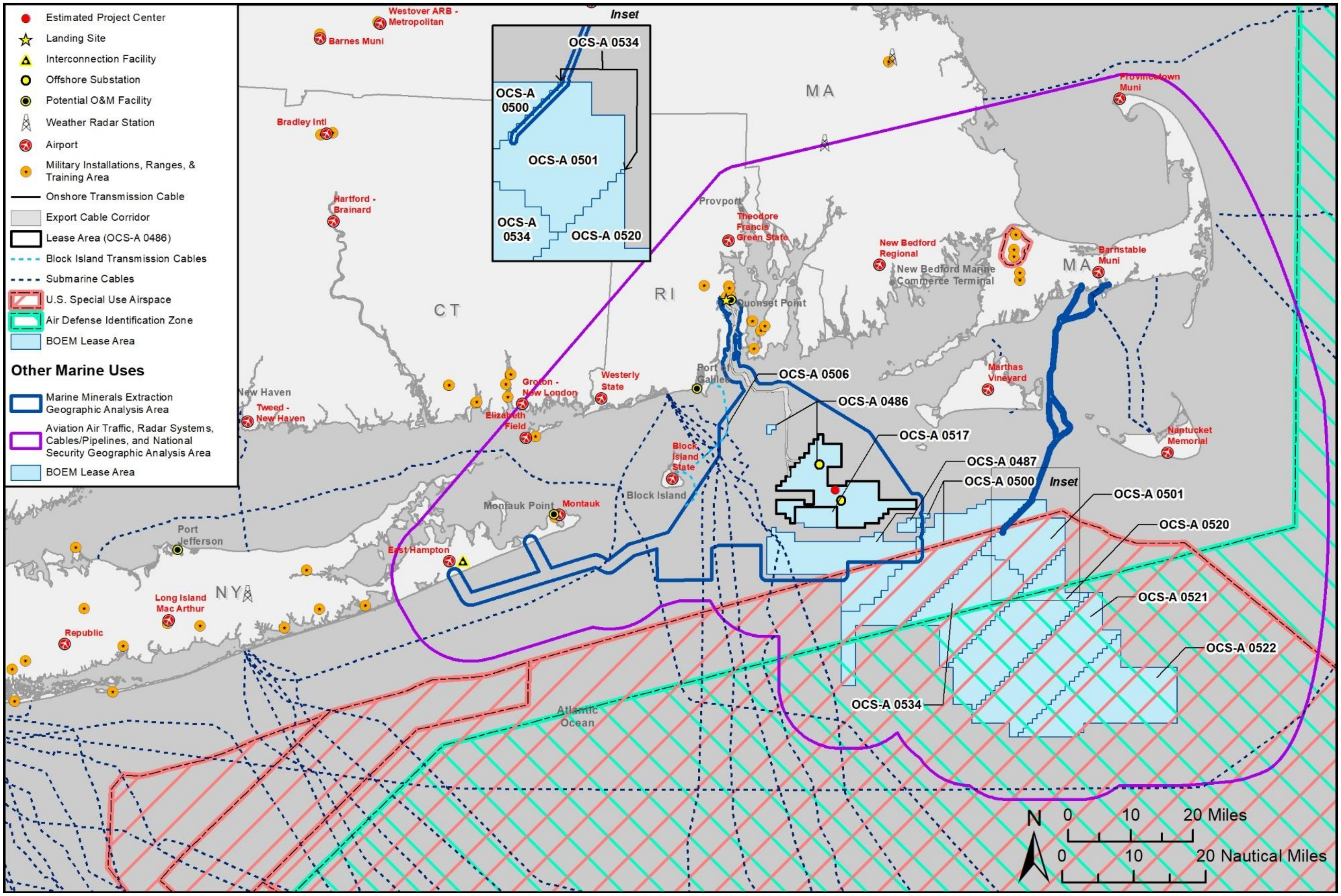


**Figure 3.17-1. Geographic analysis areas for other marine uses.**

#### 3.17.1.1 Aviation and Air Traffic

<u>Affected environment:</u> Numerous public and private airports serve portions of New York, Rhode Island, and Massachusetts in the GAA. Major airports serving the region include Boston Logan International Airport, located approximately 100 miles northeast of the Project; T.F. Green Airport in Providence, Rhode Island, located approximately 50 miles north of the Project; and Montauk Airport in Montauk, New York, approximately 30 miles west of the RWF and 9 miles north of the offshore RWEC. The closest public airports to the Project are Nantucket Memorial Airport, approximately 55 miles east on Nantucket; Martha's Vineyard Airport, approximately 32 miles northeast on Martha's Vineyard; and Block Island State Airport, approximately 20 miles west on Block Island.

#### 3.17.1.2 Land-Based Radar

<u>Affected environment:</u> Several radar systems supporting commercial air traffic control, national defense, weather forecasting, and ocean condition observation operate near the Project (Westslope Consulting, LLC [Westslope] 2021). Six high-frequency (HF) airport surveillance radar (ASR) sites are located near the Project: Boston ASR-9, Falmouth ASR-8, Nantucket ASR-9, North Truro ARSR-4, Providence ASR-9, and Riverhead ARSR-4. The study area is beyond the instrumented range of the Boston ASR-9.

Three navigational aid sites are near the Project: Martha's Vineyard VOR/DME, the Providence VOR/DME, and Sandy Point VOR/DME. Two NEXRAD weather radar systems, the Boston WSR-88D and Brookhaven WSR-88D, are located near the Project.

There are 13 HF radar sites located near the Project:

- Amagansett HF radar (operated by Rutgers University)
- Block Island Long Range HF radar (two radars operated by the University of Rhode Island and Rutgers University)
- Camp Varnum HF radar (operated by Woods Hole Oceanographic Institution)
- Horseneck Beach State Reservation HF radar (operated by Woods Hole Oceanographic Institution)
- Long Point Wildlife Refuge HF radar (operated by Woods Hole Oceanographic Institution)
- Martha's Vineyard HF radar
- Moriches HF radar (operated by Woods Hole Oceanographic Institution)
- Martha's Vineyard Coastal Observatory (MVCO) Meteorological Mast HF radar (operated by Woods Hole Oceanographic Institution)
- Nantucket Island HF radar (two radars operated by Rutgers University and Woods Hole Oceanographic Institution).
- Nauset HF radar (operated by the University of Massachusetts Dartmouth)
- Squibnocket Farms HF radar (operated by Woods Hole Oceanographic Institution)

#### 3.17.1.3 Military and National Security

Affected environment: The U.S. Navy, the USCG, and other military entities have numerous facilities in the region. Major onshore regional facilities include Naval Station Newport, the Naval Submarine Base New London, the Northeast Range Complex/Narragansett Bay Operation Area, Joint Base Cape Cod, and numerous USCG stations (Epsilon Associates, Inc. 2018). Onshore and offshore military use areas could have designated surface and subsurface boundaries and special use airspace. The Project is entirely within the Navy's Narragansett Operating Area in which national defense training exercises and system qualification tests are routinely conducted (MARCO 2021). This operating area extends approximately 100 miles south and 200 miles east of the Project. The Project is approximately 10 miles north of a Military Special Use Airspace (FK Facility Narragansett Bay) and 20 miles northeast of the closest submarine transit lanes. A DOD assessment of compatibility of offshore wind development with military assets and activities determined that potential conflicts exist in the area surrounding the Project and could require site-specific mitigation measures (OCM 2019).

#### 3.17.1.4 NOAA's Scientific Research and Surveys (see section in main EIS)

#### 3.17.1.5 Undersea Cables

Affected environment: There are existing submarine cables that run through the regional waters. Most pass through Green Hill, Rhode Island. In addition, there are NOAA nautical chart cable and pipeline areas that denote where such infrastructure may be located. The existence of these areas does not necessarily mean that actual cables or pipeline are present (BOEM 2013). Other than cables for other offshore wind projects, BOEM has not identified any publicly noticed plans for additional submarine cables or pipelines; therefore, no new cable installation is reasonably foreseeable for the purposes of this EIS.

### 3.17.2 Environmental Consequences

#### 3.17.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

The analysis presented in this section considers the impacts resulting from the maximum design scenario under the project design envelope (PDE) approach developed by BOEM to support offshore wind project development (Rowe et al. 2017). The maximum design size specifications defined in Appendix D, Table D-1, are PDE parameters used to conduct this analysis.

The following design parameters would result in different impacts relative to those generated by the design elements considered under the PDE:

- The selection of lower capacity WTG designs would reduce the total WTG height from 873 to as low as 648 feet, reducing impacts to aviation and air traffic, land-based radar, and military and national security.

See Appendix E1 for a summary of IPFs analyzed for other marine uses across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E1, Tables E2-15 to E2-21. Other marine uses subsections (NOAA's scientific research and surveys) are discussed in the main EIS.

Table 3.17-1 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers the implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts on other marine uses. These EPMs are summarized in Appendix F, Table F-1.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations. The overall effect determination for each alternative is **minor** adverse impacts for aviation and air traffic; **moderate** adverse for land-based radar; **moderate** adverse for military uses; and **negligible** adverse for undersea cables.

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**Table 3.17-1. Alternative Comparison Summary for Other Marine Uses**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| **Aviation and Air Traffic** | | | | | | | |
| Aviation and air traffic | **Offshore:** Future offshore wind activities without the Proposed Action could result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects. With implementation of FAA-approved flight plans, however, impacts of the No Action Alternative on aviation and air traffic would be **negligible** adverse. | **Offshore:** The Proposed Action would result in an increase in air traffic related to construction and installation of offshore Project elements. A helicopter route plan would be developed to meet industry guidelines and best practices in accordance with FAA guidance. Additionally, all aviation operations, including flying routes and altitude, would be aligned with relevant stakeholders, such as the FAA. On this basis, the effects of Project-related aviation and air traffic on aviation and air traffic under the Proposed Action would be **minor** adverse.<br>Helicopter flights for Project O&M would represent a 0.1% increase in annual helicopter flight hours and a 0.01% increase in general aviation hours in the GAA. When estimation uncertainty is considered, this represents a **negligible** adverse effect on general aviation air traffic.<br>The Proposed Action and reasonably foreseeable future wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **negligible** adverse impacts on aviation and air traffic. | **Offshore:** This alternative could require fewer construction and O&M–related helicopter trips due to the reduction in the number of offshore elements, incrementally reducing the number of construction-related helicopter trips. While Alternatives C to F could result in slightly reduced air traffic, the effects of this IPF on aviation and air traffic under each alternative would otherwise be similar to those described for the Proposed Action: **minor** adverse for construction and **negligible** adverse for O&M and cumulative impacts. | | | | **Offshore:** Alternative G could require fewer construction and O&M–related helicopter trips due to the reduction in the number of offshore elements and shorter IAC. Although this alternative could result in slightly reduced air traffic, the effects of this IPF on aviation and air traffic would otherwise be similar to the Proposed Action: **minor** adverse for construction and **negligible** adverse for O&M and cumulative impacts. |
| Light | **Offshore:** Future offshore wind activities without the Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. The addition of up to 1,015 lighted structures represents a small increase in the combined vessel, navigation, housing, and port lights within the GAA; therefore, the effects of light on aviation and air traffic under the No Action Alternative would be **minor** adverse. | **Offshore:** During construction and installation and O&M, WTGs would be marked with appropriate lighting to meet FAA warning guidelines and would be visible on the radar systems of low-flying aircraft, similar to other large-scale sea surface activity. Therefore, impacts to aviation and air traffic would be **negligible** adverse.<br>BOEM estimates a maximum cumulative total of up to 1,117 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidelines to minimize collision and allision risks. WTGs would also be visible on aircraft radar. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, | **Offshore:** Under Alternatives C through F, fewer lighted WTG locations would be approved by BOEM when compared to the maximum-case scenario under the Proposed Action. However, this slight reduction in lighting would not be expected to measurably reduce aviation and air traffic impacts compared to those impacts described under the Proposed Action. Therefore, the impact on aviation and air traffic under each alternative would be **negligible** adverse for all Project phases. | | | | **Offshore:** Under Alternative G, fewer lighted WTG locations would be approved by BOEM when compared to the maximum-case scenario under the Proposed Action. However, this slight reduction in lighting would not be expected to measurably reduce aviation and air traffic impacts compared to the Proposed Action. Therefore, the impact on aviation and air traffic would be **negligible** adverse for all Project phases. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | | present, and reasonably foreseeable activities would have a **negligible** adverse impact on aviation and air traffic. | | | | | |
| | **Onshore:** See offshore analysis. | **Onshore:** Operational lighting onshore would be limited to the OnSS and ICF, which would have minimal yard lighting and task lighting. This lighting is minimal and would not result in impacts to aviation and air traffic. Decommissioning would have impacts similar to those during Project construction. Therefore, the effects of light on aviation and air traffic under the Proposed Action would be **negligible** adverse. | **Onshore:** Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** adverse. | | | | **Onshore**: Alternative G would consist of the same onshore facilities and activities as the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** adverse. |
| Port utilization | **Offshore:** Port improvements and construction activities in or near ports may also require alteration of navigation patterns at nearby airports. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on aviation and air traffic. | **Offshore:** Port improvements and construction activities in or near ports may require alteration of navigation patterns at nearby airports. However, vessel traffic would also be spread among multiple ports to ensure that sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on aviation and air traffic. | **Offshore:** Alternatives C through F would require a shorter construction duration, a smaller construction footprint, and fewer offshore structures. While Alternatives C through F could result in a slight reduction in port utilization, the effects of this IPF on aviation and air traffic under Alternatives C through F would otherwise be similar to those described for the Proposed Action and would therefore be **negligible** adverse for all Project phases**.** | | | | **Offshore:** Alternative G would require a shorter construction duration, a smaller construction footprint, and fewer offshore structures. Although Alternative G could result in a slight reduction in port utilization for all Project phases, the effects of this IPF on aviation and air traffic would otherwise be similar to the Proposed Action and would therefore be **negligible** adverse. |
| | **Onshore:** See offshore analysis. | **Onshore:** Ports would be primarily used during construction and installation of the Proposed Action, as ports would be used for staging WTGs and mobilizing construction work. Decommissioning would have impacts similar to those during Project construction. There would be no impacts to aviation and air traffic from O&M and decommissioning of the Proposed Action; therefore, impacts would be **negligible** adverse.<br>Cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on aviation and air traffic. | **Onshore:** Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** to **minor** adverse. | | | | **Onshore:** Alternative G would consist of the same onshore facilities and activities as the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** to **minor** adverse. |
| Presence of structures | **Offshore:** Future offshore wind development could add up to 1,015 structures to the offshore environment in the GAA. BOEM assumes that offshore wind project operators would coordinate with aviation interests throughout the planning, construction and installation, O&M, and decommissioning process to avoid or | **Offshore:** The Proposed Action would add up to 100 WTGs with maximum blade tip heights of up to 853 feet amsl. The addition of these structures would increase navigational complexity and could change aircraft navigation patterns for aircraft flying at low altitudes and for airports in the vicinity, increasing collision risks for some aircraft during the Proposed Action's operational time frame. However, more than 90% of existing air traffic in the GAA would | **Offshore:** Under Alternatives C through F, fewer WTG locations would be approved by BOEM, which would result in a noticeably smaller offshore impact compared to the maximum-case scenario under the Proposed Action. The effects of this IPF would be the same or slightly reduced to those described for the Proposed Action and would therefore be **negligible** adverse for construction and O&M, and **minor** adverse for cumulative impacts. | | | | **Offshore:** Under Alternative G, fewer WTG locations would be approved by BOEM, which would result in a noticeably smaller offshore impact compared to the maximum-case scenario under the Proposed Action. The effects of this IPF would be the same or slightly reduced to those described for the Proposed Action and would therefore be **negligible** |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | minimize impacts on aviation activities and air traffic. For this reason, the effects of the increased presence of structures to aviation and air traffic under the No Action Alternative are anticipated to be **minor** adverse. | occur at altitudes that would not be impacted by the presence of WTGs (BOEM 2021). Therefore, the effects of the presence of structures on aviation and air traffic under the Proposed Action would be **negligible** adverse.<br>BOEM estimates a cumulative total of up to 1,117 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable Project impacts would result in a **minor** adverse impact on aviation and air traffic. | | | | | adverse for construction and O&M, and **minor** adverse for cumulative impacts. |
| | **Onshore:** See offshore analysis. | **Onshore:** The O&M of onshore structures to support the Proposed Action would not impact aviation and air traffic. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. | **Onshore:** Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** adverse. | | | | **Onshore**: Alternative G would consist of the same onshore facilities and activities as the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** adverse. |
| Vessel traffic | **Offshore:** Vessel traffic is expected to have a **negligible** adverse effect on aviation and air traffic because vessel traffic would be spread throughout a large geographic area, and while construction time frames may overlap, it is anticipated that the slight increase in vessel traffic would not impact aviation and air traffic. | **Offshore:** Vessel traffic associated with the Proposed Action would result in increased vessel traffic in the Lease Area and around ports. Construction of offshore structures would incrementally noticeably increase navigational complexity along transit routes between ports and construction sites, and locally around ports, due to increased vessel traffic. Increased vessel traffic is expected to have a **negligible** adverse effect on aviation and air traffic because vessel traffic would be spread throughout a large geographic area and would occur over a short period of time.<br>Vessel traffic associated with the Proposed Action and reasonably foreseeable future actions would result in increased vessel traffic in the GAA. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in a **minor** adverse impact on aviation and air traffic. | **Offshore:** Under Alternatives C through F, fewer WTG locations would be approved by BOEM. Construction and installation vessel traffic may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to those described for the Proposed Action. Therefore, impacts would be **negligible** adverse for construction and O&M and **minor** adverse for cumulative impacts. | | | | **Offshore**: Under Alternative G, fewer WTG locations would be approved by BOEM. Construction and installation vessel traffic may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to the Proposed Action. Therefore, impacts would be **negligible** adverse for construction and O&M and **minor** adverse for cumulative impacts. |
| | **Onshore:** See offshore analysis. | **Onshore:** Onshore vehicle traffic may increase as a result of O&M and decommissioning of the Proposed Action but would not impact aviation and air traffic because aviation and air traffic uses are generally spatially separate from vehicular traffic and occur in different locations. Therefore, this IPF would result in a **negligible** adverse impact because minimal increases in vehicle traffic would not impact aviation and air traffic. | **Onshore:** Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** adverse. | | | | **Onshore:** Alternative G would consist of the same onshore facilities and activities as the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| **Military and National Security (including search and rescue)** | | | | | | | |
| Anchoring and new cable emplacement/ maintenance | **Offshore:** Offshore energy facility construction of new cable emplacement and maintenance of cables would involve increased vessel traffic, which could impact military and national security uses by increasing the number of vessels within the GAA. Increased vessel traffic due to anchoring and cable maintenance of wind facilities could lead to course changes of military vessels, thereby increasing navigational complexity and risk of collisions. However, these impacts are expected to be limited as cable emplacement vessels would be restricted to emplacement corridors and activities would be of short duration for future offshore wind activities. Therefore, the effects of anchoring and new cable emplacement and maintenance under the No Action Alternative on military and national security would be **negligible** adverse. | **Offshore:** Anchoring and mooring activities would involve increased vessel traffic, which could impact military and national security uses by increasing the number of vessels within the GAA. However, the impacts are expected to be limited as cable emplacement vessels would be restricted to emplacement corridors and activities would be of short duration during construction and installation of offshore Project elements. Therefore, the effects of anchoring and new cable emplacement and maintenance under the Proposed Action on military and national security would be **negligible** adverse.<br>Project activities combined with reasonably foreseeable activities would result in a substantive and appreciable increase in vessel traffic during cable emplacement and maintenance, contributing to a **minor** adverse impact on military and national security. | **Offshore:** Because the impact would be slightly reduced regardless of the configuration selected, all offshore impacts under Alternatives C through F would be slightly reduced compared to the Proposed Action. The effects of this IPF would therefore be **negligible** to **minor** adverse. | | | | **Offshore:** Although the offshore footprint would be reduced, the effects of this IPF on military and national security uses under Alternative G would otherwise be similar to the Proposed Action. The effects of this IPF would therefore be **negligible** to **minor** adverse. |
| Aviation and air traffic | **Offshore:** Future offshore wind activities could result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects. With implementation of FAA-approved flight plans, however, impacts of the No Action Alternative on military and national security would be **negligible** adverse. | **Offshore:** Construction and installation of the Proposed Action would result in a 7% increase in general aviation in the GAA. Therefore, the effects of this IPF on military and national security under the Proposed Action would be **minor** adverse.<br>O&M of the Proposed Action would result in a 0.01% increase in general aviation in the GAA. Therefore, the effects of this IPF on military and national security would be **negligible** adverse.<br>The Proposed Action and reasonably foreseeable future wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **minor** adverse impacts on military and national security. | **Offshore:** Alternatives C through F would require fewer construction and O&M–related helicopter trips due to the reduction in the number of offshore elements. However, the effects of this IPF on military and national security would otherwise be similar to those described for the Proposed Action: **negligible** adverse for O&M and **minor** adverse for construction and cumulative impacts. | | | | **Offshore:** Alternative G would require fewer construction and O&M–related helicopter trips due to the reduction in the number of offshore elements. However, the effects of this IPF on military and national security would otherwise be similar to the Proposed Action: **negligible** adverse for O&M and **minor** adverse for construction and cumulative impacts. |
| Light | **Offshore:** Future offshore wind activities would result in an increase in permanent | **Offshore:** The Proposed Action would result in an increase in temporary construction aviation warning | **Offshore:** Under these alternatives, fewer lighted WTG locations would be approved by BOEM. While Alternatives C through F could result in a reduction in construction lighting, | | | | **Offshore**: Under this alternative, fewer lighted WTG locations would be approved by BOEM. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
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| | aviation warning lighting on WTGs offshore, which would add to vessel and navigational lighting, as well as onshore housing and port lighting, in the GAA, which could have a negative impact on military and national security. Therefore, the effects of light on military and national security under the No Action Alternative would be **minor** adverse. | lighting on WTGs offshore, which could have **minor** adverse impacts.<br>The O&M and decommissioning of the Proposed Action would result in an increase in permanent lighting on WTGs offshore until decommissioning is complete. The addition of permanent lighting would be an ongoing impact; therefore, the effects of light on military and national security under the Proposed Action would be **minor** adverse.<br>The Project, with reasonably foreseeable future actions, could result in the addition of up to 1,127 lighted structures in the GAA. Therefore, the cumulative impacts of light on military and national security would be **minor** adverse. | the effects of this IPF on military and national security uses would otherwise be similar to those described for the Proposed Action. Therefore, the impact on military and national security uses would be **minor** adverse. | | | | Although Alternative G could result in a reduction in construction lighting, the effects of this IPF on military and national security uses would otherwise be similar to the Proposed Action. Therefore, the impact on military and national security uses would be **minor** adverse. |
| Presence of structures | **Offshore:** Installation of up to 1,036 structures in the RI/MA WEA would impact military and national security vessels primarily through risk of allision and collision with stationary structures and other vessels. Based on coordinating efforts and anticipated mitigating measures, however, the overall impacts to military and national security uses are anticipated to be **moderate** adverse. | **Offshore:** Construction of the Proposed Action would increase the risk of collisions and allisions for military and national security vessels or aircraft within the WEA. Structures would be marked as a navigational hazard per FAA, BOEM, and USCG requirements, and risk would be consistent within the 35-year operational period. The Project's 1 × 1–nm spacing reduces some of the risk of collisions and allisions. Therefore, the Project would have **minor** to **moderate** adverse impacts on military operations and national security.<br>The presence of additional recreational vessels would add to conflict or collision risks for military and national security vessels and could increase demand for SAR operations. Therefore, the Project would have **minor** adverse O&M impacts on military operations and national security.<br>The Proposed Action structures represent a 10% increase over total estimated WTG and OSS foundations across the GAA under the No Action Alternative. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action Alternative, which would be **moderate** adverse. | **Offshore:** While the offshore footprint would be reduced under all configurations, the effects of this IPF on military and national security uses under Alternatives C through F would otherwise be similar to those described for the Proposed Action. Therefore, the impact of this IPF on military and national security uses would be **minor** to **moderate** adverse. | | | | **Offshore:** Although the offshore footprint would be reduced, the effects of this IPF on military and national security uses under Alternative G would otherwise be similar to those described for the Proposed Action. Therefore, the impact of this IPF on military and national security uses would be **minor** to **moderate** adverse. |
| Vessel traffic | **Offshore:** Increased vessel traffic due to construction and decommissioning of future offshore wind facilities could lead to course changes of military and national security vessels, congestion and | **Offshore:** Increased vessel traffic could impact military and national security uses by increasing the number of vessels in the GAA. The RWF's proposed 1 × 1–nm spacing would result in more space for vessels to navigate and would help reduce conflicts | **Offshore:** Vessel traffic associated with Alternatives C through F may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. While the offshore footprint would be reduced under all configurations, vessel traffic is expected to remain at similar levels as vessel traffic under the Project. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore | | | | **Offshore:** Vessel traffic associated with Alternative G may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. Reduced navigational complexity combined |

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|---|---|---|---|---|---|---|---|
| | delays at ports, and increased traffic along vessel transit routes. Therefore, the effects of vessel traffic on military and national security under the No Action Alternative would be **minor** adverse. | with military vessels. As a result, the effects of vessel traffic on military and national security uses under the Proposed Action would be **minor** adverse.<br>The Proposed Action represents approximately 2% of typical vessel traffic in the GAA. Therefore, the Proposed Action would result in a **minor** adverse impact for vessel traffic on military and national security. | structures would result in the effects of this IPF being the same or slightly reduced relative to those described for the Proposed Action. Therefore, impacts on military and national security would be **minor** adverse. | | | | with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to the Proposed Action. Therefore, impacts on military and national security would be **minor** adverse. |
| **Land-Based Radar** | | | | | | | |
| Presence of structures | **Offshore:** Construction of 1,015 structures in the RI/MA WEA could lead to long-term, **minor** adverse impacts to radar systems. However, these structures would be sited at such a distance from existing and proposed land-based radar systems to minimize interference to most radar systems. The final Massachusetts and Rhode Island port access route study (USCG 2020) concludes that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS all enable safe navigation with minimal loss of radar detection. | **Offshore:** Construction and installation and O&M of offshore Project components could result in impacts to land-based radar by introducing potential obstacles to radar coverage in the RI/MA WEA. The final Massachusetts and Rhode Island port access route study (USCG 2020) concludes that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS all enable safe navigation with minimal loss of radar detection. Therefore, the offshore Project components would result in **negligible** adverse impacts to land-based radar.<br>The Proposed Action and past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to land-based radar. | **Offshore:** Under Alternatives C through F, fewer WTG locations would be approved by BOEM. Because the impact would be slightly reduced regardless of configuration selected, all offshore impacts would be slightly reduced compared to the Proposed Action and would therefore be **negligible** to **minor** adverse. Radar line of sight backscatter effects may be altered or slightly reduced depending on which alternative configuration is selected, as all alternative configurations would reduce the number of WTGs. This could result in slightly reduced impacts to land-based radar at Falmouth ASR-8, Nantucket ASR-9, and the Providence ASR-9. | | | | **Offshore:** Under Alternative G, fewer WTG locations would be approved by BOEM. Because all offshore impacts would be slightly reduced compared to the Proposed Action, alternative impacts would therefore be **negligible** to **minor** adverse. Radar line-of-sight backscatter effects may be altered or slightly reduced because this alternative would reduce the number of WTGs. This could result in slightly reduced impacts to land-based radar at Falmouth ASR-8, Nantucket ASR-9, and the Providence ASR-9. |
| Vessel traffic | **Offshore:** Construction and operational vessel traffic from future offshore wind development is expected to increase. This could impact land-based radar by increasing the number of vessels in the analysis area. BOEM assumes that all offshore wind developments in the GAA would use the developer agreed upon 1 × 1–nm spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This would allow more space for vessels to navigate and would help reduce potential interference on radar systems. As a result, the effects of vessel traffic on land-based radar under the No Action Alternative would be **minor** adverse. | **Offshore:** There would be increased construction and operational vessel and O&M traffic from the Proposed Action. This could impact land-based radar by increasing the number of vessels in the analysis area. The RWF's proposed 1 × 1–nm spacing would provide more space for vessels to navigate and would help reduce potential interference on radar systems. As a result, the effects of vessel traffic on land-based radar under the Proposed Action would be **negligible** adverse.<br>Reasonably foreseeable activities are expected to also generate vessel traffic that would increase the number of vessels in the RI/MA WEA. EPMs would reduce the cumulative impacts of increased vessel traffic to a **minor** adverse level. | **Offshore:** Vessel traffic associated with Alternatives C through F may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to those described for the Proposed Action. Therefore, impacts on land-based radar would be **negligible** adverse for construction and O&M and **minor** adverse for cumulative impacts. | | | | **Offshore:** Vessel traffic associated with Alternative G may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to those described for the Proposed Action. Therefore, impacts on land-based radar would be **negligible** adverse for construction and O&M and **minor** adverse for cumulative impacts. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| **Undersea Cables** | | | | | | | |
| Presence of structures | **Offshore:** The future development of multiple wind energy projects could increase the complexity of undersea cable development by requiring routing around the facilities. Export cables are unlikely to preclude future undersea cable development because cable crossings can be protected using standard design techniques. Therefore, in the context of reasonably foreseeable environmental trends, the overall impacts from the presence of structures resulting from ongoing and planned actions are anticipated to be localized long term **negligible** because impacts can be avoided by routing design and standard cable protection techniques. | **Offshore:** The presence of the Project could preclude future submarine cable placement in the RWF and RWEC, although there are no future cables identified for location within this area. The impacts from foundation construction would be minor adverse while the installation of the RWECs would be **negligible** adverse. Once the foundations are constructed, impacts from foundation O&M and decommissioning would be **minor** adverse and O&M and decommissioning of RWECs would be **negligible** adverse. The overall impact from presence of structures on undersea cables would be **minor** adverse.<br>BOEM estimates a cumulative total of up to 1,117 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. While these structures could increase the routing complexity of undersea cables associated, cable crossing can be protected using standard cable protections. The impacts from foundation construction from reasonably foreseeable future actions would be **negligible** adverse because impacts can be avoided by routing design and standard cable protection techniques. | **Offshore:** Because the impact would be slightly reduced regardless of configuration selected, all offshore impacts under Alternatives C through F would be slightly reduced compared to the Proposed Action. The effects of this IPF would be the same or slightly reduced relative to those described for the Proposed Action and would therefore be **negligible to minor** adverse for construction and O&M and **negligible** adverse for cumulative impacts. | | | | **Offshore:** Under Alternative G, fewer WTG locations would be approved by BOEM. Because all offshore impacts would be slightly reduced compared to the Proposed Action, the effects of this IPF would be the same or slightly reduced relative to the Proposed Action and would therefore be **negligible to minor** adverse for construction and O&M and **negligible** adverse for cumulative impacts. |
| Vessel traffic | **Offshore:** Increased vessel traffic due to construction and installation of future offshore wind activities could interfere with vessels used to install or maintain existing and future undersea cables, or lead to course changes of vessels used for undersea cable maintenance and installation and increased traffic along vessel transit routes. However, given the infrequency of required maintenance at any given location along a cable route, the effects of vessel traffic on undersea cables under the No Action Alternative would be **negligible** adverse. | **Offshore:** Increased vessel traffic due to construction and installation of the Proposed Action could interfere with vessels used to install or maintain existing and future undersea cables. Additionally, there would be increased risk for allisions with vessels used for construction and O&M of undersea cables. These effects are expected to be minimal and short term. Therefore, the effects of vessel traffic on undersea cables under the Proposed Action would be **negligible** adverse. The cumulative impact from vessel traffic on undersea cables would be **negligible** adverse. | **Offshore:** Vessel traffic associated with Alternatives C through F may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to those described for the Proposed Action. Therefore, impacts on undersea cables would be **negligible** adverse. | | | | **Offshore:** Alternative G may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to the Proposed Action. Therefore, impacts on undersea cables would be **negligible** adverse. |

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### 3.17.2.2 Alternative A: Impacts of the No Action Alternative on Aviation and Air Traffic

#### 3.17.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for aviation and air traffic (see Section 3.17.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.17.2.2.2 Cumulative Impacts

This section discloses potential aviation and air traffic impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

<u>Aviation and air traffic:</u> Future offshore wind activities without the Proposed Action could result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects. While the exact increase in future project-related flights is unknown, it is anticipated that future offshore wind activities would result in an increase in flight traffic for construction, ongoing wildlife surveys, and (search and rescue) SAR related to offshore wind project vessel traffic. Based on FAA (2022) data, the Proposed Action would conservatively add up to 7% to FAA-reported air traffic in the GAA for all aircraft types per year during the construction and decommissioning phases and 0.1% during O&M. It can be assumed, therefore, that other wind activities could result in similar air traffic increases, with future projects potentially overlapping in construction and/or decommissioning phases. These simplified assumptions are conservative, likely overestimate future air traffic, and do not account for aircraft concentration near New England region airports. Future offshore wind project air traffic would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. With implementation of FAA-approved flight plans, impacts of the No Action Alternative on aviation and air traffic would be **negligible** adverse.

<u>Light:</u> Future offshore wind activities without the Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks and optimize aviation safety. The addition of up to 1,015 lighted structures represents a substantive increase in the number and extent of aviation and navigation safety lighting systems operating within the GAA, an area that includes lighting from military, commercial, and construction vessels; vessel-related lighting such as buoys and towers; and onshore lighting from housing and ports. Therefore, the effects of light on aviation and air traffic under the No Action Alternative would be **minor** adverse.

<u>Port utilization:</u> There may be a minimal increase in vessel use at ports associated with the No Action Alternative. The number of construction vessels would increase due to future offshore wind activities without the Proposed Action, which could result in delays and congestion at ports and lead to potential conflicts with air traffic due to increased activity in the vicinity of the airports listed in Section 3.17.1.1. Port improvements and construction activities in or near ports may require alteration of navigation patterns at nearby airports. Navigational hazards and collision risks at ports and in transit routes would be

reduced as construction is completed, and all navigation hazards and collision risks would be gradually eliminated during decommissioning as offshore WTGs are removed. In addition, vessel traffic would be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on aviation and air traffic.

Presence of structures: Future offshore wind development could add up to 1,015 structures to the offshore environment in the analysis area. WTGs could have maximum blade tip height of 1,171 feet (357 m) amsl. Addition of these structures would noticeably increase navigational complexity and change aircraft navigation patterns in the region around the leased areas offshore Massachusetts and Rhode Island, along transit routes between ports and construction sites, and locally around ports (see Port Utilization). These changes could compress lower-altitude aviation activity into more limited airspace in these areas, leading to airspace conflicts or congestion, and increasing collision risks for low-flying aircraft. However, open airspace around the RI and MA Lease Areas would still be available over the open ocean, and ports used for offshore WTG construction would be planned and developed to accommodate tall structures.

Open airspace around the Lease Areas would still exist after all foreseeable future offshore wind energy projects are built. BOEM assumes that offshore wind project operators would coordinate with aviation interests throughout the planning, construction and installation, O&M, and decommissioning process to avoid or minimize impacts on aviation activities and air traffic. For this reason, the effects of increased presence of structures to aviation and air traffic under the No Action Alternative are anticipated to be **minor** adverse.

Vessel traffic: Although no future non–offshore wind stationary structures were identified within the Lease Area, vessel traffic associated with future offshore wind projects located outside the Lease Area would result in increased vessel traffic in the RI/MA WEA and surrounding ports. The impacts of increased vessel traffic are discussed above under Port Utilization and Presence of Structures. Vessel traffic is expected to have a **negligible** adverse effect on aviation and air traffic because vessel traffic would be spread throughout a large geographic area, and while construction time frames may overlap, it is anticipated that the increase in vessel traffic would not impact aviation and air traffic.

#### 3.17.2.2.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on other marine uses associated with the Project would not occur. However, ongoing and future activities would have **minor** adverse impacts on aviation uses due to the presence of structures that introduce navigational complexities.

BOEM anticipates that impacts to aviation uses from the combination of most ongoing activities and reasonably foreseeable activities other than offshore wind would be **negligible** adverse because any issues with aviation routes would be resolved through coordination with the FAA, as well as through implementation of navigational marking of structures according to FAA, USCG, and BOEM requirements and guidelines.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts for aviation uses.

### 3.17.2.3 Alternative A: Impacts of the No Action Alternative on Land-Based Radar

#### 3.17.2.3.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for land-based radar (see Section 3.17.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.17.2.3.2 Cumulative Impacts

This section discloses potential aviation and land-based radar impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

<u>Presence of structures:</u> WTGs that are near or in direct line-of-sight to land-based radar systems can interfere with the radar signal causing shadows or clutter in the received signal. WTGs can also affect HF radar measurements of coastal ocean currents, oil spill tracking, and vessel drift tracking (BOEM 2020). Modeling completed on behalf of BOEM (2020) shows that small aircraft detection interference would occur in the vicinity of each WTG. Construction of 1,036 structures in the RI/MA WEA could lead to long-term, **minor** adverse cumulative impacts to radar systems. Although these structures would be sited at such a distance from existing and proposed land-based radar systems to minimize interference to most radar systems, event-based operational changes and modification of some land-based radar may be necessary. Event-based operational change may include wind farm curtailment agreements for BOEM lease areas that would cease wind farm operations when HF radar efficiency is essential, such as in the event of a severe hurricane/tropical storm or a large oil spill. Trockel et al. (2021) also developed the initial version of a software upgrade for land-based HF radar to minimize impacts from offshore wind energy facilities, and this software upgrade has been transferred to NOAA’s Integrated Ocean Observing System, which is currently testing the software for operational deployment. For vessel-based radar, the final Massachusetts and Rhode Island port access route study (USCG 2020) concludes that general mitigation measures, such as properly trained vessel-based radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS would enable safe navigation in the GAA with minimal loss of radar detection.

<u>Vessel traffic:</u> Although no future non–offshore wind stationary structures were identified within the Lease Area, construction and operational vessel traffic from future offshore wind development outside the Lease Area is expected to increase. This could impact land-based radar by increasing the number of vessels in the analysis area. BOEM assumes that all offshore wind developments in the GAA would use the developer agreed upon 1 × 1–nm spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This would allow more space for vessels to navigate and would help reduce potential interference on radar systems. As a result, the effects of vessel traffic on land-based radar under the No Action Alternative would be **minor** adverse.

#### 3.17.2.3.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on other marine uses associated with the Project would not occur. However, ongoing and future activities would have **minor** adverse impacts on other marine uses due to the presence of structures that increase radar interference.

BOEM anticipates that impacts to radar would be **negligible** adverse for any individual ongoing and reasonably foreseeable activity other than offshore wind because any issues with radar systems would be resolved through coordination with the Department of Defense (DOD) or FAA.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in notable and **moderate** adverse impacts to radar systems due to combined WTG interference.

### 3.17.2.4 Alternative A: Impacts of the No Action Alternative on Military and National Security (including Search and Rescue)

#### 3.17.2.4.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for military and national security (including search and rescue) (see Section 3.17.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.17.2.4.2 Cumulative Impacts

This section discloses potential military and national security (including search and rescue) impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

<u>Anchoring and new cable emplacement/maintenance:</u> Up to 19,976 acres could be affected by anchoring and mooring activities and cable installation during offshore wind energy development within the analysis area. This offshore energy facility construction of new cable emplacement and maintenance of cables would involve increased vessel traffic which could impact military and national security uses by increasing the number of vessels within the analysis area. Increased vessel traffic due to anchoring and cable maintenance of wind facilities could lead to course changes of military vessels, thereby increasing navigational complexity and risk of collisions. However, these impacts are expected to be low because military vessels would largely travel in transit lanes, with the exception of SAR operations, and short term due to the limited amount of cable emplacement and maintenance expected from future offshore wind activities. Therefore, the effects of anchoring and new cable emplacement and maintenance under the No Action Alternative on military and national security would be **negligible** adverse**.**

<u>Aviation and air traffic:</u> Future offshore wind activities could result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects that in turn may increase the necessity for data collection and SAR operations. While

the exact increase in future project-related flights is unknown, it is anticipated that future offshore wind-related flight traffic would be low and would be unlikely to affect military use of the area in SAR and data collection activities. Future offshore wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. With implementation of FAA-approved flight plans, impacts of the No Action Alternative on military and national security would be **negligible** adverse**.**

Light: Future offshore wind activities would result in an increase in permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize allision risks. Implementation of navigational lighting and marking per FAA and BOEM requirements and guidelines would further reduce the risk of military aircraft collisions. This increase in lighting would add to vessel and navigational lighting, as well as onshore housing and port lighting, in the GAA, which could have a negative impact on military and national. Therefore, the effects of light on military and national security under the No Action Alternative would be **minor** adverse.

Presence of structures: Installation of up to 1,015 structures in the RI/MA WEA, which currently supports only five offshore wind turbines associated with the BIWF, as well as several meteorological buoys (see Appendix E1), would impact military and national security vessels primarily through risk of allision and collision with stationary structures and other vessels. Vessels could directly allide with WTG foundations. Vessel traffic would increase during project construction, and once the WTGs are operational, the artificial reef effect created by offshore structures could attract commercial and recreational fishing vessels. This would increase the risk of vessel collisions and increase navigation complexity, leading to potential use conflicts. In general, risks to military and national security vessels would increase over time as additional wind energy facilities are built.

Military and national security vessels could allide with WTG structures. However, deep-draft military vessels are not anticipated to transit outside of navigation channels unless necessary for SAR (of people or marine mammals) or nontypical operations. Allision risks for smaller vessels moving within or near offshore wind structures would be higher. However, these risks would be minimized by projects adhering to structural lighting requirements according to the USCG and BOEM, which would provide lighting at sea level. Additionally, allision would be further mitigated by following a fixed 1 × 1–nm WTG layout proposed by offshore wind leaseholders to facilitate safe navigation through the offshore wind energy Lease Areas (Geijerstam et al. 2019).

Additionally, risk of collision with recreational fishing vessels could indirectly increase as a result of the artificial reef effect around the offshore wind facility structures. New artificial reef effects could attract recreational fishing vessels farther offshore than currently occurs, adding to existing vessel traffic and subsequently increasing the risk of collision with military and national security vessels. Furthermore, an increase in recreational vessels in and around offshore wind projects could increase the demand for USCG SAR operations (of people or marine mammals).

In addition to allision or collision risks, military and national security vessels may be impacted by offshore wind energy structures by the need to change routes and navigate around both project footprints and project-associated vessels, particularly during the construction periods between 2021 and 2030.

Furthermore, military and national security vessels may experience congestion and delays in port due to the increase in offshore wind facility vessels.

Military and national security aircraft would be impacted by the presence of tall equipment necessary for offshore wind facility construction, such as stationary lift vessels and cranes, which would increase navigational complexity in the area. Warning area W-105A measures approximately 23,000 square miles, with approximately 4% (approximately 1,000 square miles) overlaying the GAA (BOEM 2021). Military and national security operations conducted within W-105A would be impacted during construction and operation periods. However, it is assumed all offshore wind energy project operators would coordinate with relevant agencies during the COP development process to identify and minimize conflicts with military and national security operations.

Measures mitigating risks would include operational protocol to stop WTG rotation during SAR aircraft operations and implementation of FAA- and BOEM-recommended navigational lighting and marking to reduce the risk of aircraft collisions. Wind energy structures would be visible on military and national security vessel and aircraft radar. Nonetheless, the presence and layout of large numbers of WTGs could make it more difficult for SAR aircraft to perform operations (of people or marine mammals), leading to less effective search patterns or earlier abandonment of searches. This could result in otherwise avoidable loss of life due to maritime incidents.

Navigational hazards would gradually be eliminated as structures are removed. Based on coordinating efforts and the anticipated mitigating measures discussed above, the overall impacts to military and national security uses are anticipated to be **moderate** adverse under the No Action Alternative.

<u>Vessel traffic:</u> Although no future non–offshore wind stationary structures were identified within the Lease Area, increased vessel traffic due to construction and decommissioning of future offshore wind facilities outside the Lease Area could lead to course changes of military and national security vessels, congestion and delays at ports, and increased traffic along vessel transit routes. Vessel activity could peak in 2025 with as many as 210 vessels involved in construction of reasonably foreseeable projects. While construction periods of various wind energy facilities may be staggered, some overlap would result in a cumulative impact to traffic loads. Therefore, the effects of vessel traffic on military and national security under the No Action Alternative would be **minor** adverse.

#### 3.17.2.4.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on other marine uses associated with the Project would not occur. However, ongoing and future activities would have **moderate** adverse impacts on military and national security uses due to the presence of structures that introduce navigational complexities and vessel traffic.

BOEM anticipates that impacts to military and national security uses from the combination of most ongoing activities and reasonably foreseeable activities other than offshore wind would be **negligible** adverse because BOEM anticipates that any issues with the military or national security would be resolved through coordination with the DOD, as well as through implementation of navigational marking of structures according to FAA, USCG, and BOEM requirements and guidelines.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts for military and national security uses.

### 3.17.2.5 Alternative A: Impacts of the No Action Alternative on Scientific Research and Surveys (see section in main EIS)

### 3.17.2.6 Alternative A: Impacts of the No Action Alternative on Undersea Cables

#### 3.17.2.6.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for undersea cables (including search and rescue) (see Section 3.17.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.17.2.6.2 Cumulative Impacts

This section discloses potential undersea cables impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

<u>Presence of structures:</u> Up to 1,015 structures could be installed between 2021 and 2030 in the RI/MA WEA as part of future offshore wind energy project infrastructure. The presence of future offshore wind energy structures could preclude future submarine cable placement, as discussed in Appendix E2 in "Anchoring and new cable emplacement/maintenance." Installed WTGs and OSSs and stationary lift vessels used during construction that are located near existing submarine cables could pose allision risks and navigational hazards to vessels conducting maintenance activities on these cables. The future development of multiple wind energy projects could increase the complexity of undersea cable development by requiring routing around the facilities. Export cables are unlikely to preclude future undersea cable development because cable crossings can be protected using standard design techniques. Therefore, in context of reasonably foreseeable environmental trends, the overall impacts from the presence of structures resulting from ongoing and planned actions are anticipated to be localized long term **negligible** adverse because impacts can be avoided by routing design and standard cable protection techniques.

<u>Vessel traffic:</u> Although no future non–offshore wind stationary structures were identified within the Lease Area, increased vessel traffic due to construction and installation of future offshore wind activities located outside the Lease Area could interfere with vessels used to install or maintain existing and future undersea cables. Increased vessel traffic due to Project construction and installation, O&M, and decommissioning could lead to course changes of vessels used for undersea cable maintenance and installation and increased traffic along vessel transit routes. The risk of allision to cable maintenance vessels could increase as more offshore wind energy projects are constructed. However, given the infrequency of required maintenance at any given location along a cable route, this risk is expected to be low. Therefore, the effects of vessel traffic on undersea cables under the No Action Alternative would be **negligible** adverse**.**

#### 3.17.2.6.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on other marine uses associated with the Project would not occur. Ongoing and future activities would have **negligible** adverse impacts on undersea cables due to the presence of offshore wind energy cables or structures that could preclude future submarine cable placement and vessel traffic.

BOEM anticipates that impacts to undersea cables from the combination of most ongoing activities and reasonably foreseeable activities other than offshore wind would be **negligible** adverse because BOEM anticipates that cables could be easily crossed by vessels and existing cables require minimal maintenance.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **negligible** adverse impacts on undersea cables.

### 3.17.2.7 Alternative B: Impacts of the Proposed Action on Aviation and Air Traffic

#### 3.17.2.7.1 Construction and Installation

##### Offshore Activities and Facilities

<u>Aviation and air traffic:</u> The Proposed Action would result in an increase in air traffic related to construction and installation of offshore Project elements. Project construction would result in one to two helicopter flights to and from the Lease Area per day for construction of the foundations. Helicopters would also be used for additional crew transfers during construction activities. Estimated helicopter use for the RWF during the construction phase is estimated to be less than 200 helicopter trips and approximately 8,832 hours of flight time over the 2-year construction period (COP Appendix T [Tech Environmental 2023]). Based on national aviation statistics (FAA 2020), general aviation aircraft logged an estimated 792,266 hours of total flight in the FAA's New England Region in 2019. Extrapolating from nationwide statistics, helicopters would account for approximately 93,000 hours of the New England Region total. The Proposed Action would require a total estimated 8,832 hours of helicopter flight time for Project construction and installation, or approximately 4,416 flight hours per year, over the 2-year construction period of the Project. The GAA represents approximately 8% of the 160,000 square miles of airspace in the FAA New England Region. Applying this proportion, helicopter flights for Project construction and installation would represent a 63% increase in annual helicopter flight hours and a 7% increase in general aviation hours in the GAA. The effect determination is based on the 7% increase in general aviation hours in the GAA, as the increase in helicopter hours specifically would not have a direct impact on aviation and air traffic compared to the general overall increase in aircraft in the GAA. When estimation uncertainty is considered, the 7% increase in Project-related air traffic over the 2-year construction period represents a **minor** adverse effect on general aviation air traffic. A helicopter route plan would be developed to meet industry guidelines and best practices in accordance with FAA guidance. Additionally, all aviation operations, including flying routes and altitude, would be aligned with relevant stakeholders, such as the FAA. On this basis, the effects of Project-related aviation and air traffic on aviation and air traffic under the Proposed Action would be **minor** adverse.

Lighting: During construction and installation, WTGs would be marked with appropriate lighting to meet FAA warning guidelines and would be visible on the radar systems of low-flying aircrafts, similar to other large-scale sea surface activity. Therefore, impacts to aviation and air traffic would be **negligible** adverse.

Port utilization: Various ports would be improved to support the Proposed Action (see Section 3.14). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. The number of construction vessels would increase due to future offshore wind activities without the Proposed Action which could result in delays and congestion at ports which could lead to potential conflicts with air traffic due to increased activity in the vicinity of the airports listed in Section 3.17.1. Port improvements and construction activities in or near ports may require alteration of navigation patterns at nearby airports; however, port improvements are anticipated to occur under the No Action Alternative to support regional offshore wind energy industry development. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction is completed. However, vessel traffic would also be spread among multiple ports to ensure that sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on aviation and air traffic.

Presence of structures: The Proposed Action would add up to 100 WTGs with maximum blade tip heights of up to 853 feet amsl. The addition of these structures would increase navigational complexity and could change aircraft navigation patterns for aircraft flying at low altitudes and for airports in the vicinity, increasing collision risks for some aircraft during the Proposed Action's operational timeframe. However, more than 90% of existing air traffic in the analysis area would occur at altitudes that would not be impacted by the presence of WTGs (BOEM 2021).

For the air traffic that occurs at altitudes that could be impacted by the presence of WTGs, the FAA conducts aeronautical studies to ensure that proposed structures do not have an effect on air navigation safety and the ability of aircraft to efficiently use navigable airspace. Proposed structures are considered as having an adverse effect if they exceed obstacle clearance surfaces.

An air traffic flow analysis for the Project was completed (Capitol Airspace Group 2020). WTGs at a height of 873 above sea level (ASL) could affect Visual Flight Rules (VFR) routes, requiring an increase to a Block Island State Airport (BID) instrument approach minimum altitude, Boston Consolidated (A90) Terminal Radar Approach Control (TRACON) minimum vectoring altitudes (MVAs), and Providence (PVD) TRACON MVAs.

However, historical air traffic data indicates that 873-foot ASL wind turbines would not affect any regularly used VFR routes. Additionally, historical air traffic data indicates that the required changes to the BID instrument approach procedure, A90 TRACON MVA sectors and PVD TRACON MVA sectors, should not affect a significant volume of operations. As a result of these findings, it possible that the FAA would be willing to increase the affected altitudes in order to accommodate wind development up to 873 feet ASL. These mitigation options are available and subject to FAA approval. Therefore, the effects of the presence of structures on aviation and air traffic under the Proposed Action would be **negligible** adverse.

Vessel traffic: Vessel traffic associated with the Proposed Action would result in increased vessel traffic in the Lease Area and around ports. Construction of offshore structures would noticeably increase navigational complexity along transit routes between ports and construction sites, and locally around ports due to increased vessel traffic. Increased vessel traffic is expected to have a **negligible** adverse effect on aviation and air traffic because vessel traffic would be spread throughout a large geographic area and would occur over a short period of time.

#### 3.17.2.7.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

Aviation and air traffic: The Proposed Action would result in an increase in air traffic related to O&M and decommissioning of the Proposed Action. A hoist-equipped helicopter may be used to support O&M (VHB 2023). Table 3.5-5 in the COP provides a summary of O&M support vessels that are currently being considered to support Project O&M. The type and number of vessels and helicopters would vary over the operational lifetime of the Project.

During O&M, helicopters would be used to provide supplemental means of access when vessel access is not practical or desirable. Flights would be currently restricted to daylight operations when visibility is good. Helicopters would be used for two different purposes to support O&M:

- Helicopter hoist operations: An integrated helicopter hoist platform located on the roof of each WTG nacelle would provide access for O&M. SOVs and the OSSs may also be fitted with helicopter hoist platforms. The purpose of this effort is primarily for transport and transfer of technical personnel and equipment on to/from the WTGs via hoist to the nacelle but can also be conducted for transport and transfer of personnel and equipment to offshore installations that do not have a helideck. This is the most common means of access in the O&M phase and is typically used to perform minor repairs and restarts.
- Transport and transfer operations: Transport helicopter operations are flights from an onshore airport or heliport to an offshore installation or vessel with a helideck and back. Transfer helicopter operations are flights within the WEA from an offshore installation or vessel with a helideck to another, and back.

All aviation operations, including flying routes and altitude, would be aligned with relevant stakeholders, such as the FAA. It is anticipated that there would be up to 800 helicopter trips and a total flight time of up to 252 hours of flight time for O&M of the Project (Tech Environmental 2023). Based on national aviation statistics (FAA 2020), general aviation aircraft logged an estimated 792,266 hours of total flight in the FAA's New England Region in 2019. Extrapolating from nationwide statistics, helicopters would account for approximately 93,000 hours of the New England Region total. The Proposed Action would require an estimated 252 hours of helicopter flight time for project O&M, or approximately 8.4 flight hours per year, over the 35-year operating period of the Project. The GAA represents approximately 8% of the 160,000 square miles of airspace in the FAA New England Region. Applying this proportion, helicopter flights for Project O&M would represent a 0.1% increase in annual helicopter flight hours and a 0.01% increase in general aviation hours in the GAA. When estimation uncertainty is considered, this represents a **negligible** adverse effect on general aviation air traffic. On this basis, the effects of Project-related aviation and air traffic on aviation and air traffic under the Proposed Action would be **negligible** adverse.

Light: During O&M, WTGs would be marked with appropriate lighting to meet FAA warning guidelines and would be visible on the radar systems of low-flying aircrafts, similar to other large-scale sea surface activity. Decommissioning would have impacts similar to those during Project construction. Therefore, impacts to aviation and air traffic would be **negligible** adverse**.**

Port utilization: Various ports could be improved to support the Proposed Action (see Section 3.14). These improvements would likely occur within the boundaries of existing port facilities, similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction is completed, and all navigation hazards and collision risks would be gradually eliminated during decommissioning as offshore WTGs are removed. However, vessel traffic would also be spread among multiple ports to ensure that sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on aviation and air traffic.

Presence of structures: The Proposed Action would add up to 100 WTGs and two OSSs having maximum blade tip and structure heights of up to 853 feet and 180 feet amsl, respectively. The addition of these structures would increase navigational complexity and could change aircraft navigation patterns for aircraft flying at low altitudes and for airports in the vicinity, increasing collision risks for some aircraft during the Proposed Action's operational time frame. However, more than 90% of existing air traffic in the analysis area would occur at altitudes that would not be impacted by the presence of WTGs (BOEM 2021). An air traffic flow analysis completed by Capitol Airspace found that it is possible that the FAA would be willing to increase the affected altitudes in order to accommodate wind development up to 873 feet above sea level (ASL) (Capitol Airspace Group 2020). Decommissioning would have impacts similar to those during Project construction. Therefore, the effects of the presence of structures on aviation and air traffic under the Proposed Action would be **negligible** adverse**.**

Vessel traffic: Vessel traffic associated with the Proposed Action would result in increased vessel traffic in the Lease Area and around ports. Addition of offshore structures would noticeably increase navigational complexity along transit routes between ports and construction sites, and locally around ports. Increased vessel traffic is expected to have a **negligible** adverse effect on aviation and air traffic because vessel traffic would be spread throughout a large geographic area and would be short term.

### Onshore Activities and Facilities

Light: Operational lighting onshore would be limited to the OnSS and ICF, which would have minimal yard lighting and task lighting (see Section 3.14). This lighting is minimal and would not result in impacts to aviation and air traffic. Decommissioning would have impacts similar to those during Project construction. Therefore, the effects of light on aviation and air traffic under the Proposed Action would be **negligible** adverse**.**

Port utilization: Ports would be primarily used during construction and installation of the Proposed Action, as ports would be used for staging WTGs and for mobilizing construction work. Decommissioning would have impacts similar to those during Project construction. There would be no impacts to aviation and air traffic from O&M and decommissioning of the Proposed Action; therefore, impacts would be **negligible** adverse**.**

Presence of structures: The O&M of onshore structures to support the Proposed Action would not impact aviation and air traffic. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.

Vehicle traffic: Onshore vehicle traffic in and around ports and onshore facilities may increase as a result of O&M and decommissioning of the Proposed Action. Project-related vehicle traffic would not impact aviation and air traffic because these uses are generally spatially separate from vehicular traffic and occur in different locations. Therefore, this IPF would result in a **negligible** adverse impact because minimal increases in vehicle traffic would not impact aviation and air traffic.

#### 3.17.2.7.3 Cumulative Impacts

#### Offshore Activities and Facilities

Aviation and air traffic: The Proposed Action would result in approximately 4,416 construction flight hours per year during construction and installation over a 2-year construction period, then the flight hours would significantly decrease to approximately 8.4 flight hours per year during O&M and decommissioning of the RWF. During construction and installation this results in a 7% increase in general aviation air traffic in the GAA and during O&M and decommissioning this results in a 0.01% increase in general aviation air traffic in the GAA. In total, there would be an average of 303 flight hours per year over 32 years (2-year construction period and up to 35-year operational period). This represents a 4% yearly increase in helicopter flight hours in the GAA and a 1% yearly increase in general aviation flight hours. Future offshore wind activities without the Proposed Action could also result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects. While the exact increase in future Project-related flights is unknown, it is anticipated that reasonably foreseeable future wind activities would also result in increases in flight traffic similar in scale to the Proposed Action. The Proposed Action and reasonably foreseeable future wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **negligible** adverse impacts on aviation and air traffic.

Light: The Proposed Action would add permanent lighting for up to 100 WTGs and 2 OSSs for the duration of the Project. BOEM estimates a maximum cumulative total of up to 1,117 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the GAA. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidelines to minimize collision and allision risks. WTGs would also be visible on aircraft radar. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be similar to those impacts described under the No Action Alternative and would have a **negligible** adverse impact on aviation and air traffic.

Port utilization: The Proposed Action combined with reasonably foreseeable future actions could result in a very minimal increase in vessel use at ports, most of which would be during construction and decommissioning of the Project. The number of construction vessels would increase due to both the Proposed Action and reasonably foreseeable future actions, which could result in delays and congestion at ports and lead to potential conflicts with air traffic due to increased activity in the vicinity of the airports listed in the Affected Environment. Port improvements and construction activities in or near ports may require alteration of navigation patterns at nearby airports. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction is completed, and all navigation hazards and collision risks would be gradually eliminated during decommissioning as offshore WTGs are removed. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in a **negligible** adverse impact on aviation and air traffic.

<u>Presence of structures:</u> The Proposed Action structures represent a 10% increase over total estimated WTG and OSS foundations across the GAA under the No Action Alternative. BOEM estimates a cumulative total of up to 1,117 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. WTGs could have maximum blade tip height of 1,171 feet amsl.

Addition of these structures would noticeably increase navigational complexity and change aircraft navigation patterns in the region around the leased areas offshore Massachusetts and Rhode Island, along transit routes between ports and construction sites, and locally around ports (see Port utilization). These changes could compress lower-altitude aviation activity into more limited airspace in these areas, leading to airspace conflicts or congestion, and increasing collision risks for low-flying aircraft. However, open airspace around the GAA would still be available over the open ocean, and ports used for offshore WTG construction would be planned and developed to accommodate tall structures.

Open airspace would continue to exist around all Lease Areas after the Proposed Action and reasonably foreseeable future offshore wind energy projects are built. BOEM assumes that offshore wind project operators would coordinate with aviation interests throughout the planning, construction and installation, O&M, and decommissioning process to avoid or minimize impacts on aviation activities and air traffic. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable Project impacts would result in a **minor** adverse impact on aviation and air traffic.

<u>Vessel traffic:</u> Vessel traffic associated with the Proposed Action and reasonably foreseeable future actions would result in increased vessel traffic in the GAA. The impacts of increased vessel traffic are discussed above under Port Utilization and Presence of Structures. Vessel traffic would be spread throughout a large geographic area, and while construction time frames may overlap, it is anticipated that the increase in vessel traffic would not impact aviation and air traffic. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable Project impacts would result in a **minor** adverse impact on aviation and air traffic.

### Onshore Activities and Facilities

<u>Lighting:</u> It is not anticipated that any of the onshore Project components for the Proposed Action or reasonably foreseeable future actions would require FAA-compliant lighting. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable Project impacts would result in **negligible** adverse impacts on aviation and air traffic from light.

<u>Port utilization:</u> WTG components located at staging ports could result in issuance of notices to airmen, causing some aircraft to reroute. WTG components would be in staging ports for brief periods. It is expected that reasonably foreseeable future actions would have similar port utilization impacts that

account for construction and installation, O&M, and decommissioning of future actions. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on aviation and air traffic.

Presence of structures: The construction and installation, O&M, and decommissioning of the Proposed Action and other reasonably foreseeable onshore structures would not contribute to cumulative impacts on aviation and aircraft because onshore structures are sited in industrial and commercial areas away from aviation uses. The presence of onshore structures would also be limited to O&M facilities, the OnSS, and ICFs that are similar in nature to surrounding land uses and would not create impacts on aviation uses. It is expected that reasonably foreseeable future actions would have similar structure impacts that account for construction and installation, O&M, and decommissioning of future actions. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on aviation and air traffic.

Vehicle traffic: Onshore vehicle traffic surrounding ports and onshore facilities may increase as a result of the Proposed Action, but it would not impact aviation and air traffic because these uses are spatially separate from vehicular traffic and occur in different locations. Additionally, it is anticipated that vehicular traffic would also increase at onshore wind facilities and port facilities as a result of reasonably foreseeable future actions. It is expected that vehicular traffic increases would be commensurate with the impacts expected for the Proposed Action in scale, intensity, and duration. Therefore, the Proposed Action combined with reasonably foreseeable future actions would result in a **negligible** adverse impact because minimal increases in vehicle traffic would not impact aviation and air traffic.

#### 3.17.2.7.4 Conclusions

Project construction and installation, O&M, and decommissioning would affect ongoing aviation and air traffic occurring in the analysis area. Similar impacts from Project O&M would occur, although at a lesser extent and duration for aviation and air traffic. BOEM anticipates the impacts resulting from the Proposed Action alone would result in **negligible** adverse impacts on aviation and air traffic that would primarily be caused by installation of WTGs in the GAA due to potential changes in navigational patterns.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs range from **negligible** to **minor** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **minor** adverse impacts for aviation and air traffic.

### 3.17.2.8 Alternative B: Impacts of the Proposed Action on Land-Based Radar

#### 3.17.2.8.1 Construction and Installation

#### Offshore Activities and Facilities

Presence of structures: Construction and installation of offshore Project components could result in impacts to land-based radar by introducing potential obstacles to radar coverage in the RI/MA WEA. These impacts would be less than those identified for Project O&M and discussed in Section 3.17.2.3.2 Therefore, the construction and installation of offshore Project components would result in **negligible** adverse impacts to land-based radar.

Vessel traffic: There would be increased construction and operational vessel traffic from the Proposed Action, but the increase would not represent a substantial change to vessel traffic volume, which includes numerous ports and extensive marine traffic related to shipping, fishing, and recreation. As a result, the effects of vessel traffic on land-based radar under the Proposed Action would be **negligible** adverse.

#### 3.17.2.8.2 Operations and Maintenance and Decommissioning

##### Offshore Activities and Facilities

Presence of structures: WTGs that are near or in direct line of sight to land-based radar systems can interfere with the radar signal by causing shadows or clutter in the received signal. Construction of 102 structures in the Lease Area could lead to impacts to land-based radar systems identified in Appendix S2 of the COP. The radar line of sight study (Westslope 2021) determined the following radar impacts by the presence of WTGs at a height of 873 amsl:

- For the Falmouth ASR-8, wind turbines in the northeastern two-thirds of the study area would be within the line of sight of and would interfere with this radar site at a blade-tip height of 873 feet above ground level (AGL).[2]
- For the Nantucket ASR-9, wind turbines in the eastern one-half of the study area would be within the line of sight of and would interfere with this radar site at a blade-tip height of 873 feet AGL.
- For the Providence ASR-9, wind turbines in the entire study area would be within the line of sight of and would interfere with this radar site at a blade-tip height of 873 feet AGL.
- For the North Truro ARSR-4 and the Riverhead ARSR-4, wind turbines in the study area would not be within the line of sight of and would not interfere with these radar sites at a blade-tip height of 873 feet AGL.
- The EWR LOS analysis for the Cape Cod AFS EWR shows that wind turbines in the majority of the study area will be within the line of sight of this radar site and could have a significant impact on this early warning radar at a blade-tip height of 873 feet AGL.

For the Falmouth ASR-8, Nantucket ASR-9, and the Providence ASR-9, without mitigation, the radar effects due to clutter could include a partial loss of primary target detection and a number of false primary targets over and in the immediate vicinity of wind turbines within the radar line of sight in the study area. Other radar effects include a partial loss of weather detection and false weather indications over and in the immediate vicinity of wind turbines within the line of sight in the study area.

The HF radar LOS analyses show the following:

- For the Amagansett HF radar, wind turbines in the western corners of the study area would be within the line of sight of this radar site at a blade-tip height of 873 feet AGL.
- For the Block Island Long Range HF radar, Camp Varnum HF radar, Horseneck Beach State Reservation HF radar, Long Point Wildlife Refuge HF radar, and the Martha's Vineyard HF radar, wind turbines in the entire study area would be within the line of sight of these radar sites at a blade-tip height of 873 feet AGL.

[2] Height AGL used by Westslope (2021) is equivalent to height amsl as defined in Section 2.1.2.1, Table 2.1-1.

- For the Block Island Standard Range HF radar, wind turbines in the western two-thirds of the study area would be within the line of sight of this radar site at a blade-tip height of 873 feet AGL.
- For the MVCO Meteorological Mast HF radar, wind turbines in the eastern one-fifth of the study area would be within the line of sight of this radar site at a blade-tip height of 873 feet AGL.
- For the Nantucket HF radar, wind turbines in the eastern one-third of the study area would be within the line of sight of this radar site at a blade-tip height of 873 feet AGL.
- For the Squibnocket Farms HF radar, wind turbines in the eastern one-fifth and along the northern edges of the study area would be within the line of sight of this radar site at a blade-tip height of 873 feet AGL.
- For the Moriches HF radar, Nantucket Island HF radar, and the Nauset HF radar, wind turbines in the study area would not be within the line of sight of these radar sites at a blade-tip height of 873 feet AGL. Although wind turbines in the study area would not be within the line of sight of these radar sites, radar effects are still possible beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface.

Westslope (2021) concluded that, without mitigation, the Proposed Action could result in measurable effects on radar systems within their study area, including clutter in the vicinity of line-of-sight turbines and possibly in the vicinity of wind turbines beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface. These impacts could affect the following radar systems; the Amagansett HF radar, Block Island Long Range HF radar, Block Island Standard Range HF radar, Camp Varnum HF radar, Horseneck Beach State Reservation HF radar, Long Point Wildlife Refuge HF radar, Martha's Vineyard HF radar, MVCO Meteorological Mast HF radar, Nantucket HF radar, and the Squibnocket Farms HF radar.

The VOR screening analysis for the Martha's Vineyard VOR/DME, Providence VOR/DME, and the Sandy Point VOR/DME shows that the study area is greater than 8 nm from these navigational aid sites. Although possible, Revolution Wind does not anticipate that the FAA would have concerns with wind turbines in the study area at a blade-tip height of 873 feet AGL based on impacts to these navigational aid sites.

The NEXRAD weather radar screening analysis for the Boston WSR-88D and the Brookhaven WSR-88D shows that wind turbines in the study area would not be within the line of sight of and would not interfere with these radar sites at a blade-tip height of 873 feet AGL. The results also show that wind turbines in the study area at a blade-tip height of 873 feet AGL would fall within a NOAA green No Impact Zone for these radar sites.

The TDWR screening analysis for the Boston TDWR shows that the study area is beyond the instrumented range of this radar site. As such, no additional analysis was considered necessary for this radar site. In summary, there would be a **minor** adverse impact to air defense and homeland security radar and a **negligible** adverse impact on weather radar.

To address these concerns, BOEM would include terms and conditions in the COP approval requiring 30- to 60-day advanced notification to the North American Aerospace Defense Command ahead of Project completion and when the Project is complete and operational for radar management (RAM) scheduling, funding of RAM execution, and curtailment for national security or defense purposes, as described in the leasing agreement. Any other impacts on radar systems are anticipated to be mitigated by overlapping coverage and radar optimization. The FAA would evaluate potential impacts on radar systems, as well as mitigation measures, when Revolution Wind refiles Form 7460-1 for individual WTGs located within U.S. territorial waters. Revolution Wind’s marine coordinator would remain on duty for the life of the Proposed Action to liaise with military, national security, civilian, and private interests to reduce potential radar conflicts. BOEM’s (2020) study of radar interference concludes that HF SeaSonde radars, which monitor ocean currents, follow oil spills, and track powered and adrift vessels, are the most heavily impacted radar by offshore wind projects because WTGs create a phenomenon in which turbine echo is processed by these radar as current echo, resulting in interference with ocean current measurements. General mitigation measures determined by BOEM (2020) to be effective for HF radar include event-based operational changes and modification of some land-based radar. Event-based operational change may include wind farm curtailment agreements for BOEM lease areas that would cease wind farm operations when HF radar efficiency is essential, such as in the event of a severe hurricane/tropical storm or a large oil spill. BOEM is also working on developing a land-based HF radar software upgrade (Trockel et al. 2021), which has since been transferred to NOAA's Integrated Ocean Observing System for further testing and operational deployment.

The Proposed Action includes 1 × 1–nm WTG spacing that reduces, but does not eliminate, navigational complexity and space use conflicts during the operation phases of the Project. Navigational complexity in the area would remain constant during simultaneous operations and would decrease as the Project is decommissioned and structures are removed. The final Massachusetts and Rhode Island Port Access Route Study (USCG 2020) concludes that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS all enable safe navigation with minimal loss of radar detection. Following the layout recommendations in the final Massachusetts and Rhode Island Port Access Route Study (USCG 2020) would improve safety, but it would not completely remove the risk of allisions or collisions with WTGs during SAR operations (of people or marine mammals), particularly in challenging weather or visibility conditions. Therefore, the effects of the presence of offshore structures on land-based radar under the Proposed Action would be **negligible** adverse**.**

<u>Vessel traffic:</u> Operational vessel traffic from the Proposed Action is expected to increase, although it would be less than during the construction and decommissioning phases. This could impact land-based radar by increasing the number of vessels in the analysis area. The Proposed Action includes 1 × 1–nm WTG spacing that allows more space for vessels to navigate and would help reduce potential interference on radar systems. As a result, the effects of vessel traffic on land-based radar under the Proposed Action would be **negligible** adverse**.**

#### 3.17.2.8.3 Cumulative Impacts

#### Offshore Activities and Facilities

<u>Presence of structures:</u> The Proposed Action would result in long-term negligible adverse impacts to land-based radar when compared to conditions under the No Action Alternative. These structures would increase the long-term risk of radar interference or clutter.

BOEM's radar study (2020) suggests general mitigation measures, including event-based operational changes and modification of some land-based radar through software upgrades to reduce impacts. For vessel-based radar, the final Massachusetts and Rhode Island port access route study (USCG 2020) concludes that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS, all enable safe navigation with minimal loss of radar detection. BOEM would include approval conditions in the COP regarding notification to North American Aerospace Defense Command of RAM scheduling, funding of RAM execution, and curtailment for national security or defense purposes, as needed.

Therefore, the Proposed Action and past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to land-based radar.

<u>Vessel traffic:</u> The Project Action would result in an increase of offshore vessels during every phase of the Project. The increase in vessels in the analysis area would result in long-term impacts to land-based radar due to increased potential for radar interference or clutter. Reasonably foreseeable activities are expected to also generate vessel traffic that would increase the number of vessels in the RI/MA WEA. Measures described under Presence of structures would reduce the cumulative impacts of increased vessel traffic to a **minor** adverse level when considering cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities.

#### 3.17.2.8.4 Conclusions

Project construction and installation, O&M, and decommissioning would affect land-based radar occurring in the analysis area. Similar impacts from Project O&M would occur, although at a lesser extent and duration for some uses. BOEM anticipates the impacts on land-based radar resulting from the Proposed Action alone would be **minor** adverse, as the overall effect would be managed through event-based operational changes and radar equipment upgrades.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor** adverse. Considering all the IPFs together, BOEM anticipates that the overall cumulative impacts associated with the Proposed Action combined with past, present, and reasonably foreseeable activities, would be **moderate** adverse for land-based radar.

### 3.17.2.9 Alternative B: Impacts of the Proposed Action on Military and National Security (including search and rescue)

#### 3.17.2.9.1 Construction and Installation

#### Offshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> Anchoring and mooring activities would occur during offshore wind energy development within the analysis area as part of the Proposed Action. This would involve increased vessel traffic which could impact military and national security uses by increasing the number of vessels within the analysis area. The presence of construction vessels could cause military vessels to change course or otherwise alter operations and could increase demand for SAR. These impacts are expected to be limited to cable emplacement corridors. Cable laying vessels are expected to travel slowly, typically at speeds of less than 1 knot, resulting in a low risk of collision with

other vessels. In addition, it is anticipated that the USCG would establish temporary 500-yard navigation safety zones around each WTG foundation and each cable laying vessel, further reducing risk of contact with other vessels. Therefore, the effects of anchoring and new cable emplacement and maintenance under the Proposed Action on military and national security would be **negligible** adverse**.**

<u>Aviation and aircraft traffic:</u> Construction and installation of the Proposed Action would result in a 7% increase in general aviation in the GAA. Please refer to Section 3.17.2.2.1 for analysis of the Project's construction and installation impacts. The effects of this IPF on military and national security under the Proposed Action would be **minor** adverse, as there would be increased air traffic that could increase navigational complexities for military aircraft in the GAA.

<u>Light:</u> The Proposed Action would result in an increase in temporary construction aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize allision risks. Implementation of navigational lighting and marking per FAA and BOEM requirements and guidelines would further reduce the risk of military aircraft collisions. This would result in a general increase of lights in the analysis area, which could have **minor** adverse impacts on military and national security by increasing the amount of light in the geographical analysis area.

<u>Presence of structures:</u> Access by military vessels to the RWF and RWEC would be limited during installation; however, USCG air- and waterborne SAR activities would still occur as needed. The addition of up to 100 WTGs, two OSSs, and two RWECs would increase the risk of allisions for military vessels for up to 35 years during Project operations, particularly in bad weather or low visibility. Military vessel traffic within the RI/MA WEA has historically been relatively low (four vessels recorded in 2016 and 2017), and deep-draft military vessels are not anticipated to navigate outside navigation channels unless necessary for SAR operations (BOEM 2021). Additionally, construction of the Proposed Action could attract recreational fishing or sightseeing vessels, which would add to the number of vessels operating in the area to complete construction of these Project elements. The presence of construction-related vessels and additional recreational vessels would add to conflict or collision risks for military and national security vessels and could increase demand for SAR operations. *The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study* (USCG 2020) examined potential navigation SAR issues associated with anticipated offshore wind development in the RI/MA WEA. The USCG report concluded that a wind turbine array that follows a standard and uniform grid pattern with three lines of orientation and standard spaces, as proposed for the Project, would maintain the Coast Guard's ability to conduct SAR operations within the Lease Area (USCG 2020). BOEM (2020) acknowledges, however, that some SAR operations are aided by land-based radar vessel tracking, as well as wind and current tracking to extrapolate disabled vessel distance and direction, which can be inhibited by the presence of WTGs, and suggests mitigation related to radar equipment and event-based operational changes to counteract these effects. The navigational safety risk assessment found there are an average of 1.5 missions expected per year in the Lease Area (DNV GL Energy USA 2020). Therefore, it is anticipated that the presence of Project-related structures would impact some future USCG SAR missions. The presence of offshore wind infrastructure could require adjusting the operational parameters for such missions; however, the impact is anticipated to be minimal based on the uniform spacing of structures for waterborne SAR and other vessel maneuverability and mitigation for land-based radar.

Construction of the Proposed Action would necessitate use of stationary lift vessels within the RWEC, cranes in ports during construction, and FAA-regulated structures temporarily in transit routes between port and the WEA, increasing navigational complexity and changing navigational patterns for vessels and aircraft operating in the area around the WEA during construction and operations. Increased navigational complexity would increase the risk of collisions and allisions for military and national security vessels or aircraft within the WEA, and could increase demand for SAR. Structures would be marked as a navigational hazard per FAA, BOEM, and USCG requirements, and risk would be consistent within the 35-year operational period. It is anticipated that the USCG would establish temporary 500-yard (457-meter) navigation safety zones around each WTG foundation and each installation vessel, reducing risk of contact with other vessels The Project's 1 × 1–nm spacing reduces some of the risk of collisions and allisions. Based on the above impacts, the Project would have **minor** to **moderate** adverse impacts on military operations, including SAR, and national security due to the presence of structures.

Vessel traffic: There would be increased construction and operational vessel traffic from the Proposed Action. This could impact military and national security uses by increasing the number of vessels in the analysis area. The RWF's proposed 1 × 1–nm spacing would result in sufficient space between foundations for vessels to navigate. USCG establishment of temporary safety zones around cable laying vessels and foundation construction sites would further minimize the potential for construction vessel conflicts with military vessels. As a result, the effects of vessel traffic on military and national security uses under the Proposed Action would be **minor** adverse**.**

#### 3.17.2.9.2 Operations and Maintenance and Decommissioning

##### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Anchoring and mooring activities would occur during offshore wind energy O&M and decommissioning within the analysis area as part of the Proposed Action. This would involve increased vessel traffic which could impact military and national security uses by increasing the number of vessels within the analysis area. However, the impacts are expected to be small and infrequent during O&M and decommissioning of offshore Project elements. Therefore, the effects of anchoring and new cable emplacement/maintenance under the Proposed Action on military and national security would be **negligible** adverse.

Aviation and aircraft traffic: O&M of the Proposed Action would result in a 0.01% increase in annual general aviation traffic in the GAA. Please refer to Section 3.17.2.2.2 for analysis of the Project's O&M impacts. The increase in vessel traffic associated with Project O&M could result in an increased demand for SAR, and increased military aircraft traffic in and around the RWF. Therefore, the effects of this IPF on military and national security activities under the Proposed Action, including SAR, would be **negligible** adverse.

Light: The O&M and decommissioning of the Proposed Action would result in an increase in permanent lighting on WTGs offshore until decommissioning is complete. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks. This would result in a general increase of lights in the analysis area, which could have a small impact on military and national security. The addition of permanent lighting would be an ongoing impact; therefore, the effects of light on military and national security under the Proposed Action would be **minor** adverse.

Presence of structures: The addition of up to 100 WTGs and up to two RWECs would increase risk of allisions for military vessels for up to 35 years during Project operations, particularly in bad weather or low visibility. Military traffic within the RI/MA WEA has historically been relatively low (four vessels recorded in 2016 and 2017), and deep-draft military vessels are not anticipated to navigate outside navigation channels unless necessary for SAR operations (BOEM 2021). Additionally, the Proposed Action could create an artificial reef effect until decommissioning is complete, attracting species of interest to recreational fishing or sightseeing, and attracting additional recreational fishing and sightseeing vessels that would be additive to existing vessel traffic in the area. The presence of additional recreational vessels would add to conflict or collision risks for military and national security vessels and could increase demand for SAR operations. Therefore, the Project would have **minor** adverse impacts on military operations and national security.

Vessel traffic: There would be increased operational vessel traffic from the Proposed Action. This could impact military and national security uses by increasing the number of vessels in the analysis area. The RWF's proposed 1 × 1–nm spacing would result in more space for vessels to navigate and would help reduce conflicts with military vessels. As a result, the effects of vessel traffic on military and national security uses under the Proposed Action would be **minor** adverse**.**

#### 3.17.2.9.3 Cumulative Impacts

#### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Up to 25,019 acres could be affected by anchoring and mooring activities and cable installation during offshore wind energy development within the analysis area as part of the Proposed Action and other reasonably foreseeable future actions. This offshore energy facility construction of new cable emplacement and maintenance of cables would involve increased vessel traffic, which could impact military and national security uses by increasing the number of vessels within the analysis area. Increased vessel traffic due to anchoring and cable maintenance of wind facilities could lead to course changes of military vessels, thereby increasing navigational complexity and risk of collisions. However, these impacts are expected to be limited to cable emplacement corridors, which would result in contact with cable emplacement and maintenance vessels expected from the Proposed Action and future offshore wind activities. Therefore, the cumulative effects of anchoring and new cable emplacement and maintenance would be **minor** adverse on military and national security.

Aviation and aircraft traffic: The Proposed Action would result in a measurable increase in general aviation traffic in the GAA during construction and installation, as well as decommissioning, which is expected to be similar in aviation traffic volumes as during construction and installation. The Proposed Action would result in a negligible effect on aviation traffic during O&M of the RWF. Other planned and potential future offshore wind projects could also result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning. While the aviation requirements of other reasonably foreseeable offshore wind activities are unknown, it is anticipated that the aviation requirements for construction and O&M of these projects would be similar to those for the Proposed Action. Construction of these projects may occur concurrently between now and 2030 and, with a conservative 7% increase in aircraft traffic for all aircraft types in the GAA, the cumulative increase in air traffic during the construction period would be additive. Once projects are operational, cumulative O&M air traffic would likely result in a 0.1% increase in aviation traffic for all aircraft. The Proposed Action and reasonably foreseeable future wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **minor** adverse impacts on military and national security.

Light: The Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks and optimize aviation safety. This would result in a general increase of lighting in the GAA, adding to vessel, navigation, onshore housing, and port lighting, which could impact military and national security uses. The Project, in combination with other reasonably foreseeable future actions, could result in the addition of up to 1,117 lighted structures in the analysis area. Therefore, because Project activities combined with reasonably foreseeable activities would result in an increase in lighted structures offshore, the cumulative impacts of light on military and national security would be **minor** adverse.

Presence of structures and vessel traffic: The Proposed Action would require approximately 970 construction vessel trips per construction day over the 2-year construction period. This vessel activity would increase the risk of collisions, allisions, and spills. However, the Proposed Action represents approximately 2% of typical vessel traffic in the GAA. Therefore, the Proposed Action would result in **negligible** adverse impacts to military and national security uses.

BOEM estimates a peak of 262 vessels due to offshore wind project construction over a 10-year time frame. Although the number of construction vessels would represent a large portion of the traffic in the region, most vessels would remain in the maximum work area, with fewer vessels transporting materials back and forth from ports. With multiple offshore wind projects under construction, traffic would also be spread among multiple ports to ensure that sufficient capacity exists at each port and in each waterway. Additionally, BOEM also anticipates that coordination with military and national security interests would be ongoing during construction and installation, O&M, and decommissioning activity.

The Proposed Action would result in noticeable impacts to military and national security through the installation and operation of up to 100 WTGs and two OSSs, along with stationary lift vessels and cranes during construction, to conditions under the No Action Alternative, for a total of 1,117 structures within the GAA. The Proposed Action structures represents a 10% increase over total estimated WTG and OSS foundations across the GAA under the No Action Alternative.

Project structures are likely to generate artificial reef effects that lead to increased abundance of commercially and recreationally desirable fish and shellfish within wind farm boundaries. This could in turn lead to an increase in commercial and recreational vessel traffic and activity in and around wind farms. Increased vessel traffic and presence of structures would therefore contribute to an increase the short-term and long-term collision and allision risks for military and national security vessels, as well as search and rescue vessels. However, deep-draft military vessels are not anticipated to transit outside navigation channels unless needed for search and rescue. Potential allision risks if these vessels lost power would be minimized through the Proposed Action’s 1 ×1–nm WTG spacing. BOEM also anticipates that coordination with military and national security interests would be ongoing during construction and installation, O&M, and decommissioning.

Changing navigation patterns could also concentrate vessels within and around the outsides of the RI and MA Lease Areas, potentially causing space use conflicts in these areas or reducing the effectiveness of SAR operations. While the addition of Project structures and associated construction vessels would also increase navigational complexity or alter navigation patterns for military and national security aircraft operating in the region, Project structures would be marked as a navigational hazard per FAA, BOEM, and USCG guidelines and WTGs would be visible on military and national security vessel and aircraft radar. The Proposed Action would implement a 1 × 1–nm spacing, consistent with all other projects in the RI/MA WEA.

Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action Alternative, which would be **moderate** adverse for presence of structures and **minor** adverse for vessel traffic on military and national security.

#### 3.17.2.9.4 Conclusions

Project construction and installation, O&M, and decommissioning would affect ongoing military uses in the analysis area. Similar impacts from Project O&M would occur, although at a lesser extent and duration for some uses. BOEM anticipates that the impacts resulting from the Proposed Action alone that range from interference with ongoing military and national security activities to an expected increase in demand for SAR would range from negligible to moderate adverse. Therefore, BOEM expects the overall impact on military and national security from the Proposed Action alone to be **minor** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** adverse to **moderate** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **moderate** adverse for military uses.

### 3.17.2.10 Alternative B: Impacts of the Proposed Action on Scientific Research and Surveys (see section in main EIS)

### 3.17.2.11 Alternative B: Impacts of the Proposed Action on Undersea Cables

#### 3.17.2.11.1 Construction and Installation

##### Offshore Activities and Facilities

<u>Presence of structures:</u> Up to 100 WTGs, two OSS foundations, and two RWECs would be installed as part of the Proposed Action. The RWEC would cross up to seven identified subsea assets within the installation corridor, including three telecommunications cables.

The presence of the Project could preclude future submarine cable placement in the RWF and RWEC, although there are no future cables identified for location within this area. The presence of the RWF would likely require routing of future undersea cables around the Lease Area. Cable crossings of the RWEC would necessarily include mapping and installation of cable protection at the crossing location, standard design techniques for undersea cable installation. The impacts from foundation construction would be **minor** adverse while the installation of the RWECs would be **negligible** adverse. The overall impact from presence of structures on undersea cables would be **minor** adverse.

Vessel traffic: Increased vessel traffic due to construction and installation of the Proposed Action could interfere with vessels used to install or maintain existing and future undersea cables. Increased construction vessel traffic due to Project construction could lead to course changes of vessels used for undersea cable maintenance and installation and increased traffic along vessel transit routes. Additionally, there would be increased risk for allisions with vessels used for construction of undersea cables. These effects during the construction and installation phase are expected to be minimal and short term. Therefore, the effects of vessel traffic on undersea cables under the Proposed Action would be **negligible** adverse.

#### 3.17.2.11.2 Operations and Maintenance and Decommissioning

##### Offshore Activities and Facilities

Presence of structures: Up to 100 WTGs, two OSS foundations and two RWECs would be installed as part of the Proposed Action. The presence of the Project could preclude future submarine cable placement. O&M of the Project would be less likely to interfere with future undersea cable development than construction and decommissioning. OSS and WTG foundations would have a larger footprint compared to the RWECs, which are buried, and therefore would be more likely to preclude future undersea cable development. Once the foundations are constructed, impacts from foundation O&M and decommissioning would be **minor** adverse and O&M and decommissioning of RWECs would be **negligible** adverse. The overall impact from presence of structures on undersea cables is **minor** adverse.

Vessel traffic: Increased vessel traffic due to O&M and decommissioning of the Proposed Action could interfere with vessels used to install or maintain existing and future undersea cables. Additionally, there is increased risk for allisions with vessels used for undersea cable O&M. However, given the infrequency of required maintenance at any given location along a cable route, this risk is expected to be low. These effects during the construction and installation phase are expected to be minimal and short in duration. Therefore, the effects of vessel traffic on undersea cables under the Proposed Action would be **negligible** adverse.

#### 3.17.2.11.3 Cumulative Impacts

##### Offshore Activities and Facilities

Presence of structures: The Proposed Action would result in long-term impacts to existing undersea cables through the installation of up to 100 WTGs and two OSSs to conditions under the No Action Alternative. BOEM estimates a cumulative total of up to 1,117 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA.

Construction of the foundations associated with the Proposed Action and reasonably foreseeable future actions could increase the complexity of undersea cable development by requiring routing around the facilities. Export cables are unlikely to preclude future undersea cable development because cable crossings can be protected using standard design techniques. Therefore, in context of reasonably foreseeable environmental trends, the overall impacts from the presence of structures resulting from the Proposed Action and planned actions are anticipated to be localized long term **negligible** because impacts can be avoided by routing design and standard cable protection techniques.

Vessel traffic: Vessel traffic related to construction and O&M of undersea cables is expected to increase if new undersea cables are constructed and as ongoing maintenance is required. Additionally, there would be increased vessel traffic due to the Proposed Action and reasonably foreseeable future actions. The risk of allision to cable maintenance vessels could increase as more offshore wind energy projects are constructed. However, given the infrequency of required maintenance at any given location along a cable route, this risk is expected to be low. Therefore, the cumulative impact from vessel traffic on undersea cables is **negligible** adverse.

#### 3.17.2.11.4 Conclusions

Project construction and installation, O&M, and decommissioning would affect undersea cables occurring in the GAA. Similar impacts from Project O&M would occur, although at a lesser extent and duration for some uses. BOEM anticipates the impacts resulting from the Proposed Action alone would be **negligible**. Therefore, BOEM expects the overall impact on other marine uses from the Proposed Action alone to be **negligible** adverse for undersea cables.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would be **negligible**. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse impacts for undersea cables.

### 3.17.2.12 Alternatives C, D, E, and F: Aviation and Air Traffic

Table 3.17-1 provides a summary of IPF findings by alternative.

#### 3.17.2.12.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from each alternative alone would be **negligible** adverse compared to the Proposed Action. The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **minor** adverse impacts for aviation and air traffic.

### 3.17.2.13 Alternatives C D, E, and F: Land-Based Radar

Table 3.17-1 provides a summary of IPF findings by alternative.

#### 3.17.2.13.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from each alternative alone would be the same as the Proposed Action: **minor** adverse. The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **moderate** adverse impacts for land-based radar.

### 3.17.2.14 Alternatives C, D, E, and F: Military and National Security (including Search and Rescue)

Table 3.17-1 provides a summary of IPF findings by alternative.

#### 3.17.2.14.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from each alternative alone would be similar to the Proposed Action: **minor** adverse. The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **moderate** adverse for military uses and national security.

### 3.17.2.15 Alternatives C, D, E, and F: Scientific Research and Surveys (see section in main EIS)

### 3.17.2.16 Alternatives C, D, E, and F: Undersea Cables

Table 3.17-1 provides a summary of IPF findings by alternative.

#### 3.17.2.16.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from each alternative alone would be the same as the Proposed Action: **negligible** adverse. The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **negligible** adverse for undersea cables.

### 3.17.2.17 Alternative G: Impacts of the Preferred Alternative on Aviation and Air Traffic

Table 3.17-1 provides a summary of IPF findings for this alternative.

#### 3.17.2.17.1 Conclusions

Project construction and installation, O&M, and decommissioning under Alternative G would affect ongoing aviation and air traffic occurring in the analysis area through the same mechanisms described for the Proposed Action, including increased air traffic, vessel traffic, vehicle traffic, light, port utilization, and an increase in structures. Although the overall extent of impacts to aviation and air traffic would be reduced under Alternative G relative to the Proposed Action, the significance of those effects would be the same. Therefore, the impacts of Alternative G alone on aviation and air traffic would be **negligible** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, Alternative G impacts from individual IPFs range from **negligible** to **minor** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with Alternative G when combined with past, present, and reasonably foreseeable activities would be **minor** adverse impacts for aviation and air traffic.

#### 3.17.2.18 Alternative G: Impacts of the Preferred Alternative on Land-Based Radar

Table 3.17-1 provides a summary of IPF findings for this alternative.

##### 3.17.2.18.1 Conclusions

Construction and installation, O&M, and decommissioning under Alternative G would affect land-based radar in the analysis area. BOEM anticipates the impacts on land-based radar resulting from Alternative G alone would be **minor** adverse because the overall effect would be managed through event-based operational changes and radar equipment upgrades. Considering all the IPFs together, BOEM anticipates that the overall cumulative impacts associated with Alternative G when combined with past, present, and reasonably foreseeable activities would be **moderate** adverse for land-based radar.

#### 3.17.2.19 Alternative G: Impacts of the Preferred Alternative on Military and National Security (including Search and Rescue)

Table 3.17-1 provides a summary of IPF findings for this alternative.

##### 3.17.2.19.1 Conclusions

Project construction and installation, O&M, and decommissioning under Alternative G would affect ongoing military uses in the analysis area. Similar impacts from Project O&M would occur, although at a lesser extent and duration for some uses. BOEM anticipates that the impacts resulting from Alternative G alone that range from interference with ongoing military and national security activities to an expected increase in demand for SAR would range from **negligible** to **moderate** adverse. Therefore, BOEM expects the overall impact on military and national security from Alternative G alone to be **minor** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under Alternative G resulting from individual IPFs would range from **negligible** adverse to **moderate** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with Alternative G when combined with past, present, and reasonably foreseeable activities would be **moderate** adverse for military and national security.

#### 3.17.2.20 Alternative G: Impacts of the Preferred Alternative on Scientific Research and Surveys (see section in main EIS)

#### 3.17.2.21 Alternative G: Impacts of the Preferred Alternative on Undersea Cables

Table 3.17-1 provides a summary of IPF findings for this alternative.

##### 3.17.2.21.1 Conclusions

Project construction and installation, O&M, and decommissioning would affect undersea cables in the GAA. Similar impacts from Project O&M would occur, although at a lesser extent and duration for some uses. BOEM anticipates the impacts resulting from Alternative G alone would be **negligible**. Therefore, BOEM expects the overall impact on other marine uses from Alternative G alone to be **negligible** adverse for undersea cables.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts of Alternative G resulting from individual IPFs would be **negligible**. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with Alternative G when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse impacts for undersea cables.

#### 3.17.2.22 Mitigation

Mitigation measures resulting from agency consultations for land-based radar and military and national security are identified in Appendix F, Table F-2, and summarized in Table 3.17-2. These measures, if adopted, would further define how the effectiveness and enforcement of EPMs would be ensured and would improve accountability for compliance with EPMs by requiring the submittal of plans for approval by the enforcing agency(ies) and by defining reporting requirements. Because these measures ensure the effectiveness of and compliance with EPMs that are already analyzed as part of the Proposed Action, implementation of these measures would not further reduce the impact level of the Proposed Action from what is described in Section 3.17.2. Aviation, air traffic, and undersea cables have no additional mitigation measures proposed.

**Table 3.17-2. Mitigation and Monitoring Measures Resulting from Consultations for Other Marine Uses (land-based radar and military and national security) (Appendix F, Table F-2)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| **Land-based Radar** | | |
| Operational mitigation for ARSR-4 and ASR-8/9 radar | Mitigation for ASR-8/9 radar:<br>Passive aircraft tracking using ADS-B or signal/transponder<br>Increasing aircraft altitude near radar<br>Sensitivity time control (range-dependent attenuation)<br>Range azimuth gating (ability to isolate/ignore signals from specific range-angle gates)<br>Track initiation inhibit, velocity editing, plot amplitude thresholding (limiting the amplitude of certain signals)<br>Modification mitigations for ARSR-4 and ASR-8/9 systems include using the dual beams of the radar simultaneously and using in-fill radar. Additional conditions for COP approval to mitigate potential impacts on ASR-8/9 include notifying the North American Aerospace Defense Command 30 to 60 days ahead of Project completion and when the Project is complete and operational for Radar Adverse-impact Management (RAM) scheduling, contributing funds toward execution of the RAM, and curtailment of operations for national security or defense purposes. | These measures would reduce the anticipated minor adverse impacts to air defense and homeland security radar systems. |
| Mitigation for oceanographic HF radar | WTG operators sharing real-time surface current telemetry, other oceanographic data, and wind turbine operational data with radar operators would serve to aid interference mitigation. | These measures would complement existing EPMs and further reduce anticipated negligible impacts to weather radar and minor adverse impacts on SAR activities. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | Mitigation would also include a wind farm curtailment agreement. Additional modifications identified for oceanographic HF radar systems include signal processing enhancements and antenna modifications. | |
| Mitigation for NEXRAD weather radar systems | Research is underway for potential to mitigate weather radar using phased array radars to achieve a null in the antenna radiation pattern in the direction of the wind turbine. Additional mitigation includes a wind farm curtailment agreement. | This measure would further reduce anticipated negligible impacts on weather radar systems. |
| **Military and National Security** | | |
| Fiber-optic sensing technology | Distributed fiber-optic sensing technology proposed for the Project or associated transmission cables would be reviewed by the DOD to ensure that distributed fiber-optic sensing technology is not used to detect sensitive data from DOD activities, to conduct any other type of surveillance of U.S. government operations, or to otherwise pose a threat to national security. | Although this measure would not reduce the minor to moderate adverse impacts to military operations and national security, it would prevent the potential for impacts resulting from the use of wind energy project structures for surveillance. |
| WTG shut-down mechanism | Equip all WTG rotors (blade assemblies) with control mechanisms operable from the Project control centers 24 hours a day, 7 days a week. The control mechanisms would enable control room operators to shut down the requested WTGs within an agreed-upon time of notification between the USCG and Revolution Wind. A formal shut-down procedure would be part of the standard operating procedures and periodically tested. Normally, USCG-ordered shut downs would be limited to those WTGs in the immediate vicinity of an emergency and for as short | This measure would reduce anticipated minor impacts by allowing the USCG to request shut down of WTGs as necessary to complete military and national security operations, maintain public safety, and conduct SAR. |

| **Mitigation Measure** | **Description** | **Expected Effect on Impacts from Action Alternatives** |
|---|---|---|
| | a period as is safely practicable under the circumstances, as determined by the USCG. | |
| WTG shut-down mechanism | Revolution Wind would participate in periodic USCG-coordinated training and exercises to test and refine notification and shut-down procedures and to provide SAR training opportunities for USCG vessels and aircraft. | This measure would reduce anticipated minor impacts by providing smooth WTG shut-down procedures through training and increased coordination. |
| WTG shut-down mechanism | Prior to operation of the Project, Revolution Wind would submit a written plan for O&M, which includes control center (or centers), for review by BOEM and the USCG. The plan must demonstrate that the control centers would be adequately staffed to perform standard operating procedures, communications capabilities, and monitoring capabilities. The plan would include the following topics that may be modified through ongoing discussions with the USCG:<br>Standard operating procedures: Methods for establishing and testing WTG rotor shut down; methods of lighting control; methods for notifying the USCG of mariners in distress or potential/actual SAR incidents; methods for notifying the USCG of any events or incidents that may impact maritime safety or security; and methods for providing the USCG with environmental data, imagery, communications, and other information pertinent to SAR or marine pollution response.<br>Staffing: Number of personnel intended to staff the control centers to ensure continuous monitoring of WTG operations, communications, and surveillance systems. | This measure would reduce anticipated minor impacts by providing a plan to support testing, training, and implementation of WTG shut down in emergency situations. The plan would also provide communication protocols for providing information on WTG operations and incidents that could affect military and national security uses. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | Communications: Capabilities to be maintained by the control centers to communicate with the USCG and mariners in and near the Lease Area. Communications capability would, at a minimum, include VHF marine radio and landline and wireless for voice and data.<br>Monitoring: The control centers would maintain the capability to monitor the Project installation and operations in real time (including night and periods of poor visibility) for determining the status of all PATONs and for detecting a survivor who has climbed to the survivor's platform, if installed, on any WTG or OSS. | |
| WTG shut-down mechanism | If the Project's OSSs include helicopter-landing platforms, those platforms would be designed and built to accommodate up to and including USCG H60 sized rescue helicopters. | This measure would reduce anticipated minor impacts by allowing military and national security uses to use wind energy structures during operations and for emergencies. |

#### 3.17.2.22.1 Measures Incorporated into the Preferred Alternative

Mitigation measures for other marine uses required through completed consultations, authorizations, and permits listed in Table 3.15-14 and in Appendix F, Table F-2, are incorporated into Alternative G (Preferred Alternative). BOEM has identified additional measures in Table 3.15-15 as incorporated into the Preferred Alternative. These measures, if adopted, would further define how the effectiveness and enforcement of EPMs would be ensured and would improve accountability for compliance with EPMs by requiring the submittal of plans for approval by the enforcing agency(ies) and by defining reporting requirements. Because these measures would ensure the effectiveness of and compliance with EPMs that are already analyzed as part of the Proposed Action, implementation of these measures would not further reduce the impact level of the Proposed Action from what is described in Section 3.17.2.

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# 3.18 Recreation and Tourism

## 3.18.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Recreation and Tourism

Geographic analysis area: The GAA for recreation and tourism (Figure 3.18-1) comprises all Project components plus a 40-mile radius around the Lease Area. The area covers approximately 6,113 square miles of open ocean, 1,488 square miles of land, and over 1,008 miles of shoreline, and coincides with the Project's visual impact assessment (EDR 2023) to 1) address Project visibility from visually sensitive resources located within New York, Connecticut, Rhode Island, and Massachusetts and 2) encompass all locations where BOEM anticipates recreation impacts associated with Project construction and installation, O&M, and decommissioning.

Affected environment: Recreation and tourism play a major role in the leisure pursuits of local residents and the coastal economies of the states affected by the Project (see Section 3.9 and Section 3.11). NOAA collects economic data for six sectors dependent on the ocean and Great Lakes: living resources, marine construction, marine transportation, offshore mineral resources, ship and boat building, and tourism and recreation. Tourism and recreation statistics from NOAA's Economics: National Ocean Watch are good indicators of coastal and ocean tourism because they estimate the ocean-dependent portion of business for hotels and restaurants by including only those establishments located in shore-adjacent zip code areas, and they exclude all forms of sports and entertainment that are not ocean-related. A summary of economic data for counties and states that fall within the recreation and tourism analysis area is aggregated in Table 3.18-1. As of 2018, ocean economy sectors accounted for 3% to 22% of the total economy for affected counties and states. Tourism and recreation were the substantive sources of economic activity for most locations.

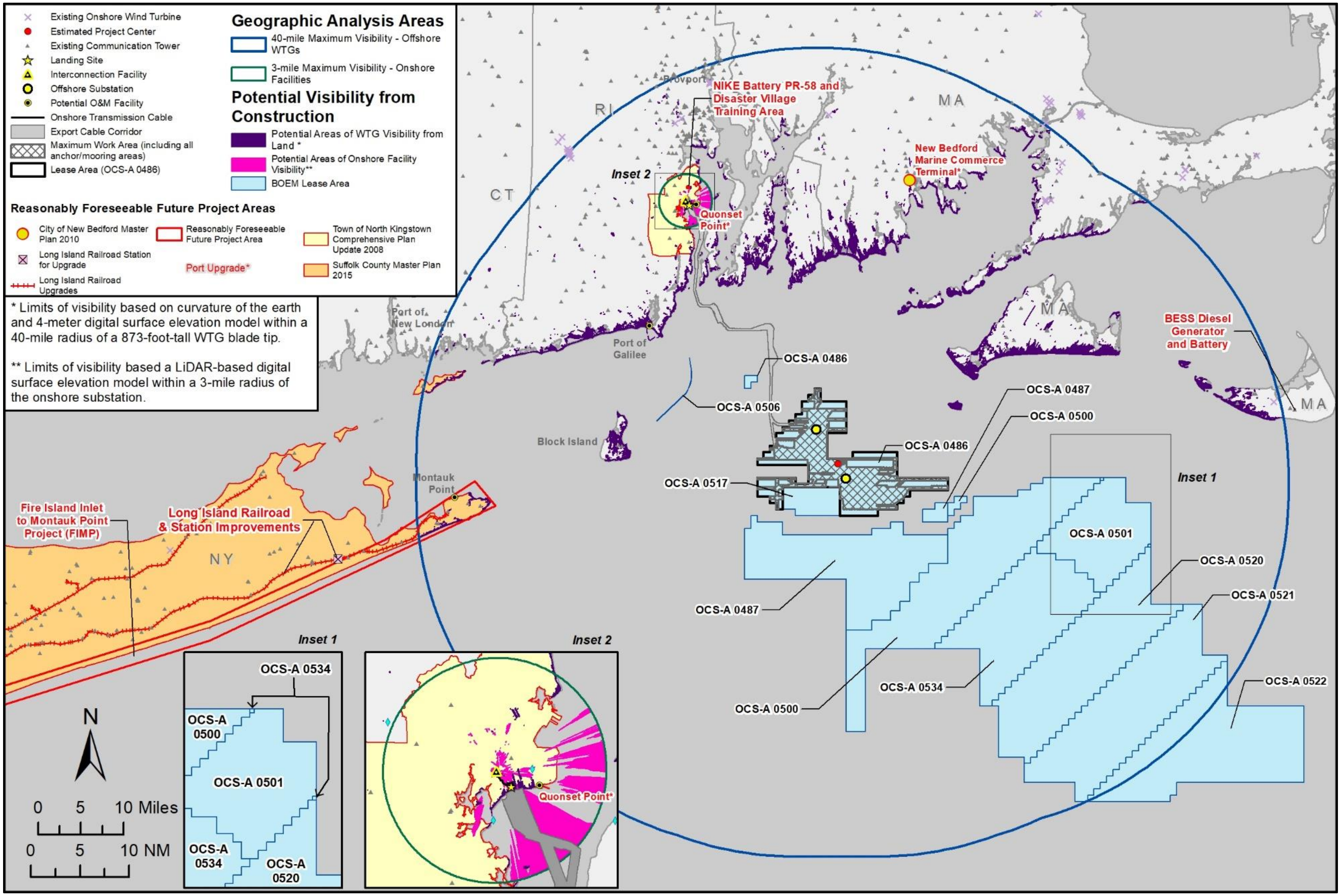


Figure 3.18-1. Geographic analysis area for recreation and tourism.

**Table 3.18-1. Ocean Economies for Counties and States that Would be Directly or Indirectly Affected by the Project**

| Location | % of Total Economy | Number of Employed Residents for Tourism and Recreation (% of total residents employed in ocean economy) | Total Wages for Tourism and Recreation (% of total wages generated by ocean economy) | Total Gross Domestic Product for Tourism and Recreation (% of total gross domestic product generated by ocean economy) |
|---|---|---|---|---|
| Suffolk County, NY | 6% | 36,385 (87.9%) | 921.1 million (70.1%) | 1.9 billion (73.4%) |
| New London, CT | 17% | 7,397 (36.2%) | 176.5 million (12.9%) | 374.3 million (15.5%) |
| Washington, RI | 21% | 6,032 (53.5%) | 145.2 million (31.6%) | 327.6 million (27.6%) |
| Kent, RI | 10% | 7,338 (96.4%) | 148.5 million (91.7%) | 321.8 million (93.0%) |
| Providence, RI | 6% | 14,803 (92.1%) | 326.3 million (84.8%) | 700.0 million (87.9%) |
| Bristol, RI | 17% | 1,977 (86.8%) | 46.5 million (76.8%) | 96.1 million (72.6%) |
| Bristol, MA | 3% | 2,963 (48.9%) | 55.0 million (19.1%) | 105.8 million (16%) |
| Newport, RI | 21% | 6,976 (82.0%) | 184.4 million (54.2%) | 444.1 million (56.8%) |
| Plymouth, MA | 5% | 9,180 (87.5%) | 203.8 million (71.2%) | 400.9 million (71.3%) |
| Barnstable, MA | 19% | 17,028 (94.0%) | 489.3 million (87.9%) | 1.1 billion (87.0%) |
| Dukes, MA | 16% | 1,394 (97.5%) | 52.9 million (96.1%) | 120.1 million (96.9%) |
| Nantucket, MA | 22% | 1,668 (99.5%) | 71.2 million (99.7%) | 159.7 million (99.8%) |

Source: NOAA (2020).

Notes: CT = Connecticut, MA = Massachusetts, NY = New York, RI = Rhode Island.

The analysis area for recreation and tourism supports a wide range of inland, shoreline or beach, and ocean-based recreation and tourist activities, including 16 water trails, more than 1,000 conservation areas, nearly 1,000 hiking trails, New Bedford Whaling National Historical Park, several hundred designated SCUBA diving areas, and 78 marinas (Northeast Ocean Data 2021). Recreational activities include beach-going, boating (for pleasure and competition), walking-hiking, swimming, surfing, metal detecting, horseback riding, camping, stand-up paddleboarding, cross-country skiing, kite sailing, and scenic-bird-nature viewing. The *Ocean State Outdoors Rhode Island's Comprehensive Outdoor Recreation Plan* (Rhode Island DEM 2019) identifies visiting coastal areas-beaches as one of the top three outdoor activities by Rhode Island residents. Likewise, Connecticut's statewide survey identifies beach activities as the top water-related recreation activity by residents (Center for Public Policy & Social Research 2017). Road or trail biking, birdwatching, and camping are also activities reported as displaying a relatively high degree of participation. Based on a broader study encompassing the northeast United States, the five most popular activities in the northeast region are beachgoing (61.9%), scenic enjoyment-sightseeing (50.2%), watching marine life (33.7%), photography (32.5%), and collecting non-living resources-beachcombing (27.4%) (Bloeser et al. 2015). The same study notes that surfing, stand-up paddleboarding, and triathlon typically occurred in nearshore bay-protected waters.

Locally, Blue Beach, a public beach, is approximately 500 feet west of the southwest corner of the Project's proposed 20-acre landfall envelope. Blue Beach is accessed via a trail located west of the Hayward Industries, Inc. building, which is just outside the landfall envelope. Compass Rose Beach, another public beach, is approximately 2,600 feet east of the southeast corner of the landfall envelope. The Martha's Vineyard Fast Ferry dock is directly east of Compass Rose Beach. The North Kingstown Golf Course is approximately 2,000 feet north of the northern edge of the landfall envelope and is separated by Roger Williams Way.

Boating in the analysis area includes ocean-going vessels down to small boats used by residents and tourists in sheltered waters. A 2012 survey of recreational boaters along the northeastern U.S. coast found that more than half (52.4%) of recreational boating occurred within 1 nm of the coastline (Starbuck and Lipsky 2013). In 2011, NOAA estimated that 93% of the 2011 recreational boating from Massachusetts occurred within 3 nm of shore (BOEM 2012). However, several long-distance sailboat races may pass through the offshore portions of analysis area, depending on the route selected for a particular year; these races include the Transatlantic Race, Marion to Bermuda Race, and Newport to Bermuda Race. Although these sailing events occur along the entire Long Island coastline, they are generally small (averaging less than 50 racing vessels). Larger sightseeing boats also travel to offshore locations where sightings of whales are more likely.

Recreational fishing along the shoreline and the pursuit of highly migratory species (HMS) such as tuna, shark, swordfish, and billfish are also popular recreational activities in the analysis area. In the nearby Vineyard Wind Lease Area, the recreational fishing effort for HMS occurs seasonally from June to October using a wide range of fishing methods, although mobile fishing methods predominate (Kneebone and Capizzano 2020). Coxes Ledge, The Fingers, and The Claw all support the highest level of recreational fishing for HMS (see Section 3.9 for additional discussion of recreational fishing activities and trends).

Although many of the above-listed publicly available recreation and tourism activities are free, local businesses also offer boat rentals and numerous recreation experiences such as private boat-cruise charters; canoe, kayak, and stand-up-paddleboard touring; whale watching; deep-sea fishing charters; and scuba diving in the analysis area. These tourism activities also support other local businesses, including non-ocean-related leisure, hotels, and restaurants.

Recreation and tourism in the GAA are noticeably higher in the spring, summer, and fall when the ambient air and water temperatures are comfortable (Parsons and Firestone 2018).

Historically, much of the fishing by the region's Native American tribes was concentrated in the nearshore marine and estuarine environment (Bennett 1955). Recent BOEM consultation with Native American tribes in lease areas adjacent to the Project indicate that tribal subsistence fisheries continue to occur predominately in inshore areas (BOEM 2020).

## 3.18.2 Environmental Consequences

### 3.18.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). The Project design parameters that would influence the magnitude of the impacts on recreation and tourism consists of the number and type of WTGs installed. Impacts on recreational fishing and boating are based on the installation of 100 WTGs and two OSSs, for a total of 102 foundations in the GAA. If Revolution Wind were instead to install 59 12-MW WTGs, the maximum height of the blade tip for WTGs would be 873 feet above the surface, compared to 648 feet for the 8-MW WTGs. Because the WTGs would exceed 699 feet, FAA regulations require supplemental mid-tower lighting, in addition to lighting at the top of the nacelle (FAA 2018). The taller WTGs and additional lighting would result in greater visual impacts within the GAA. However, the 12-MW WTG option would reduce the number of WTGs and IAC; therefore, navigational complexity for offshore recreation users would be reduced compared to the 8-MW WTG option.

Revolution Wind has committed to implementing ADLS (as described in Appendix F) as a measure to reduce the duration of lighting impacts. Revolution Wind would also establish temporary safety zones around construction areas and work with the USCG to communicate these zones and other work areas to the boating public via local Notices to Mariners. These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for recreation and tourism across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E1 Table E2-10.

Table 3.18-2 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations. All of the action alternatives would include both adverse and beneficial effects. Overall, these effects to recreation and tourism across all alternatives would be **minor** adverse because they would be small, and the resource would be expected to recover completely with no mitigating action required.

**Table 3.18-2. Alternative Comparison Summary for Recreation and Tourism**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| Anchoring and new cable emplacement/ maintenance | **Offshore**: Most anchoring would occur outside the area most commonly used for recreational boating, which would prevent most conflicts for recreational uses. Anchoring activities would also be temporary and localized; therefore, construction-related anchoring impacts from future projects would be **minor** adverse.<br>Smaller vessel anchors would not penetrate to the typical target cable burial depth (4 to 6 feet), and recreational vessel anchoring is uncommon in water depths where offshore structures would be installed. However, scour protection for cables and foundations could hinder boat anchoring and result in gear entanglement or loss if recreational activity coincides with scour protection areas. If project-related seafloor hazards are not noted on charts, operators could lose anchors, leading to increased risks associated with drifting vessels that are not securely anchored. Therefore, new cable emplacement and maintenance would result in temporary to long-term **minor** adverse impacts. | **Offshore**: Installation of offshore cables and anchoring would temporarily restrict recreation access within the cable routes. Revolution Wind would implement a comprehensive communication plan during offshore construction to inform all mariners, including commercial and recreational fishermen and recreational boaters, of construction activities and vessel movements. Temporary safety zones around each WTG site and each cable-laying vessel (anticipated to be established and monitored by Revolution Wind) would minimize potential conflicts for recreational uses. Potential O&M anchoring impacts would be similar to the construction phase, but reduced due to fewer anchored vessels. Therefore, potential changes in navigation routes due to Proposed Action would constitute a temporary, **minor** adverse impact.<br>Cable installation could also affect fish and mammals of interest for recreational fishing and sightseeing through dredging and turbulence, although no population-level impacts are expected, resulting in short-term **minor** adverse impacts.<br>Up to approximately 6,550 acres of anchoring and 18,995 acres of cabling seafloor disturbance could occur from ongoing and planned actions, including the Proposed Action, in the recreation and tourism GAA. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** adverse cumulative impacts on recreation and tourism. | **Offshore**: Alternatives C through F would reduce the number of WTG foundations and scour protection associated with the IAC. This could reduce risks associated with gear entanglement or loss if recreational activity occurs in scour protection areas. Reduced IAC installation could also negligibly decrease turbidity that could alter the behavior of species important to recreational fishing (see Section 3.9) and marine mammal sightseeing. Differences in estimated acres of anchoring by alternative are disclosed in Appendix E4 and range from 1,814 acres (Alternative F) to 2,961 acres (Alternative D). Project design for IACs and the export cable has not occurred for Alternatives C through F; therefore, a comparison of cabling-related disturbance is not available. However, best professional judgment suggests that the footprint of the IAC, OSS-link cable, and RWEC would change and be slightly reduced to match the reduced number of WTGs.<br>During O&M, no impacts are anticipated because the RWEC, IAC, and OSS transmission cable typically have no maintenance requirements unless a fault or failure occurs.<br>Approximately 5,158 to 6,331 acres of anchoring and up to 18,995 acres of cabling seafloor disturbance could occur from ongoing and planned actions, including Alternatives C through F (see Appendix E4 for a comparison of cumulative anchoring acreage estimates). Project-related construction anchorages would noticeably add to disturbances of marine species and their habitats important to recreational fishing and could require recreational and tourism vessels to navigate around moving and anchored construction-related vessels while in transit. The buried cabling would also present short-term navigational hazards. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** adverse cumulative impacts on recreation and tourism. | | | | **Offshore**: Alternative G would reduce the number of WTG foundations and scour protection associated with the IAC. This could reduce risks associated with gear entanglement or loss if recreational activity occurs in scour protection areas. Reduced IAC installation could also negligibly decrease turbidity that could alter the behavior of species important to recreational fishing (see Section 3.9) and marine mammal sightseeing. Differences in estimated acres of anchoring by alternative are disclosed in Appendix E4 and would be 2,098 acres for Alternative G. A comparison of cabling-related disturbance is not available. However, best professional judgment suggests that the footprint of the IAC, OSS-link cable, and RWEC would change and be slightly reduced to match the reduced number of WTGs.<br>During O&M, no impacts are anticipated because the RWEC, IAC, and OSS transmission cable typically have no maintenance requirements unless a fault or failure occurs.<br>Approximately 5,444 acres of anchoring and 18,386 acres of cabling seafloor disturbance could occur from ongoing and planned actions, including Alternative G (see Appendix E4 for a comparison of cumulative anchoring acreage estimates). Project-related construction anchorages would noticeably add to disturbances of marine species and their habitats important to recreational fishing and could require recreational and tourism vessels to navigate around moving and anchored construction-related vessels while in transit. The buried cabling would also present short-term navigational hazards. Therefore, Alternative G when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** adverse cumulative impacts on recreation and tourism. |
| | **Onshore:** Onshore construction and installation of future wind facilities could affect recreation and tourism due to noise and activity at the landfall locations or | **Onshore:** Installation of onshore cables would be localized. No direct impacts to public parks, beaches, or other public recreational facilities would occur. Therefore, recreation and tourism | **Onshore:** Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** adverse. | | | | **Onshore:** Alternative G would not impact onshore activities; therefore, impacts would be |

| **Impact-Producing Factor** | **No Action Alternative** | **Alternative B (Proposed Action) up to 100 WTG** | **Alternative C (Habitat Alternative) 64–65 WTGs** | **Alternative D (Transit Alternative) 78–93 WTGs** | **Alternative E (Viewshed Alternative) 64–81 WTGs** | **Alternative F (Higher Capacity Turbine Alternative) 56 WTGs** | **Alternative G (Preferred Alternative)** |
|---|---|---|---|---|---|---|---|
| | along the onshore cable route if these locations intersect recreational or commercial uses. These **minor** adverse impacts would be unavoidable during construction but would be temporary and localized. | impacts during construction would be temporary and **minor** adverse.<br>No onshore cable maintenance would be required unless a fault or failure occurs. Therefore, cumulative, O&M, and decommissioning impacts would represent a **negligible** adverse impact on recreational users. | | | | | the same as the Proposed Action: **negligible** adverse. |
| Light | **Offshore:** Visual impacts on recreation and tourism would be short term during construction and long term during O&M, with **negligible to moderate** adverse impacts, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed. | **Offshore:** Visual impact assessment prepared for Revolution Wind (see COP Appendix U3 [EDR 2023]) determined that the Project would not likely be easily detectable when viewed from a distance of 20 miles or more and that only 3% of the land area within the visual study area would contain views of the Project. Therefore, visual impacts on recreation and tourism would be temporary during construction, with **negligible** to **moderate** adverse impacts, based on the observed distance.<br>The Proposed Action's aviation warning lighting, when visible, would add a developed/industrial visual element to views that were previously characterized by dark, open ocean during O&M. Due to the limited duration and frequency of such events and the distance of WTGs from shore, however, visible aviation hazard lighting for the Proposed Action would result in a long-term intermittent **negligible** adverse impact on recreation and tourism.<br>Given the distance from recreational viewers and atmospheric interference, lighting from the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in long-term intermittent **minor** adverse cumulative impacts on recreation and tourism. | **Offshore:** Construction of offshore components would likely require less time under Alternatives C through F than under the Proposed Action, and could lead to reduced potential lighting impacts due to a smaller number of installed WTGs, ranging from 56 WTGs (Alternative F) to 93 WTGs (Alternative D). Therefore, Alternatives C through F would have **negligible** to **moderate** adverse impacts.<br>Alternatives C through F would also reduce nighttime O&M lighting as compared to the Proposed Action due to the required aviation hazard lighting of fewer WTGs and the addition of two OSSs. Because of the limited duration and frequency of such events and the distance of WTGs from shore, however, visible aviation hazard lighting would still only result in a long-term negligible adverse impact on recreation and tourism.<br>Offshore construction activities would add new WTGs and two OSSs to the No Action Alternative. Construction vessels would employ navigational safety lighting, and offshore structures would employ aviation and navigation hazard lighting. New lighting from Alternatives C through F would contribute a 6% to 10% increase to in-water lighting sources from past, present, and reasonably foreseeable future projects within the GAA by introducing built visual elements to views previously characterized by dark, open ocean. Given that impacts would depend on observed viewer distance and atmospheric interference, lighting from Alternatives C through F when combined with past, present, and reasonably foreseeable projects would result in long-term intermittent **minor** adverse cumulative impacts on recreation and tourism. | | | | **Offshore:** Construction of offshore components would likely require less time under Alternative G than under Proposed Action, and could lead to reduced potential lighting impacts due to a smaller number of installed WTGs as compared to the maximum-case scenario for the Proposed Action. Therefore, Alternative G would have **negligible** to **moderate** adverse impacts.<br>Alternative G would also reduce nighttime O&M lighting as compared to the Proposed Action due to the required aviation hazard lighting of fewer WTGs and the addition of two OSSs. Because of the limited duration and frequency of such events and the distance of WTGs from shore, however, visible aviation hazard lighting would still only result in a long-term negligible adverse impact on recreation and tourism.<br>Offshore construction activities would add new WTGs and two OSSs to the No Action Alternative. Construction vessels would employ navigational safety lighting, and offshore structures would employ aviation and navigation hazard lighting. New lighting from Alternative G would contribute a 7% increase to in-water lighting sources from past, present, and reasonably foreseeable future projects within the GAA by introducing built visual elements to views previously characterized by dark, open ocean. Given the distance from recreational viewers and atmospheric interference, lighting from Alternative G when combined with past, present, and reasonably foreseeable projects would result in long-term intermittent **minor** adverse cumulative impacts on recreation and tourism. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| | **Onshore:** Construction of some planned future onshore projects would require new visible structures or nighttime lighting on structures that could be visible by onshore recreational users and tourists. Onshore O&M impacts from future projects would be variable based on project type) but are anticipated to be long term with variable **minor** to **moderate** adverse impacts experienced based on the observed distance. | **Onshore**: Light from onshore construction activities could temporarily adversely impact the recreation experience of users if present or traveling on roads near the landing site, onshore cable route, and proposed onshore facilities. However, as previously noted, no public parks, beaches, or other public recreational facilities are within or immediately adjacent to this onshore route, OnSS, or ICF. For nighttime construction work, downward-facing portable floodlights would be used in compliance with all safety and security and local government requirements. Therefore, for most locals and tourists, any adverse impacts would be temporary, **minor**, and inconvenient but would not cause a loss to their overall experience.<br>Operational lighting for the OnSS and ICF would comply with Quonset Development Corporation lighting regulations and be mounted with the lamp horizontal to the ground (light facing straight down) or with a lamp tilt no more than 25 degrees from the horizon. As such, it is anticipated that the OnSS and ICF would result in long-term **negligible** adverse lighting impacts to the recreation and tourism activities in the GAA.<br>Construction associated with the Proposed Action could add temporary **minor** adverse light impacts experienced by onshore recreational users near the landfall work area, onshore transmission cable route, or onshore facilities or from the aviation hazard lighting on the new WTGs. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in temporary **minor** adverse cumulative impacts to onshore recreation and tourism. | **Onshore:** Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** to **minor** and temporary to long term. | | | | **Onshore:** Alternative G would not impact onshore activities; therefore, impacts would be the same as the Proposed Action: **negligible** to **minor** and temporary to long term. |
| Noise | **Offshore**: Pile driving is the loudest aspect of most planned future projects. Most pile driving would occur far enough offshore that that work would be inaudible from onshore locations or from typical recreational fishing locations (within 1 mile of the coast). However, pile driving and other construction noise could cause some offshore boaters and recreational fishers to avoid areas of noise-generating activity, although the loudest noise would | **Offshore**: Construction noise could result in impacts on recreation and tourism through displacement of species important to recreational fishing and sightseeing in and around construction areas, resulting in a short-term **moderate** adverse impact to fishing, shellfishing, or whale-watching activities.<br>Offshore construction and onshore cable installation near the landfall area at Quonset Point in North Kingstown, Rhode Island, could have short-term **negligible** to **minor** adverse | **Offshore**: Alternatives C through F would negligibly decrease noise associated with pile driving for WTGs as compared to the Proposed Action, resulting in short-term **moderate** adverse impacts. Operational noise sources and levels would also be similar to, but slightly lower than, the Proposed Action, resulting in long-term **minor** adverse impacts.<br>Construction activities would add noise from pile driving for foundations proposed under Alternatives C through F and from offshore dredging for the export and inter-array cabling to the ambient noise levels of the No Action Alternative. Noise from construction could lead to the displacement of fish in and around construction sites, leading to spatial competition, depending on migrating patterns. Recreational boaters and tourists would not be permitted to approach active construction zones and would therefore not be expected to experience noise impacts from offshore construction. Because of the distance from receptors, | | | | **Offshore**: Alternative G would negligibly decrease noise associated with pile driving for WTGs as compared to the Proposed Action, resulting in short-term **moderate** adverse impacts. Operational noise sources and levels would also be similar to, but slightly lower than, the Proposed Action, resulting in long-term **minor** adverse impacts.<br>Construction activities would add noise from pile driving for foundations and from offshore dredging for the export and inter-array cabling |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| | be within the temporary safety zones (with restricted recreational and tourism vessel access) anticipated to be established for each project by offshore wind developers. Most of the anticipated offshore O&M noise from future projects would be from continuous WTG operations farther offshore. Field observations also concluded that WTG operational noise from the Block Island Wind Farm was not detectable from shore and further suggested that as wind speeds increase (causing increased ambient noise), the associated increase in operational noise of the WTG becomes less detectable (HDR 2019). Therefore, noise from offshore activities would result in temporary to long-term **minor** adverse impacts. | impacts on the recreational enjoyment of the marine and coastal environments.<br>Offshore operational noise from the WTGs would be similar to the noise described for other projects under the No Action Alternative and would thus have long-term **minor** adverse impacts.<br>Because of the distance from receptors, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in localized short-term **minor** to **moderate** adverse cumulative impacts on recreation and tourism due to construction activities, whereas noise from O&M activities would result in long-term **negligible** adverse cumulative impacts. | Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in localized, short-term **minor** to **moderate** adverse cumulative impacts on recreation and tourism due to construction activities, whereas noise from O&M activities would result in long-term **negligible** cumulative impacts. | | | | to the ambient noise levels of the No Action Alternative. Noise from construction could lead to the displacement of fish in and around construction sites, leading to spatial competition, depending on migrating patterns. Recreational boaters and tourists would not be permitted to approach active construction zones and would therefore not be expected to experience noise impacts from offshore construction. Because of the distance from receptors, Alternative G when combined with past, present, and reasonably foreseeable activities would result in localized, short-term **minor** to **moderate** adverse cumulative impacts on recreation and tourism due to construction activities, whereas noise from O&M activities would result in long-term **negligible** cumulative impacts. |
| | **Onshore**: Construction noise from planned future projects onshore would be variable based on project type, but many projects would include one or more noise-generating activities such as earth moving, pile driving, trenching, jackhammering, and other similar large equipment operations. Onshore O&M impacts from future projects would be variable based on project type but are anticipated to be adverse and long term with variable **minor** to **moderate** adverse impacts experienced based on the distance to the noise source. | **Onshore**: Noise from onshore construction activities could temporarily adversely impact the recreation experience of users if present or traveling on roads near the landing site, onshore cable route, and proposed onshore facilities. However, as previously noted, no public parks, beaches, or other public recreational facilities are within or immediately adjacent to this onshore route, OnSS, or ICF. Therefore, for most locals and tourists, any adverse impacts would be temporary**,** **minor**, and inconvenient but would not cause a loss to their overall experience.<br>Operations of onshore Project components (i.e., offshore to onshore transition joint bays, onshore transmission cable route, OnSS, and ICF) would have **negligible** adverse noise impacts intermittently over the life of the Project to onshore recreation and tourism because these components would only require periodic routine maintenance.<br>As with lighting, construction activities would add noise from the construction of onshore facilities to the ambient noise levels of the No Action Alternative. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in temporary | **Onshore**: Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** to **minor** and temporary to long term. | | | | **Onshore**: Alternative G would not impact onshore activities; therefore, impacts would be the same as the Proposed Action: **negligible** to **minor** and temporary to long term. |

| **Impact-Producing Factor** | **No Action Alternative** | **Alternative B (Proposed Action) up to 100 WTG** | **Alternative C (Habitat Alternative) 64–65 WTGs** | **Alternative D (Transit Alternative) 78–93 WTGs** | **Alternative E (Viewshed Alternative) 64–81 WTGs** | **Alternative F (Higher Capacity Turbine Alternative) 56 WTGs** | **Alternative G (Preferred Alternative)** |
|---|---|---|---|---|---|---|---|
| | | **minor** adverse cumulative impacts to onshore recreation and tourism. | | | | | |
| Presence of structures | **Offshore**: Recreational impacts associated with in-water structures would include the risk of recreational vessel allision and collision, fishing gear entanglement, vessel damage or loss, increased navigation hazards, and visual impacts: The impact of visible structures on recreation would be long term and **moderate** adverse but unlikely to impact shore-based or marine recreation and tourism in the GAA as a whole. | **Offshore**: Offshore structures would impact recreation and tourism through increased navigational complexity, risk of allision or collision, attraction of recreational vessels to offshore wind structures for fishing and sightseeing, increased risk of fishing gear loss or damage by entanglement due to scour or cable protection, and potential difficulties in anchoring over scour or cable protection. Revolution Wind would minimize these **minor** to **moderate** adverse impacts through the navigation- and fishing-related EPMs listed in Appendix F.<br>Based on the duration of Project activity and observed distance, visual contrast associated with the Proposed Action could have a beneficial, adverse, or neutral impact on the quality of the recreation and tourism experience depending on the viewer's orientation, activity, and purpose for visiting the area. Additionally, construction of offshore Project components could elicit a long-term **minor** beneficial impact through an increase in curiosity, recreational fishing and diving activity.<br>New structures related to the Proposed Action would noticeably increase navigational complexity; risks of structure allision; route adjustments for races, sightseeing, and fishing; loss and damage of fishing gear to scour and cable protection; viewshed changes; and difficulty anchoring over scour and cable protection. However, new in-water structures from the Proposed Action could benefit recreation and tourism by attracting recreational vessels to WTGs for fishing and sightseeing activities. Therefore, new in-water structures from the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** to **moderate** adverse and long-term **minor** beneficial cumulative impacts on recreation and tourism. | **Offshore**: Alternatives C through F would reduce the number of WTGs, ranging from 56 WTGs (Alternative F) to 93 WTGs (Alternative D), potentially allowing for improved maneuverability for recreational vessels through the Lease Area. These alternatives could also negligibly reduce visual impacts as compared to the Proposed Action, depending on the observable distance and individual responses to a view of offshore wind farms (see Section 3.20 for details).<br>Alternatives C through F would add foundations to the 893 foundations estimated for the No Action Alternative within the GAA. New structures would add to the long-term impacts on recreation and tourism throughout the life of the Project (up to 35 years, plus up to an additional 2 years for decommissioning) by increasing navigational complexity; risks of structure allision; route adjustments for races, sightseeing, and fishing; loss and damage of fishing gear to scour and cable protection; and difficulty anchoring over scour and cable protection. Based on visual simulations from onshore locations, some seaside locations could experience reduced recreational and tourism activity as a result of visible in-water structures, but the visibility of large offshore structures is not expected to impact shore-based recreation and tourism as a whole.<br>New in-water structures could also benefit recreation and tourism by attracting recreational vessels to WTGs for fishing and sightseeing activities. Therefore, new in-water structures from Alternatives C to F when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** to **moderate** adverse and long-term **minor** beneficial cumulative impacts on recreation and tourism. | | | | **Offshore**: Alternative G would reduce the number of WTGs as compared to the maximum-case scenario for the Proposed Action, potentially allowing for improved maneuverability for recreational vessels through the Lease Area. This alternative could also negligibly reduce visual impacts as compared to the Proposed Action, depending on the observable distance and individual responses to a view of offshore wind farms (see Section 3.20 for details).<br>Alternative G would add foundations to the 893 foundations estimated for the No Action Alternative within the GAA. New structures would add to the long-term impacts on recreation and tourism throughout the life of the Project (up to 35 years, plus up to an additional 2 years for decommissioning) by increasing navigational complexity; risks of structure allision; route adjustments for races, sightseeing, and fishing; loss and damage of fishing gear to scour and cable protection; and difficulty anchoring over scour and cable protection. Based on visual simulations from onshore locations, some seaside locations could experience reduced recreational and tourism activity as a result of visible in-water structures, but the visibility of large offshore structures is not expected to impact shore-based recreation and tourism as a whole.<br>New in-water structures could also benefit recreation and tourism by attracting recreational vessels to WTGs for fishing and sightseeing activities. Therefore, new in-water structures from Alternative G when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** to **moderate** adverse and long-term **minor** beneficial cumulative impacts on recreation and tourism. |
| | **Onshore**: Not applicable | **Onshore**: Inland residential/commercial areas and recreational sites would generally be screened from construction views due to the presence of existing development combined with forested | **Onshore:** Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** to **minor** adverse and temporary to long term. | | | | **Onshore:** Alternative G would not impact onshore activities; therefore, impacts would be the same as the Proposed Action: **negligible** to **minor** adverse and temporary to long term. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
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| | | areas (see COP Appendix U1 [EDR 2023]). Therefore, any adverse impacts to overall recreator experience would be temporary and **minor** adverse impacts, but would not cause a loss to the overall recreator experience.<br>The proposed OnSS and ICF would not be out of scale or character with the existing types of development currently present in the vicinity, such as the existing Davisville Substation or the structures at nearby Quonset Business Park. As such, it is anticipated that O&M of the OnSS and ICF would result in **negligible** adverse visual impacts to recreation and tourism activities in the GAA.<br>New onshore structures would only result in **minor** adverse visual impacts experienced by recreational users due to the existing settings at these locations. When considered cumulatively with past, present, and reasonably foreseeable activities, the Proposed Action would result in temporary **negligible** to **minor** adverse cumulative visual impacts on recreation and tourism. | | | | | |
| Vessel traffic | **Offshore**: Future projects would generate increased nearshore and offshore vessel traffic, primarily during construction, along routes between ports and the offshore wind construction areas. Although long-term increased traffic volumes from O&M of future projects would be low, they would add to existing in-water vessel traffic and therefore present **minor** long-term adverse impacts on recreational users. | **Offshore**: Construction would result in as many as 59 construction vessels per construction day in 2023 and 2024 present at offshore work areas on a daily basis. However, the majority of recreational boating occurs within 1 nm of shore. Therefore, most recreational boaters in the GAA would experience a temporary **minor** adverse inconvenience from construction-related vessel traffic.<br>The estimated low volume of O&M vessel traffic would not be anticipated to affect ongoing recreational use. O&M of the Proposed Action would therefore have **negligible** adverse impacts on onshore or offshore recreation and tourism.<br>Project vessels would add to disturbances of marine species and their habitats important to recreational fishing and could require recreational and tourism vessels to navigate around moving construction-related vessels while in transit. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** adverse cumulative impacts on recreation and tourism. | **Offshore**: Construction of offshore components would likely require less time for Alternatives C through F than anticipated for the Proposed Action, and could lead to reduced potential navigational impacts for recreational users due to a smaller number of WTGs. Therefore, Alternatives C through F would have **negligible** to **minor** adverse impacts. | | | | **Offshore**: Construction of offshore components would likely require less time for Alternative G than anticipated for the Proposed Action, and could lead to reduced potential navigational impacts for recreational users due to a smaller number of WTGs. Therefore, Alternative G would have **negligible** to **minor** adverse impacts. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative D (Transit Alternative) 78–93 WTGs | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| | **Onshore**: Future projects could increase onshore vehicle traffic or alter traffic patterns in a manner that inconveniences recreational users, primarily during construction near port facilities and on adjacent, existing roadways. Although long-term increased traffic volumes from O&M activities of future projects would be relatively low, they would add to the existing onshore traffic and therefore present **minor**, localized long-term adverse impacts on recreational users. | **Onshore**: No public parks, beaches, or other public recreational facilities are immediately adjacent to the onshore route, OnSS, or ICF. Additionally, Revolution Wind would coordinate with local authorities during onshore construction to minimize local traffic impacts. Therefore, any adverse impacts to tourism or overall recreator experience would be temporary to long term and **minor** adverse. | **Onshore**: Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **minor** and temporary to long term. | | | | **Onshore**: Alternative G would not impact onshore activities; therefore, impacts would be the same as the Proposed Action: **minor** and temporary to long term. |

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### 3.18.2.2 Alternative A: Impacts of the No Action Alternative on Recreation and Tourism

#### 3.18.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for recreation and tourism (see Section 3.18.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.18.2.2.2 Cumulative Impacts

This section discloses potential recreation and tourism impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

#### Offshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> Construction of future projects would increase the number of anchored vessels and work platforms used for survey and construction purposes. Applying estimates developed by BOEM based on their 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), up to 3,346 acres of anchoring could occur under the No Action Alternative in the recreation and tourism GAA. The presence of anchored vessels could increase navigation complexity for recreational vessels. Increased turbidity from anchoring could also briefly alter the behavior of species important to recreational fishing (see Section 3.9) and sightseeing (primarily whales, but also dolphins and seals). However, most anchored construction-related vessels would be located within temporary safety zones (anticipated to be established and monitored by offshore wind developers). Likewise, most anchoring would occur outside the area most commonly used for recreational boating, which would prevent most conflicts for recreational uses. Anchoring activities would also be temporary and localized; therefore, construction-related anchoring impacts from future projects would be **minor** adverse. Anchoring impacts to fish species used for recreational fishing are addressed in Section 3.9.

Up to 14,986 acres of seafloor disturbance could occur from IAC and export cable installation within the recreation and tourism GAA (see Appendix E4, Table E4-1). As with anchoring, installation of offshore cables would temporarily increase navigation complexity for recreational vessels present around work areas and reduce recreational opportunities if individuals prefer to avoid the noise and disruption caused by installation. Cable installation could also have temporary impacts on individual fish and invertebrates of interest for recreational fishing due to dredging, turbulence, and disturbance; however, no population-level species impacts would occur. Once installed, buried cables typically have no maintenance unless a fault or failure occurs. Smaller vessel anchors would not penetrate to the typical target cable burial depth (4 to 6 feet), and recreational vessel anchoring is uncommon in water depths where offshore structures would be installed. However, scour protection for cables and foundations could hinder boat anchoring and result in gear entanglement or loss if recreational activity coincides with scour protection areas. If project-related seafloor hazards are not noted on charts, operators could lose anchors, leading to increased risks associated with drifting vessels that are not securely anchored. Therefore, new cable emplacement and maintenance would result in temporary to long-term **minor** adverse impacts.

Light: Construction of future planned offshore projects would require nighttime lighting on WTGs, vessels, and platforms that could be visible by onshore recreational users and tourists, as well as offshore boaters recreating at night or in low-light conditions. O&M of the estimated 876 WTGs in the GAA would require permanent aviation warning lights that could be visible from some beaches and coastlines and could impact recreation and tourism if recreation decisions are influenced by lighting. Field observations made from the mainland shoreline during WTG operations at the Block Island Wind Farm indicated that at nighttime and under clear skies, the turbine lights were visible with the naked eye up to 26.75 miles (23.2 nm) (HDR 2019). A University of Delaware study evaluating the impacts of visible offshore WTGs on beach use found that WTGs visible more than 15 miles from the viewer would have negligible adverse impacts on businesses dependent on recreation and tourism (Parsons and Firestone 2018). Likewise, a 2017 study on the impact of offshore wind facilities on vacation rental prices found that nighttime views of aviation hazard lighting (without ADLS) for WTGs close to shore (5 to 8 miles) would adversely impact the rental price of properties with ocean views (Lutzeyer et al. 2017). However, the study did not specifically address the relationship between lighting, nighttime views, and tourism for WTGs located farther from shore.

A 2013 BOEM study evaluated the impacts of WTG lighting on birds, bats, marine mammals, sea turtles, and fish. The study found that existing guidelines "appear to provide for the marking and lighting of [WTGs] that would pose minimal if any impacts on birds, bats, marine mammals, sea turtles or fish" (Orr et al. 2013). By extension, existing lighting guidelines or ADLS (if implemented) would not impact recreational fishing or wildlife viewing opportunities.

Lighting impacts would be most pronounced for views that can be currently characterized as undeveloped, where lighting from human infrastructure and activities is not dominant or even exists. However, less than 5% of the lighted WTG positions envisioned in the GAA would be within 15 miles from coastal locations. Therefore, visual impacts on recreation and tourism would be short term during construction and long term during O&M, with **negligible** to **moderate** adverse impacts, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed.

Noise: Construction noise from offshore activities from planned future projects such as pile driving, trenching, and construction-related vessels would intrude upon the natural sounds of the marine environment. Pile driving is the loudest aspect of most planned future projects. Most pile driving would occur far enough offshore that that work would be inaudible from onshore locations or from typical recreational fishing locations (within 1 mile of the coast). However, pile driving and other construction noise could cause some offshore boaters and recreational fishers to avoid areas of noise-generating activity, although the loudest noise would be within the temporary safety zones (with restricted recreational and tourism vessel access) anticipated to be established for each project by offshore wind developers. Additionally, because some fish species are sensitive to underwater sound, construction noise could cause fish to move away from the noise source, which could adversely affect recreational fishing opportunities near work areas. Construction noise could also contribute to impacts on marine mammals, with resulting impacts on marine sightseeing that relies on the presence of mammals, primarily whales. However, as noted in Section 3.15, no population-level marine mammal effects are anticipated.

Most of the anticipated offshore O&M noise from future projects would be from continuous WTG operations farther offshore. Sound pressure levels would be at or below ambient levels at relatively short distances from WTG foundations (Kraus et al. 2016). Field observations made during normal operations at the Block Island Wind Farm minimally exceeded ambient levels at 164 feet from the WTG base. These field observations also concluded that WTG operational noise from the Block Island Wind Farm was not detectable from shore and further suggested that as wind speeds increase (causing increased ambient noise), the associated increase in operational noise of the WTG becomes less detectable (HDR 2019). Therefore, noise from offshore activities would result in temporary to long-term **minor** adverse impacts.

Presence of structures: The placement and operation of up to 893 foundations (see Table E4-1 in Appendix E4) are proposed within the recreation and tourism GAA. Recreational impacts associated with in-water structures would include the risk of recreational vessel allision and collision, fishing gear entanglement, vessel damage or loss, increased navigation hazards, and visual impacts.

Offshore routes for recreational boaters, anglers, sailboat races, and sightseeing boats could require adjustment to avoid allision risks with in-water structures. Generally, the vessels more likely to allide with WTGs or OSSs would be smaller vessels capable of moving within and near wind installations. Examples include recreational fishing (especially HMS fishing), long-distance sailboat races, sightseeing boats, and large sailing vessels. Sailing vessels with tall masts that could be affected by in-water structures, like WTGs and associated platforms, could choose to avoid offshore in-water structures. However, the adverse impact of the future offshore wind structures on recreational boating would be limited by the distance offshore. As previously noted, a 2012 survey of recreational boaters along the northeastern United States coast found that the highest density of recreational vessels occurs within 1 nm of the coastline (Starbuck and Lipsky 2013). Likewise, a 2020 study of recreational boaters in the RI/MA WEA found that wind facilities are unlikely to have significant impacts on recreational boaters because those boaters prefer to use waters closer to the coast. Most recreational boaters from Rhode Island ports who choose to visit the RI/MA WEAs would likely keep their distance from new structures, and increased abundance of targeted fish species near offshore wind facilities would have beneficial impacts on recreational fishing (Dalton et al. 2020). Based on these findings, under the No Action Alternative, most recreational vessels would not interact with proposed WTGs and OSS(s). However, WTGs could also attract recreational boaters and sightseeing vessels. These conditions could increase the number of congregating vessels and increase collision or allision risks (see Section 3.16 for additional discussion of navigation impacts). The USCG would need to adjust their search and rescue planning and search patterns to allow aircraft to fly within the GAA, as described in greater detail in Section 3.17.

HMS fisheries are further offshore than most fisheries and therefore more likely to overlap with future offshore wind development. The greatest amount of recreational HMS fishing effort in southern New England from 2002 through 2018 occurred west of the RI/MA WEA (Kneebone and Capizzano 2020), although HMS fishing also occurred in specific locations within the RI/MA WEA, including The Dump, Coxes Ledge, The Fingers, and The Claw (see Section 3.9). Commonly used mobile methods for HMS angling such as trolling and drifting could be incompatible with the presence of WTGs and OSSs, depending upon weather conditions and specific techniques. For example, trolling could involve trailing many feet of lines and hooks behind the vessel and then following large pelagic fish once they are hooked, posing navigational and maneuverability challenges around WTGs. Scour protection used for in-water foundations would also increase risk of recreational fishing gear loss or damage by entanglement and present a hazard for anchoring (see new cable placement above). These concerns notwithstanding, new in-water structures could result in several long-term beneficial impacts including increased recreational fishing by introducing new aquatic habitats (see Section 3.9) and increased tourism by people interested in viewing the structures (see Section 3.18.2.2.2). New in-water structures could also create foraging opportunities for seals, small odontocetes, and sea turtles (see Sections 3.15 and 3.19), which could offer recreational sightseeing opportunities.

Visual impacts from the presence of vertical structures on the offshore horizon would create a visual contrast contrary to the horizontal plane of the ocean's water surface and the line at the visual horizon that separates the ocean from sky. Studies and surveys that have evaluated the impacts of offshore wind facilities on tourism found that established offshore wind facilities in Europe did not result in decreased tourist numbers, tourist experience, or tourist revenue, and that Block Island's WTGs provide excellent sites for fishing and shellfishing (Smythe et al. 2018). The proximity of WTGs to shore may be correlated to recreational experience. As noted in Parsons and Firestone (2018), different changes to beach experience occurred based on distance to visible WTGs. Reported trip loss (respondents who stated that they would visit a different beach without offshore wind) averaged 8% when wind projects were 12.5 miles (20 km) offshore, 6% when 15 miles (24.1 km) offshore, and 5% when 20 miles (32 km) offshore. Conversely, approximately 2.6% of respondents were more likely to visit a beach with visible offshore wind facilities at any distance. A 2019 survey of coastal recreation users in New Hampshire (Ferguson et al. 2020) also found that most users (77%) supported offshore wind development along the New Hampshire coast, 74% anticipated that offshore wind development would have a neutral to beneficial impact on their recreational activities, and 26% anticipated that offshore wind development would have an adverse impact (Ferguson et al. 2021).

Based on the currently available studies, portions of nearly all 876 WTGs associated with the No Action Alternative could be visible from shorelines (depending on vegetation, topography, weather, atmospheric conditions, and the viewers' visual acuity) (see Section 3.20 for details). WTGs visible from some shoreline locations in the GAA would have adverse impacts on visual resources when discernable because of the introduction of industrial elements in previously undeveloped views. Visual impacts would be more pronounced in views lacking development and outside of heavy recreation use times (i.e., when crowds of beachgoers do not impact the visitor's experience of the natural elements of the landscape). Based on the research cited above, the impact of visible structures on recreation would be long term and **moderate** adverse but unlikely to impact shore-based or marine recreation and tourism in the GAA as a whole. Visual impacts to tribes that may be present or travel to the GAA for recreation or tourism purposes are disclosed in Section 3.10.

Vessel traffic: Future projects would generate increased nearshore and offshore vessel traffic, primarily during construction, along routes between ports and the offshore wind construction areas. Applying vessel activity estimates developed by BOEM based on their 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), vessel activity could peak in 2025 with as many as 210 vessels involved in the construction of reasonably foreseeable projects (see Section 3.16.1.1). Increased vessel traffic would require increased alertness on the part of recreational or tourist-related vessels and could result in minor delays or route adjustments, particularly if more than one future offshore wind facility is under construction at the same time. The likelihood of vessel collisions would increase as a result of the higher volumes of vessel traffic during construction. However, most of the moving construction-related vessels would be located within temporary safety zones (anticipated to be established and monitored by offshore wind developers), which would prevent most conflicts for recreational uses. These activities would also be temporary and localized. Although long-term increased traffic volumes from O&M of future projects would be low, they would add to existing in-water vessel traffic and therefore present **minor** long-term adverse impacts on recreational users.

### Onshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: No anchoring impacts would occur as a result of future onshore activities. However, onshore construction and installation of future wind facilities could affect recreation and tourism due to noise and activity at the landfall locations or along the onshore cable route if these locations intersect recreational or commercial uses. These **minor** adverse impacts would be unavoidable during construction but would be temporary and localized. No long-term cable impacts are anticipated because cables would be buried.

Light: Construction of some planned future onshore projects would require new visible structures or nighttime lighting on structures that could be visible by onshore recreational users and tourists. However, most onshore project components are anticipated to be in previously developed and lighted areas. Therefore, adverse effects of onshore lighting from construction would be short term and localized to discrete construction sites. Onshore O&M impacts from future projects would be variable based on project type (i.e., increased rail and road infrastructure use, increased port operational noise) but are anticipated to be long term with variable **minor** to **moderate** adverse impacts experienced based on the observed distance.

Noise: Construction noise from planned future projects onshore would be variable based on project type, but many projects would include one or more noise-generating activities such as earth moving, pile driving, trenching, jackhammering, and other similar large equipment operations. Recreational users could be subject to these construction noises anywhere future projects intersect public access areas, public recreational facilities, public roadways, or private and commercial facilities where tourism occurs (e.g., restaurants, shopping, and lodging establishments). Onshore construction noise from cable installation at the landfall locations, and inland if cable routes are near parkland, recreation areas, or other areas of public interest, would temporarily disturb the quiet enjoyment of the site (in locations where such quiet is an expected or typical condition). However, most of these onshore project components are anticipated to be in previously developed areas. Therefore, adverse effects of onshore noise from construction would be short term and localized to discrete construction sites. Onshore O&M impacts from future projects would be variable based on project type (i.e., increased rail and road infrastructure use, increased port operational noise) but are anticipated to be adverse and long term with variable **minor** to **moderate** adverse impacts experienced based on the distance to the noise source.

Vessel traffic: Future projects could increase onshore vehicle traffic or alter traffic patterns in a manner that inconveniences recreational users, primarily during construction near port facilities and on adjacent, existing roadways. Construction vehicles and construction areas would follow established safety guidelines that would prevent most conflicts for recreational uses. Impacts from onshore activities would be temporary and localized; therefore, construction impacts from future projects would not add to adverse impacts on recreational users. Although long-term increased traffic volumes from O&M activities of future projects would be relatively low, they would add to the existing onshore traffic and therefore present **minor**, localized long-term adverse impacts on recreational users.

#### 3.18.2.2.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on recreation and tourism associated with the Project would not occur. However, ongoing and future activities would have continuing short-term to long-term impacts on recreation and tourism, primarily due to the interruption of access and introduction of new offshore hazards, as well as new aquatic habitat and increased tourism/recreation opportunities.

BOEM anticipates that the range of individual IPF impacts for reasonably foreseeable offshore wind activities would be **negligible** to **moderate** adverse and **minor** beneficial, primarily due to the presence of offshore structures. As described in Appendix E1, BOEM anticipates that the range of individual IPF impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be **minor** to **moderate** adverse.

Considering all the IPFs together, BOEM anticipates that the overall impact associated with all reasonably foreseeable environmental trends and activities would result in **minor** adverse impacts on recreation and tourism because most adverse impacts could be avoided, would not disrupt normal or routine recreation and tourism functions, or would return to a condition with no measurable effects after activity ends.

### 3.18.2.3 Alternative B: Impacts of the Proposed Action on Recreation and Tourism

#### 3.18.2.3.1 Construction and Installation

**Offshore Activities and Facilities**

During construction, recreational offshore uses such as boating, fishing, diving, and wildlife and whale watching could be adversely impacted by Project activities. Detailed analysis by IPF is provided below. Construction EPMs would be implemented to minimize adverse impacts to recreators as practicable (see Table F-1 in Appendix F), including communication with vessel operators and implementation of ADLS.

<u>Anchoring and new cable emplacement/maintenance:</u> Anchoring could occur anywhere within the maximum work area under the Proposed Action, although impacts would be localized to specific anchoring sites and would be temporary in duration. The presence of as many as 59 construction vessels per construction day in 2023 and 2024 would increase navigation complexity for recreational vessels, requiring individual boats to navigate around Project vessels and work areas (see COP Table 3.3.10-2). Increased turbidity from anchoring could also briefly alter the behavior of species important to recreational fishing (see Section 3.9) and marine mammal sightseeing. However, temporary safety zones around each WTG site and each cable-laying vessel (anticipated to be established and monitored by Revolution Wind) would minimize potential conflicts for recreational uses. Anchoring activities would also be localized; therefore, construction impacts would represent a temporary, **minor** adverse impact on recreational users. Proposed Action anchoring impacts to fish species used for recreational fishing are addressed in Section 3.9.

Up to 4,009 acres of seafloor disturbance could occur from Proposed Action IAC and export cable installation within the recreation and tourism GAA. Installation of offshore cables would temporarily restrict recreation access within the cable routes. Recreational vessels traveling near the cable routes would also need to navigate around construction vessels. Revolution Wind would implement a comprehensive communication plan during offshore construction to inform all mariners, including commercial and recreational fishermen and recreational boaters, of construction activities and vessel movements. Communication would be facilitated through a fisheries liaison, a Project website, and public notices to mariners and vessel float plans (in coordination with the USCG). Therefore, potential changes in navigation routes due to Proposed Action construction would constitute a temporary, **minor** adverse impact.

Cable installation could also affect fish and mammals of interest for recreational fishing and sightseeing through dredging and turbulence, although no population-level impacts are expected (see Sections 3.13 and 3.9), resulting in short-term and **minor** adverse impacts on recreation and tourism.

<u>Light:</u> The Proposed Action would require nighttime lighting for construction vessels traveling to and working at the Project's offshore construction areas that could be visible by recreational users and tourists. The visual impact assessment prepared for Revolution Wind (see COP Appendix U3 [EDR 2023]) determined that the Project would not likely be easily detectable when viewed from a distance of 20 miles or more and that only 3% of the land area within the visual study area would contain views of the Project. Therefore, visual Impacts on recreation and tourism would be temporary during construction, with **negligible** to **moderate** adverse impacts, based on individual responses by recreationists and visitors to changes in the viewshed. Popular tourism locations near the Lease Area, such as Aquinnah Overlook, would have the potential for greater adverse impacts than more distant locations (see Section 3.20).

<u>Noise:</u> Construction noise could result in impacts on recreation and tourism through displacement of species important to recreational fishing and sightseeing in and around construction areas, resulting in a short-term **moderate** adverse impact to fishing, shellfishing, or whale-watching activities. Pile driving represents the loudest likely noise source during construction activities. Installation of a single monopile foundation is estimated to normally require 1 to 4 hours (6 to 12 hours maximum) of pile driving; up to three WTG monopile foundations would be installed in a 24-hour period. Therefore, recreational boaters near the RWEC and WTGs could also be temporarily inconvenienced by pile-driving noise.

Offshore construction and onshore cable installation near the landfall area at Quonset Point in North Kingstown, Rhode Island, could have short-term **negligible** to **minor** adverse impacts on the recreational enjoyment of the marine and coastal environments. This landing site is developed for military and industrial use; however, the closest public recreation area, Blue Beach, is located approximately 500 feet to the southwest of the Project's landfall envelope. Compass Rose Beach, another public beach, and Martha's Vineyard Fast Ferry are also located approximately 2,600 feet east of the southeast corner of the landfall envelope. Recreational users at these locations could experience temporary adverse impacts due to construction noise, if these noise levels exceed ambient noise conditions generated by ongoing industrial and port activities.

<u>Presence of structures:</u> The installation of up to 102 Project foundations are proposed within the recreation and tourism GAA. As also noted under the No Action Alternative, these offshore structures would impact recreation and tourism through increased navigational complexity, risk of allision or collision, attraction of recreational vessels to offshore wind structures for fishing and sightseeing, increased risk of fishing gear loss or damage by entanglement due to scour or cable protection, and potential difficulties in anchoring over scour or cable protection. Revolution Wind would minimize these **minor** to **moderate** adverse impacts through the navigation- and fishing-related EPMs listed in Appendix

F. As part of these EPMs, Revolution Wind would establish temporary safety zones around construction areas and work with the USCG to communicate these zones and other work areas to the boating public via local Notices to Mariners. Additionally, the majority of recreational boating would occur more than 10 miles from Proposed Action WTGs and OSSs.

WTG and OSS construction could also affect recreation and tourism through visual impacts. During construction, offshore boaters and visitors on the coastline would see the upper portions of tall equipment such as mobile cranes. This equipment would move from turbine to turbine as construction progresses and thus would not be long-term fixtures.

Further, a survey-based study of 1,725 participants who typically visit the coast suggested that (based on visual simulations for prospective offshore wind facilities) only 10% of respondents would experience adverse visual impacts at a distance of 10 miles from shore (Parsons and Firestone 2018). The study suggests that coastal visitors could experience adverse reactions approaching 0% from Project WTGs at approximately 25 to 30 miles offshore. Based on the duration of construction activity and observed distance, visual contrast associated with the Proposed Action would have a temporary **negligible** adverse impact on recreation and tourism, subject to individual responses by recreationists and visitors to changes in the viewshed. Popular tourism locations near the Lease Area, such as Aquinnah Overlook, would have the potential for greater adverse impacts than more distant locations (see Section 3.20).

Additionally, construction of offshore Project components could elicit a temporary beneficial impact through an increase in curiosity visits by individuals interested in WTG construction (Parsons and Firestone 2018). The PDE analyzed for the Project allows for installing wind turbines that may reach 873 feet to the tip of blade (52% taller than those studied by Parsons and Firestone) with a rotor diameter of 538 feet (9% larger rotor diameter than those studied by Parsons and Firestone). Although it is predictable that the percentage of social acceptance or change in choice may shift, the shift would not be proportional to the difference in the size and scale of the wind turbines in Parsons and Firestone's 2018 study and those analyzed in this EIS.

<u>Vessel traffic:</u> Construction would result in as many as 59 construction vessels per construction day in 2023 and 2024 present at offshore work areas (see COP Table 3.3.10-2) on a daily basis. This increase in vessel volume for the Proposed Action would contribute to increased vessel traffic and associated vessel collision risk along routes between ports and the offshore construction areas if recreational boaters cross or approach cable and WTG locations. However, the majority of recreational boating occurs within 1 nm of shore (Starbuck and Lipsky 2013). Therefore, most recreational boaters in the GAA would experience a temporary, **minor** adverse impact from construction-related vessel traffic.

### Onshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> No anchoring impacts would occur as a result of onshore activities. Although onshore construction and installation would occur at the landing site during installation of the cable onshore/offshore transition vaults and during HDD or trenching in preparation for joining the onshore and offshore cables, the landfall work area is developed for non-recreational purposes. The Quonset Point Naval Air Station property is currently the home of the 14$^{3r}$d Airlift Wing of the Rhode Island Air National Guard and is in use as both a military base and a public airport with two active runways. A portion of the base has been converted into a business park. The onshore cable route would follow Circuit Drive to the OnSS. No public parks, beaches, or other public recreational facilities are

within or immediately adjacent to this onshore route. However, the route travels through the Wickford Historic District, which is primarily a residential community with some commercial buildings that support a seasonal recreation economy. Three potential recreation opportunities—the Wickford Village/Harbor State Scenic Area, the Quonset-Martha's Vineyard Ferries, and Narraganset Bay—are also located in the vicinity. Additionally, as noted above, two public beaches—Blue Beach and Compass Rose Beach—are within 500 to 2,600 feet of the landfall envelope. However, installation of onshore cables would be localized. No direct impacts to public parks, beaches, or other public recreational facilities would occur. Therefore, recreation and tourism impacts during construction would be temporary and **minor** adverse.

Light and Noise: Light and noise from onshore construction activities could temporarily adversely impact the recreation experience of users if present or traveling on roads near the landing site, onshore cable route, and proposed onshore facilities. However, as previously noted, no public parks, beaches, or other public recreational facilities are within or immediately adjacent to this onshore route, OnSS, or ICF. Additionally, the onshore construction schedule would be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day. The majority of onshore construction would be completed during daytime hours. Revolution Wind would generally comply with North Kingstown's noise ordinance; however, certain construction tasks such as concrete pours, HDD and landfall installation, and cable pulling or splicing, once started, would be continued through to completion. For nighttime construction work, downward-facing portable floodlights with a maximum height of approximately 18 feet would be used in compliance with all safety and security and local government requirements. Therefore, for most locals and tourists, any adverse impacts would be temporary **minor** impacts, but would not cause a loss to their overall experience.

Presence of structures: A new OnSS and ICF adjacent to the existing Davisville Substation would be constructed to support interconnection of the Project to the existing electrical grid. Vegetation clearing and taller equipment (e.g., cranes) would be visible from certain vantage points during construction of these onshore structures. However, inland residential/commercial areas and recreational sites would generally be screened from construction views due to the presence of existing development combined with forested areas (see COP Appendix U1 [EDR 2023]). Therefore, any adverse impacts to overall recreator experience would be temporary and **minor** adverse impacts, but would not cause a loss to the overall recreator experience.

Vessel traffic: Vehicle and equipment traffic from onshore cable construction activities could temporarily adversely impact the recreation experience of users if present or travelling on roads near the landing site and onshore cable route and facilities. However, as previously noted, no public parks, beaches, or other public recreational facilities are immediately adjacent to the onshore route, OnSS, or ICF. Additionally, Revolution Wind would coordinate with local authorities during onshore construction to minimize local traffic impacts. Therefore, any adverse impacts to tourism or overall recreator experience would be temporary and **minor** adverse.

#### 3.18.2.3.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: During the O&M, a limited number of vessels would be present in the Lease Area or RWEC at any one time. Potential anchoring impacts would be similar to the construction phase, but reduced due to fewer anchored vessels. No cable impacts are anticipated as the RWEC, IAC, and OSS transmission cable typically have no maintenance requirements unless a fault or failure occurs. If cable repair or replacement or remedial cable protection is required, maintenance activities would be limited to the disturbance corridors previously defined for construction. Therefore, O&M and decommissioning impacts would represent a temporary **minor** adverse impact on recreational users. Proposed Action anchoring and cable impacts to fish species used for recreational fishing are addressed in Section 3.9.

Impacts during decommissioning would be similar to the impacts during construction and installation.

Light: During operations, the Proposed Action would contribution to nighttime lighting due to required aviation hazard lighting of up to 102 WTGs and OSSs. The visual impact assessment prepared for Revolution Wind (see COP Appendix U3 [EDR 2023]) determined that the Project would not likely be easily detectable when viewed from a distance of 20 miles or more, and that only 3% of the land area within the visual study area would contain views of the Project. Revolution Wind has also committed to implement ADLS (as described in Appendix F) as a measure to reduce the duration of lighting impacts. As noted in Section 3.20, the Proposed Action's aviation warning lighting, when visible, would add a developed/industrial visual element to views that were previously characterized by dark, open ocean. Due to the limited duration and frequency of such events and the distance of WTGs from shore, however, visible aviation hazard lighting for the Proposed Action would result in a long-term intermittent **negligible** adverse impact on recreation and tourism, subject to individual responses by recreationists and visitors to changes in the viewshed. Popular tourism locations near the Lease Area, such as Aquinnah Overlook, would have the potential for greater adverse impacts than more distant locations (see Section 3.20).

Impacts during decommissioning would be similar to the impacts during construction and installation.

Noise: Noise from O&M (predominately WTG operations) could result in impacts on recreation and tourism. Offshore operational noise from the WTGs would be similar to the noise described for other projects under the No Action Alternative and would thus have long-term **minor** adverse impacts. Impacts during decommissioning would be similar to the impacts during construction and installation.

Presence of structures: During O&M of the Proposed Action, the permanent presence of WTGs would create obstacles for recreational vessels. At their lowest point, WTG blades would be 94 feet above the surface. At this height, larger sailboats would need to navigate around the Lease Area, while smaller vessels could navigate through the Lease Area but would still need to adjust routes to bypass WTGs and OSS foundations. No restrictions on fishing or other recreational pursuits would occur during Project operations. However, some recreational anglers could avoid fishing in the Lease Area due to concerns about their ability to safely fish within or navigate through the area.

For recreational anglers harvesting HMS such as tunas, sharks, and billfish, the spacing of the WTGs could impact access to fishing locations. The fishing methods used and the size, strength, and swimming speed of these larger species require significantly more space for fishing compared to other species; as a result, the proposed separation between WTGs could be insufficient for this type of fishing. Anglers who do fish within the Lease Area would need to change their methods (i.e., they would not be able to allow their boats to drift and would need to correct course to avoid WTGs). See Section 3.9 for analysis on for-hire fishing impacts.

The presence of WTGs would also require the USCG to adjust their search and rescue planning and search patterns to allow aircraft to fly within the GAA, potentially leading to a less-optimized search pattern and a lower probability of success for lost or hurt recreationists (see Section 3.17).

The Proposed Action's WTGs would also affect recreation and tourism through visual impacts. When visible (i.e., on clear days in locations with unobstructed ocean views), WTGs would add a developed/industrial visual element to ocean views that were previously characterized by open ocean, broken only by transient vessels and aircraft passing through the view. However, the visual impact assessment prepared for Revolution Wind (see COP Appendix U3 [EDR 2023]) determined that the Project would not likely be easily detectable when viewed from a distance of 20 miles or more and that only 3% of the land area within the visual study area would contain views of the Project. Revolution Wind has voluntarily committed to use ADLS and non-reflective pure white or light gray paint color, as described in Appendix F to reduce impacts.

The visual contrast created by the WTGs could have a beneficial, adverse, or neutral impact on the quality of the recreation and tourism experience depending on the viewer's orientation, activity, and purpose for visiting the area. As discussed in Section 3.18.1, research suggests that at a distance of 15 miles, few beach visitors (only 6%) would select a different beach based on the presence of offshore wind turbines. An estimated 55 WTGs would fall within this distance, based on the proposed Project array. Considering these factors, BOEM expects the impact of visible WTGs on the use and enjoyment of recreation and tourist facilities and activities during O&M of the Proposed Action Alternative to be long term and **minor** adverse, subject to individual responses by recreationists and visitors to changes in the viewshed. Popular tourism locations near the Lease Area, such as Aquinnah Overlook, would have the potential for greater adverse impacts than more distant locations (see Section 3.20). Although some visitors to south-facing coastal or elevated locations could alter their behavior, this changed behavior is unlikely to meaningfully affect the recreation and tourism industry as a whole.

Additionally, increased beach visitation by individuals who view the WTGs as positive would offset some lost trips from visitors who consider views of WTGs to be negative (Parsons and Firestone 2018). As disclosed in Section 3.18.2.3.1, the PDE analyzed for the Project allows for installing wind turbines that may reach 873 feet to the tip of blade (52% taller than those studied by Parsons and Firestone) with a rotor diameter of 538 feet (9% larger rotor diameter than those studied by Parsons and Firestone). Although it is predictable that the percentage of social acceptance or change in choice may shift, the shift would not be proportional to the difference in the size and scale of the wind turbines in Parsons and Firestone's 2018 study and those analyzed in this EIS.

Overall, the impacts on most recreational pursuits would be long term but **minor** adverse, while the impact on for-hire fishing would be **moderate** adverse because these enterprises are more likely to be materially affected by displacement, competition for resources, and longer transit times in a manner similar to commercial fishing businesses.

Conversely, charter cruises could also choose to market the operational WTGs as a tourist destination, although their distance from shore could limit some interest. Scour protection around the WTG foundations would likely attract forage fish as well as game fish, which could provide new opportunities for certain recreational anglers. A 1989 survey of recreational fishermen and divers in the Gulf of Mexico found that fishermen were willing to travel up to 45 nm offshore and divers 77 nm offshore to visit abandoned platforms that have been reefed (Stanley and Wilson 1989). A subsequent 2002 study (Hiett and Milon 2002) also found that that there is substantial recreational activity associated with the presence of oil and gas structures in the Gulf of Mexico from Alabama through Texas. These structures range from directly offshore in 10-foot water depths to complex facilities in water depths up to almost 10,000 feet at more than 80 miles from shore (NOAA 2021). The report estimated a total of $324.6 million in economic output in coastal counties of the Gulf region associated with fishing and diving activities near oil and gas structures. A survey of United Kingdom offshore recreational fishermen by Hooper et al. (2017) found that respondents frequently fished at offshore wind farms, with a mean distance from shore of 10 nm. Approximately one quarter of the respondents reported having fished within or around the perimeter of wind farms. Likewise, evidence from Block Island Wind Farm indicates an increase in recreational fishing near the WTGs (Smythe et al. 2018). These surveys suggest that the Project could attract recreational fishing and diving activity, providing a long-term **minor** benefit. The Project could also increase tourism activity during peak tourism months (Carr-Harris and Lang 2019).

Impacts during decommissioning would be similar to the impacts during construction and installation.

<u>Vessel traffic:</u> For regularly scheduled maintenance and inspections, Revolution Wind anticipates that, on average, up to nine crew transfer vessels or service operation vessels would operate in the Lease Area. In other maintenance or repair scenarios, additional vessels could be required. However, this low volume of vessel traffic would not be anticipated to affect ongoing recreational use. O&M of the Proposed Action would therefore have **negligible** adverse impacts on onshore or offshore recreation and tourism.

Impacts during decommissioning would be similar to the impacts during construction and installation.

### Onshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> No anchoring impacts would occur as a result of onshore activities. No onshore cable maintenance would be required unless a fault or failure occurs. If cable repair or replacement or remedial cable protection is required, maintenance activities would be limited to the disturbance corridors previously defined for construction. Therefore, O&M and decommissioning impacts would represent a **negligible** adverse impact on recreational users.

<u>Light:</u> Based results of the viewshed analysis (see COP Appendix U1 [EDR 2023]), portions of the lightning masts for OnSS and ICF features could be visible from some views. However, lighting at these facilities would be limited to yard and task lighting for emergency maintenance or repairs. Both categories would be switched lights and only in use if staff are present. Operational lighting for the OnSS and ICF would comply with Quonset Development Corporation lighting regulations and be mounted with the lamp horizontal to the ground (light facing straight down) or with a lamp tilt no more than 25 degrees from the horizon. As such, it is anticipated that the OnSS and ICF would result in **negligible** adverse lighting impacts to the recreation and tourism activities in the GAA. Impacts during decommissioning would be similar to the impacts during construction and installation.

<u>Noise:</u> Operations of onshore Project components (i.e., offshore to onshore transition joint bays, onshore transmission cable route, OnSS, and ICF) would have **negligible** adverse noise impacts intermittently over the life of the Project to onshore recreation and tourism because these components would only require periodic routine maintenance.

Impacts during decommissioning would be similar to the impacts during construction and installation.

Presence of structures: Based on results of the viewshed analysis (see COP Appendix U1 [EDR 2023]), it is anticipated that the OnSS and ICF could be visible from approximately 15% of the viewshed analysis area. However, the presence of existing landscape vegetation along roadways could further reduce the extent of visual impacts. For more distant views from Wickford Historic District and Wickford Harbor/Wickford Village State Scenic Area, and Narragansett Bay, visibility would only include the upper portions of a few proposed transmission structures. However, where visible at foreground distances, the proposed OnSS and ICF could introduce new industrial/utility structures into the landscape. Nevertheless, the proposed OnSS and ICF would not be out of scale or character with the existing types of development currently present in the vicinity, such as the existing Davisville Substation or the structures at nearby Quonset Business Park. As such, it is anticipated that the OnSS and ICF would result in **negligible** adverse visual impacts to recreation and tourism activities in the GAA.

Impacts during decommissioning would be similar to the impacts during construction and installation.

Vessel traffic: Potential traffic impacts would be similar to the construction phase but likely reduced due to fewer equipment and vehicle trips. Impacts during decommissioning would be similar to the impacts during construction and installation: temporary and **minor** adverse.

#### 3.18.2.3.3 Cumulative Impacts

### Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Up to approximately 6,550 acres of anchoring and 18,995 acres of cabling seafloor disturbance could occur from ongoing and planned actions, including the Proposed Action, in the recreation and tourism GAA. Project-related construction anchorages would noticeably add to disturbances of marine species and their habitats important to recreational fishing and could require recreational and tourism vessels to navigate around moving and anchored construction-related vessels while in transit. The buried cabling would also present short-term navigational hazards. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** adverse cumulative impacts on recreation and tourism.

Light: New lighting from the Proposed Action would contribute to a 11% increase in in-water lighting sources from past, present, and reasonably foreseeable future projects within the GAA by introducing built visual elements to views previously characterized by dark, open ocean.

Given the distance to most recreational viewers and potential for atmospheric interference, lighting from the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in long-term intermittent **minor** adverse cumulative impacts on recreation and tourism.

Noise: Noise from construction could lead to the displacement of fish in and around construction sites, leading to spatial competition, depending on migrating patterns. Recreational boaters and tourists would not be permitted to approach active construction zones and would therefore not be expected to experience noise impacts from offshore construction. Because of the distance from receptors, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in localized short-term **minor** to **moderate** adverse cumulative impacts on recreation and tourism due to construction activities, whereas noise from O&M activities would result in long-term **negligible** adverse cumulative impacts.

<u>Presence of structures:</u> The Proposed Action would noticeably add up to 102 foundations to the 893 foundations estimated for the No Action Alternative within the GAA. New structures related to the Proposed Action would add to the long-term impacts on recreation and tourism throughout the life of the Project (up to 35 years, plus up to an additional 2 years for decommissioning) by increasing navigational complexity; risks of structure allision; route adjustments for races, sightseeing, and fishing; loss and damage of fishing gear to scour and cable protection; and difficulty anchoring over scour and cable protection. However, new in-water structures from the Proposed Action could benefit recreation and tourism by attracting recreational vessels to WTGs for fishing and sightseeing activities. Therefore, new in-water structures from the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** to **moderate** adverse and long-term **minor** beneficial cumulative impacts on recreation and tourism.

Construction and O&M of the Project would also noticeably increase the visual impacts on recreational and tourism users by adding up to 100 WTGs and two OSSs to the No Action Alternative. Based on visual simulations described in Sections 3.18.1.1, 3.18.2.2.1, and 3.18.2.2.2, the visibility of large offshore structures is not expected to impact shore-based recreation and tourism as a whole. Cumulative visual impacts on recreation and tourism resulting from the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would be short term and **minor** adverse for onshore viewers at sensitive viewing locations because of the distance and natural atmospheric interference. Cumulative visual impacts on recreation and tourism resulting from the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would be short term **minor** to **moderate** adverse for offshore recreational users and would increase as users approach the WTGs. Impacts to viewers at sensitive viewing locations are addressed in Section 3.20.

<u>Vessel traffic:</u> Project vessels would noticeably add to disturbances of marine species and their habitats important to recreational fishing and could require recreational and tourism vessels to navigate around moving construction-related vessels while in transit. However, non-Project traffic would be able to adjust routes and avoid the work area and transiting construction vessels. BOEM estimates a peak of 210 vessels at sea on a daily basis due to offshore wind project construction and O&M over a 10-year time frame, with most of these vessels remaining in the vicinity of their respective lease areas. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** adverse cumulative impacts on recreation and tourism.

### Onshore Activities and Facilities

<u>Anchoring and new cable emplacement/maintenance:</u> No anchoring impacts would occur as a result of onshore activities. No onshore cable maintenance would be required unless a fault or failure occurs. If cable repair or replacement or remedial cable protection is required, maintenance activities would be limited to the disturbance corridors previously defined for construction. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in temporary **negligible** adverse cumulative impacts to onshore recreation and tourism.

<u>Light:</u> Construction associated with the Proposed Action could add temporary minor adverse light impacts experienced by onshore recreational users near the landfall work area, onshore transmission cable route, or onshore facilities or from the aviation hazard lighting on the new WTGs. Long-term increases in operational lighting from the Proposed Action would be **negligible** adverse. Therefore, the Proposed

Action when combined with past, present, and reasonably foreseeable projects would result in temporary **minor** adverse cumulative impacts to onshore recreation and tourism.

Noise: As with lighting, construction activities would add noise from the construction of onshore facilities to the ambient noise levels of the No Action Alternative. Onshore construction noise would be localized to the source, short term **minor** to **moderate** adverse, depending on the distance of the receptor from the source. Long-term increases in operational noise from the Proposed Action would be **negligible** adverse. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in temporary **minor** adverse cumulative impacts to onshore recreation and tourism.

Presence of structures: Onshore construction and installation would add an O&M facility, an interconnection facility, and an OnSS to the No Action Alternative. These new onshore structures would only result in **minor** adverse visual impacts experienced by recreational users due to the existing settings at these locations (see Section 3.20 for details on potential visual impacts). When considered cumulatively with past, present, and reasonably foreseeable activities, the Proposed Action would result in temporary **negligible** to **minor** adverse cumulative visual impacts on recreation and tourism.

Vessel traffic: Construction vehicles associated with the Proposed Action could add traffic delays experienced by recreational travelers on local roadways. Long-term increases in operational traffic from the Proposed Action would be **negligible** adverse. Therefore, the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in temporary **minor** adverse cumulative impacts to onshore recreation and tourism.

#### 3.18.2.3.4 Conclusions

Project construction and installation and decommissioning would introduce noise, lighting, human activity, vehicles and vessels (increasing potential collision risk), and interruption to access points in the GAA. Noise, lighting, and human activity impacts from Project O&M would occur, although at lower levels than those produced during construction and decommissioning. BOEM anticipates that the impacts resulting from the Proposed Action alone would range from **negligible** to **minor** adverse and short term to long term. Project activities are expected to contribute to several IPFs, the most prominent being noise and vessel traffic during construction and the presence of offshore structures during operations. Noise and vessel traffic would have impacts on visitors, who may avoid onshore and offshore noise sources and vessels, and impacts on recreational fishing and sightseeing as a result of the impacts on fish, invertebrates, and marine mammals. BOEM expects the overall impact on recreation and tourism from the Proposed Action alone to be **minor** adverse; however, the overall effect would be small, and recreation and tourism would be expected to recover completely without remedial or mitigating action.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **moderate** adverse and **minor** beneficial. Impacts would result from short-term impacts during construction: noise, anchored vessels, and hindrances to navigation; and the long-term presence of cable hard cover and structures in the GAA during operations, with resulting impacts on recreational vessel navigation and visual quality. Beneficial impacts would result from the reef effect and sightseeing attraction of offshore wind energy structures. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action, when combined with past, present, and reasonably foreseeable activities, would result in **minor** adverse impacts and **minor** beneficial impacts to recreation and tourism.

The overall effect would be small, and recreation and tourism would be expected to recover completely with no mitigating action required.

#### 3.18.2.4 Alternatives C, D, E, and F

Table 3.18-2 provides a summary of IPF findings for these alternatives.

##### 3.18.2.4.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and associated IACs, the presence of WTGs could still increase congestion, space conflicts, navigation risks, and the potential for collision, albeit at lower levels than the Proposed Action. The reduced number of WTGs under these alternatives could provide a long-term beneficial impact for some recreational viewers. Therefore, BOEM expects that the impacts resulting from each alternative alone would range from **negligible** to **moderate** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that each alternative's impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate** adverse and **minor** beneficial). The overall impacts of each alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same as those under the Proposed Action: **minor** adverse and **minor** beneficial.

#### 3.18.2.5 Alternative G: Impacts of the Preferred Alternative on Recreation and Tourism

Table 3.18-2 provides a summary of IPF findings for this alternative.

##### 3.18.2.5.1 Conclusions

Although Alternative G would reduce the number of WTGs and associated IACs, the presence of WTGs could still increase congestion, space conflicts, navigation risks, and the potential for collision, albeit at lower levels than the Proposed Action. The reduced number of WTGs under this alternative could provide a long-term beneficial impact for some recreational viewers. Therefore, BOEM expects that the impacts resulting from this alternative alone would range from **negligible** to **moderate** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that this alternative's impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate** adverse and **minor** beneficial). The overall impacts of this alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same as the Proposed Action: **minor** adverse and **minor** beneficial.

#### 3.18.2.6 Mitigation

There are no potential additional mitigation measures for recreation and tourism identified in Table F-2 or Table F-3 of Appendix F.

# 3.19 Sea Turtles

## 3.19.1 Description of the Affected Environment for Sea Turtles

Geographic analysis area: The GAA for sea turtles comprises the Northeast Shelf and Southeast Shelf Large Marine Ecosystems, as shown in Figure 3.19-1 and also described in Appendix G. This broad area captures the typical movement range within U.S. waters of most sea turtles that could occur within the Project vicinity during the construction and installation, O&M, and decommissioning of the Project. Thus, although Project-related impacts to sea turtle habitat are restricted to a relatively small GAA, the GAA for Project impacts to sea turtles is necessarily large due to their movement range.

The intent of the GAAs used in this EIS is to define a reasonable boundary for assessing the potential effects, including cumulative effects, resulting from the IPF with the maximum area of impact from the development of an offshore wind energy industry on the Mid-Atlantic OCS. GAAs for marine biological resources are necessarily large because marine populations range broadly and cumulative impacts can be expressed over broad areas. GAAs are not used as a basis for analyzing the effects of the Proposed Action, which represent a subset of these broader effects and expressed over a smaller area. These impacts are analyzed specific to each IPF.

Affected environment: Four species of sea turtles are known to occur in or near the proposed RWF and RWEC, and all are protected species under the ESA. These are the green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), and Kemp's ridley sea turtle (*Lepidochelys kempii*). The potential impacts of the Proposed Action to these species are assessed in Section 3.19.2. The hawksbill sea turtle (*Eretmochelys imbricata*) is also protected under the ESA but is exceedingly rare in the Project vicinity (Kenney and Vigness-Raposa 2010) (see Figure 3.19-1). The proposed RWF and RWEC are considered outside the normal range of hawksbill turtles, which range predominantly in warmer waters to the south. Individual hawksbill turtles have occasionally occurred in and near the southern New England area after being stunned by exposure to unusual cold-water events and subsequently transported northward by the Gulf Stream into the region. These occurrences are not representative of normal behaviors or distribution. Hawksbill turtles are known to occur in potential construction vessel transit routes to the Gulf of Mexico, but the number of vessel trips being considered over the 2-year construction period (16–17 trips per year) is small compared to the existing baseline of tens of thousands of vessel trips. Should these vessel trips occur, their contribution to cumulative effects on this species would not be measurable. Therefore, while this species does occur in the GAA for sea turtles (defined in Appendix E), the Proposed Action is unlikely to contribute to any measurable cumulative effects, and hawksbill sea turtles are therefore not considered further in this EIS.

Sea turtles primarily inhabit tropical and subtropical seas throughout the world, with several species seasonally ranging into temperate zones to forage. Sea turtles are morphologically adapted for continuous swimming, and they can remain underwater for extended periods, ranging from several minutes to several hours, depending on factors such as daily and seasonal environmental conditions and specific behavioral activities associated with dive types (Hochscheid 2014; National Science Foundation [NSF] and USGS 2011). These adaptations are important because sea turtles often travel long distances between their feeding grounds and nesting beaches (Meylan 1995). There are no nesting beaches or other designated critical habitats near the RWF (Greater Atlantic Regional Fisheries Office [GARFO] 2020), meaning that individuals occurring in the proposed RWF and RWEC are either migrating or foraging. Given this, these individuals likely spend most of the time below the surface, although specifics are species dependent. Underwater observations of 73 sea turtles with 2,742 minutes of video in the Mid-Atlantic found that loggerhead sea turtles were within the near-surface region of the water column a median of 42% of the time (Patel et al. 2016).

The combination of sightings, strandings, tag, and bycatch data provides the best available information on sea turtle distribution. Information about species occurrence in the RWF and RWEC was obtained from various sources, including aerial surveys (Kraus et al. 2016; NEFSC and SEFSC 2018; North Atlantic Right Whale Consortium 2019), regional historical data (Kenney and Vigness-Raposa 2010), and sea turtle stranding records from the Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP) database (Halpin et al. 2009). Table 3.19-1 summarizes potential sea turtle occurrence in the southern New England coastal waters off Rhode Island and Massachusetts. Potential effects to sea turtles, which are discussed in Section 3.19.2, are based on the likelihood of occurrence.

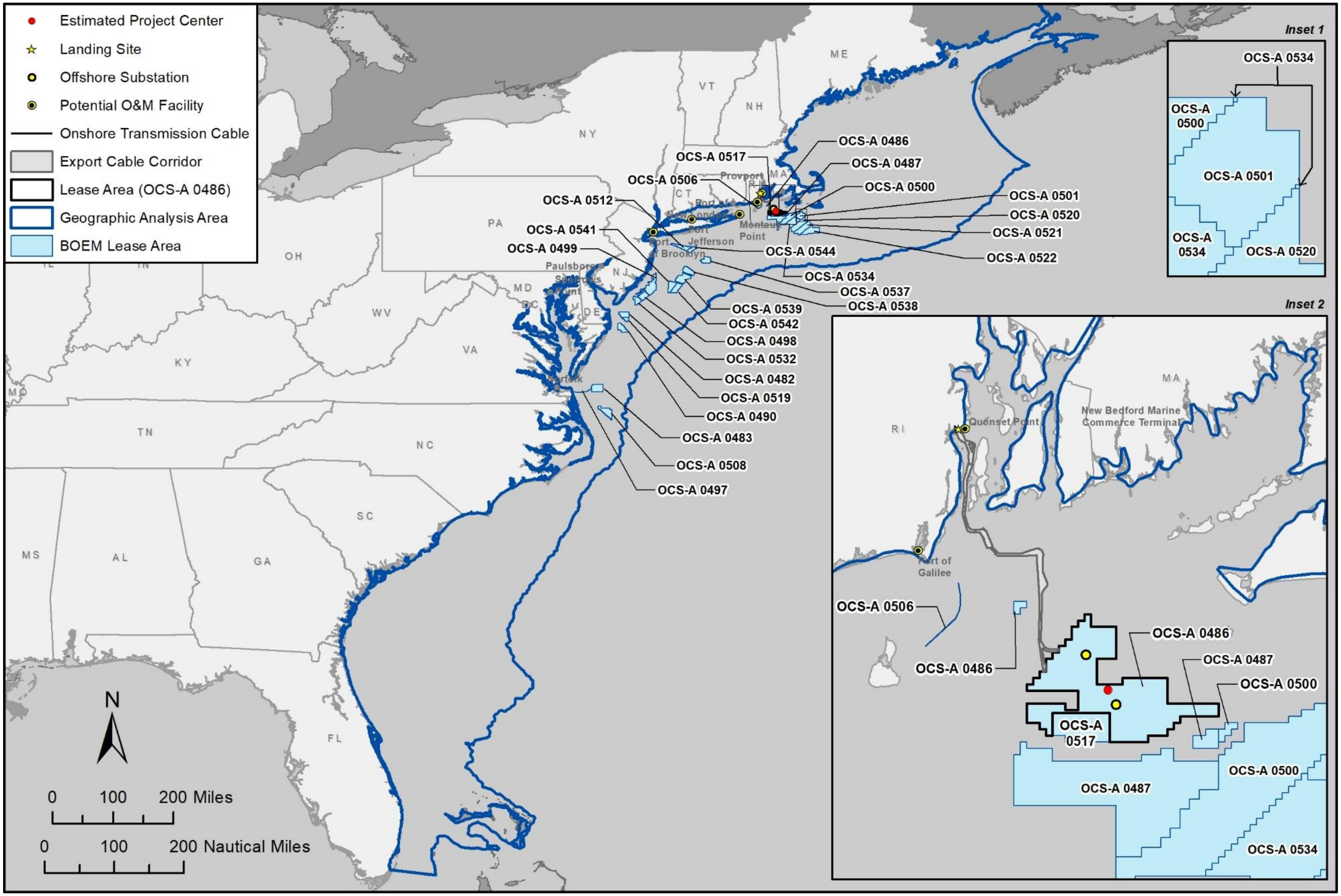


**Figure 3.19-1. Geographic analysis area for sea turtles.**

**Table 3.19-1. Frequency of Sea Turtle Species Occurrence in the Revolution Wind Farm and Revolution Wind Export Cable**

| Common Name | Scientific Name | Distinct Population Segment*/Population | Endangered Species Act Status* | Frequency of Occurrence†, ¶ | Seasonal Occurrence‡,§ | Likelihood of Occurrence§,¶ | Included in Impact Analysis? |
|---|---|---|---|---|---|---|---|
| Green sea turtle | *Chelonia mydas* | North Atlantic | T | Regular, limits of range | May to November | Unlikely/ uncommon | Yes |
| Hawksbill sea turtle | *Eretmochelys imbricata* | Throughout range | E | Rare, outside range | May to November | Exceedingly unlikely | No, outside limits of range |
| Leatherback sea turtle | *Dermochelys coriacea* | Atlantic‡‡ | E | Common | May to November | Likely | Yes |
| Loggerhead sea turtle | *Caretta caretta* | Northwest Atlantic | T | Common | May to November | Likely | Yes |
| Kemp's ridley sea turtle | *Lepidochelys kempii* | Throughout range | E | Regular | May to November | Likely but infrequent | Yes |

* DPS = distinct population segment, E = endangered, T = threatened.

† Data from Kenney and Vigness-Raposa (2010). Common = fewer than 100 observations, regular = 10–100 observations; rare = fewer than 10 observations.

‡ Data from GARFO (2020). Sea turtles may also occur in the Lease Area outside these months.

§ Data from NEFSC and SEFSC (2018). Based on density estimates from Kot et al. (2018) and observations by Kraus et al. (2013, 2014, 2016), O'Brien et al. (2021a, 2021b), and Quintana et al. (2019).

‡‡ A Northwest Atlantic DPS to be listed as threatened has been proposed for leatherback sea turtles (85 *Federal Register* 48332). The Atlantic population considered herein includes this proposed DPS.

**Green sea turtle:** Green sea turtles are found in tropical and subtropical waters around the globe. They are most commonly observed feeding in the shallow waters of reefs, bays, inlets, lagoons, and shoals that are abundant in algae or marine grass (NMFS and USFWS 2007). In U.S. waters, they are typically found in the Gulf of Mexico or coastal waters south of Virginia (USFWS 2021). Juveniles and subadults are occasionally observed in Atlantic coastal waters as far north as Massachusetts (NMFS and USFWS 1991), including the waters of Long Island Sound and Cape Cod Bay (Cetacean and Turtle Assessment Program 1982). The species' primary nesting beaches are located in Costa Rica, Mexico, the United States (Florida), and Cuba. According to Seminoff et al. (2015), nesting trends are generally increasing for this population. Based on feeding and habitat preferences, the species is less likely to occur in the RI/MA WEA and MA WEA. Kenney and Vigness-Raposa (2010) recorded one confirmed sighting within the RI/MA WEA in 2005. The STSSN reported one offshore and 20 inshore green sea turtle strandings between 2017 and 2019, and green sea turtles are found each year stranded on Cape Cod beaches (NMFS STSSN 2020; Wellfleet Bay Wildlife Sanctuary [WBWS] 2018). Five green sea turtle sightings were recorded off the Long Island shoreline 10 to 30 miles southwest of the RI/MA WEA in aerial surveys conducted from 2010 to 2013 (NEFSC and SEFSC 2018), but none were positively identified in multiseason aerial surveys of the RI/MA WEA from October 2011 to June 2015 (Kraus et al. 2016).

Juvenile green sea turtles represented 6% of 293 cold-stunned turtle stranding records collected in the inshore waters of Long Island Sound from 1982 to 1997 (Gerle et al. 2000). These and other sources of information indicate that juvenile green sea turtles occur at least periodically in the shallow nearshore waters of Long Island Sound and the coastal bays of New England (Morreale et al. 1992).

Based on the available information, green sea turtle occurrence in the RWF and RWEC appears to be unlikely but cannot be ruled out. They are most likely to occur as juveniles or subadults in the shallow coastal waters of Rhode Island and Massachusetts and in Narragansett Sound within and adjacent to the RWEC corridor.

**Hawksbill sea turtle:** Hawksbill sea turtles are a circumtropical species that in the Atlantic Ocean is most observed between 30°N and 30°S latitude. In the western Atlantic, hawksbills are typically found in the Caribbean Sea and the Gulf of Mexico off the coasts of Florida and Texas. No nesting beaches exist in the northeast United States, and records of species occurrence near the Lease Area are rare. This species is likely to occur elswhere in the GAA, specifically in vessel transit routes to ports in the Gulf of Mexico (see Appendix B). The OBIS-SEAMAP database (Halpin et al. 2009) contains only six hawksbill sea turtle observation records for the region. These comprise two verified stranding records, both from Martha's Vineyard in 1911, and four shipboard survey records at and seaward of the shelf break to the east and south of the Lease Area. The species was not observed in recent multiyear aerial and shipboard surveys of the RI/MA WEA and vicinity (Kraus et al. 2016). Therefore, although individual hawksbills could conceivably occur in the Project vicinity, they would be extralimital and outside their normal range. Hawksbill sea turtle occurrence within the Lease Area and RWEC corridor is unlikely. The species could be encountered along potential construction vessel transit routes between the Lease Area and ports in the Gulf of Mexico (see Appendix B) and the southeast United States, but the number of vessel transits to these distant ports would be limited. At-sea vessels transiting from non-local ports traveling greater than 10 knots (5.1 m per second) would employ PSOs or NMFS-approved visual detecting devices. Given the low density of hawksbill sea turtles and the low number of vessel transits from non-local ports, the likelihood of an encounter resulting in a ship strike is very low. Additionally, the measures proposed in the *Protected Species Mitigation and Monitoring Plan* (Revolution Wind 2022a) and adherence to NOAA guidelines for turtle strike avoidance measures (see Appendix F) would further reduce the chance of any adverse effects to the species from the Proposed Action. Therefore, due to the very low probability of an encouter with a hawksbill sea turtle, this species is not considered further in this analysis.

**Leatherback sea turtle:** The leatherback is the most globally distributed sea turtle species, ranging broadly from tropical and subtropical to temperate regions of the world's oceans (NMFS and USFWS 1992). Leatherbacks are a pelagic species, but they are commonly observed in coastal waters along the OCS (NMFS and USFWS 1992). The breeding population estimate (total number of adults) in the North Atlantic is 34,000 to 95,000, and, aside from the western Caribbean, nesting trends at all other Atlantic nesting sites are generally stable or increasing (NMFS and USFWS 2013; Turtle Expert Working Group 2007). Atlantic Marine Assessment Program for Protected Species surveys conducted from 2010 through 2013 routinely documented leatherbacks in New England waters, including the RI/MA WEA, during the summer months (NEFSC and SEFSC 2018). Kraus et al. (2016) recorded 153 observations in monthly aerial surveys, all between May and November, with a strong peak in August. Monthly aerial surveys on the New York Bight from 2017 through 2020 documented a total of 37 leatherback sea turtles, with an additional 503 unidentified sea turtles observed (Tetra Tech and LGL Ecological Research Associates, Inc. 2020). During the summer (June–August) and fall (September–November) months; leatherback density within the RI/MA WEA (refer to Figure 1.1-2) was estimated to be 0.0063 animals per $km^2$ and 0.0087 animals per $km^2$, respectively, compared to densities of 0.00588 animals per $km^2$ for the winter and spring months (December–May) (Kot et al. 2018; Kraus et al. 2016). The STSSN reported 19 offshore and 77 inshore leatherback sea turtle strandings between 2017 and 2019, the highest number among all turtle species reported (NMFS STSSN 2020). Kraus et al. (2016) data indicated that leatherbacks would be the most abundant sea turtle species in the RWF and RWEC, which is consistent with the other information on sea turtle occurrence in the vicinity presented here. Based on this information, leatherback sea turtles are expected to occur commonly in the RWF and RWEC between May and November, with the highest probability of occurrence from July through October (Sherrill-Mix et al. 2008).

**Loggerhead sea turtle:** Foraging loggerhead sea turtles range widely and have been observed along the entire Atlantic Coast as far north as Canada (Brazner and McMillan 2008; Ceriani et al. 2014; Shoop and Kenney 1992). Regional abundance on the northwest Atlantic, corrected for unidentified turtles in proportion to the ratio of identified turtles, estimates about 801,000 loggerheads (NEFSC and SEFSC 2011). The three largest nesting subpopulations responsible for most of the production in the western North Atlantic (peninsular Florida, northern United States, and Quintana Roo, Mexico) have all been declining since at least the late 1990s, thus indicating a downward trend for this population (Turtle Expert Working Group 2009). In southern New England, loggerhead sea turtles can be found seasonally, primarily during the summer and fall, but are typically absent during the winter (Kenney and Vigness-Raposa 2010; Shoop and Kenney 1992). Atlantic Marine Assessment Program for Protected Species surveys reported loggerhead sea turtles as the most commonly sighted sea turtles on the shelf waters from New Jersey to Nova Scotia, Canada. During the December 2014 to March 2015 aerial abundance surveys, 280 individuals were recorded (Palka et al. 2017). Large concentrations were regularly observed south and east of Long Island near the RI/MA WEA (NEFSC and SEFSC 2018). Kraus et al. (2016) observed loggerhead sea turtles within the RI/MA WEA in the spring, summer, and fall, with the greatest density of observations in August through September. The density of loggerhead sea turtles within the RI/MA WEA was estimated to be 0.00755 animals per $km^2$ at peak occurrence during the fall months, 0.00206 animals per $km^2$ during the summer months, and 0.035 animals per $km^2$ for the rest of the year (Kot et al. 2018; Kraus et al. 2016). The STSSN reported six offshore and 58 inshore loggerhead sea turtle strandings between 2017 and 2019 (NMFS STSSN 2020). In New York State waters, the New York Marine Rescue Center (NYMRC) documented 816 strandings of loggerhead sea turtles from 1980 to 2018 (NYMRC 2021). Winton et al. (2018) estimated densities using data from 271 satellite tags deployed on loggerhead sea turtles between 2004 and 2016 and found that tagged loggerheads primarily occupied the OCS from Long Island, New York, south to Florida, but relative densities in the RI/MA WEA increased during the period between July and September. Collectively, available information indicates that loggerhead sea turtles are expected to occur commonly in the RWF and RWEC as adults, subadults, and juveniles from the late spring through fall, with the highest probability of occurrence from July through September (Winton et al. 2018).

**Kemp's ridley sea turtle:** Kemp's ridley sea turtles are most commonly found in the Gulf of Mexico and along the U.S. Atlantic Coast. The species is primarily associated with habitats on the OCS, with preferred habitats consisting of sheltered areas along the coastline, including estuaries, lagoons, and bays (Burke et al. 1994; NMFS 2019), and nearshore waters less than 120 feet (37 m) deep (Seney and Landry 2008; Shaver et al. 2005; Shaver and Rubio 2008), although they can also be found in deeper offshore waters. Kemp's ridley sea turtle nesting is largely limited to the beaches of the western Gulf of Mexico, primarily in Tamaulipas, Mexico. Nesting also occurs in Veracruz, and a few historical records exist for Campeche, Mexico. In the United States, nesting occurs primarily in Texas and occasionally in Florida, Alabama, Georgia, South Carolina, and North Carolina (NMFS and USFWS 2015). Nesting outside of Gulf of Mexico states is rare but has been observed as far north as New York State (NPS 2018). Recent data show that the total number of recorded nests from all beaches in Mexico peaked in 2012 at 22,458 but declined to 12,060 in 2014, the last year for available data (NMFS and USFWS 2015). Juvenile and subadult Kemp's ridley sea turtles are known to travel as far north as Cape Cod Bay during summer foraging (NMFS et al. 2011). Visual sighting data are limited because this small species is difficult to observe using typical aerial survey methods (Kraus et al. 2016). In all, five observations were recorded in the RI/MA WEA during 4 years of aerial surveys, all in August and September 2012 (Kraus et al. 2016). The species has been sighted near the proposed RWF in other survey efforts, mostly to the south and west of the RI/MA WEA (North Atlantic Right Whale Consortium 2019).

The density of Kemp's ridley sea turtles within the RI/MA WEA was conservatively estimated to be 0.00925 animals per $km^2$ throughout the year for exposure modeling purposes (Kot et al. 2018; Kraus et al. 2016). However, this estimate does not accurately reflect seasonality of occurrence. Like all sea turtle species occurring in the region, the Kemp's ridley sea turtle is most commonly observed from late spring through early fall when suitable water temperatures are present, with occurrences later in the year limited to individuals that have been cold stunned and are outside their normal seasonal range. The STSSN reported six offshore and 69 inshore Kemp's ridley sea turtle strandings between 2017 and 2019 (NMFS STSSN 2020), and the NYMRC has documented the stranding of 620 Kemp's ridley sea turtles within New York State waters between 1980 and 2018 (NYMRC 2021). Cold-stunned Kemp's ridley sea turtles are often found stranded on the beaches of Cape Cod (Lui et al. 2019; WBWS 2019). Based on this information, Kemp's ridley sea turtles could occur infrequently as juveniles and subadults from July through September. The highest likelihood of occurrence within the Project limits is along the RWEC corridor in the protected waters of Narragansett Bay. Occurrence in the RWF is possible the likelihood of occurrence is difficult to assess from available data because this species is difficult to detect in visual surveys (Kraus et al. 2016). On this basis, Kemp's ridley sea turtles could occur in the RWF and RWEC in low numbers on an annual basis throughout the life of the Project.

## 3.19.2 Environmental Consequences

### 3.19.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

The analysis presented in this section considers the impacts resulting from the maximum-case scenario under the PDE approach developed by BOEM to support offshore wind project development (Rowe et al. 2017). The maximum design size specifications defined in Appendix D, Table D-1 are PDE parameters used to conduct this analysis. Several Project parameters could change during the development of the final Project configuration, potentially reducing the extent and/or intensity of impacts resulting from the associated IPFs.

The following design parameters would result in reduced impacts relative to those generated by the design elements considered under the PDE:

- The permitting and installation of fewer WTGs, resulting in fewer offshore structures and reduced IAC cable length. This would reduce the extent of temporary to long-term impacts on marine mammals by
    - reducing the extent and duration of underwater noise impacts from WTG foundation installation; and
    - reducing the extent of reef and hydrodynamic effects resulting from structure presence.
- The Project could use a casing pipe method to construct the RWEC sea-to-shore transition, which would result in less acoustic impact than vibratory pile driving to construct a cofferdam (Zeddies 2021).
- The use of a temporary cofferdam for RWEC sea-to-shore transition construction would reduce suspended sediment effects on sea turtles.

See Appendix E2 for a summary of IPFs analyzed for sea turtles across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E, Table E2-6.

Table 3.19-2 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers the implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts on sea turtles. These EPMs are summarized in Appendix F, Table F-1.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

The conclusion section within each alternative analysis discussion includes rationale for the overall effect determination. Overall impacts associated with the each alternative would result in **minor** adverse impacts on sea turtles in the GAA because unavoidable adverse impacts on individual sea turtles could occur, but those impacts are unlikely to measurably affect the viability of any sea turtle species at the population level.

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**Table 3.19-2. Alternative Comparison Summary for Sea Turtles**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| Accidental releases and discharges | **Offshore**: While marine vessels are an inherent source of accidental releases of trash, debris, and contaminants, existing regulatory requirements would effectively avoid and minimize these impacts such that the resulting effects to sea turtles would be **negligible** adverse.<br>All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and the BSEE Oil spill response plans are required for each project and would provide for rapid spill response, clean-up, and other measures that would help to minimize potential impacts on affected resources. Given the low probability of a large spill event, impacts to sea turtles are likely to be **negligible** adverse. | **Offshore**: BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore renewable energy facilities (30 CFR 585.105(a)). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). The Project would comply with these requirements (VHB 2023). Given these restrictions, the short-term impacts to sea turtles from trash and debris from the Project would be **negligible** adverse.<br>Project EPMs, permit requirements, controls, and procedures would be implemented as part of the Project to reduce the potential or extent of offshore spills, thereby avoiding or minimizing impacts on water quality. Should a spill occur, response and containment procedures would limit the reach of the spill to a localized area, where changes to water quality would be detectable and would exceed water quality standards. Given the low potential for spills and minimal risk of exposure to small temporary spills, the risk from construction-related spills is **negligible** to **minor** adverse. Impacts on sea turtles from accidental spills or releases of pollutants are considered **minor** adverse during O&M because of the low probability of the risk and EPMs.<br>Cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse because of the regulatory protections and limited likelihood of sea turtle exposure. | **Offshore:** Effects on sea turtles from accidental releases and discharges under Alternatives C through F would be similar to those described for the Proposed Action. Alternatives C through F would include the same EPMs to avoid and minimize impacts to sea turtles from accidental releases and discharges. Effects on sea turtles would therefore be **negligible** adverse and short term. While unlikely, vessels collision or allisions could occur during Project construction, presenting the potential risk of larger spills, potentially harmful to sea turtles. Alternatives C through F would slightly reduce total chemical and lubricant uses relative to the Proposed Action, but this effect would be small in comparison to projected chemical use on the Mid-Atlantic OCS. When combined with other offshore wind projects, up to approximately 34 million gallons of coolants, fuels, oils, and lubricants could cumulatively be stored within WTG foundations and OSSs. However, all future offshore energy development projects would comply with BOEM and USCG regulations that prohibit dumping of trash and debris and require measures to avoid and minimize accidental spills. Cumulative impacts associated with Alternative C when combined with past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse. | | | | **Offshore:** Similar to Alternatives C through F, effects on sea turtles from accidental releases and discharges under Alternative G would be similar to those described for the Proposed Action. Alternative G would include the same EPMs to avoid and minimize impacts to sea turtles from accidental releases and discharges. Effects on sea turtles would therefore be **negligible** adverse and short term. Cumulative impacts associated with Alternative G when combined with past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse. |
| Climate change | **Offshore**: Over time, climate change, in combination with coastal and offshore development, would alter existing habitats, potentially rendering some areas unsuitable for certain species and more suitable for others. However, sea turtle populations likely to be impacted by the Project are stable or generally increasing from historic lows. Therefore, | **Offshore**: Northward shifts in sea turtle distributions due to warming waters could result in magnification of the anticipated impacts due to increased exposure. However, this magnification includes potential benefits associated with the creation of artificial reef habitat and could represent an increasing impact over the life of the Project. Therefore, the Proposed Action when combined with other past, present, and reasonably foreseeable actions is expected to result in **minor** | **Offshore:** The types of impacts from global climate change described for the No Action Alternative would occur under Alternatives C through F, but as with the Proposed Action, this alternative could also contribute to a long-term net decrease in GHG emissions. However, northward shifts in sea turtle distributions due to warming waters could result in magnification of the anticipated impacts due to increased exposure. This magnification includes potential benefits associated with the creation of artificial reef habitat and could represent an increasing impact over the life of the Project. Therefore, Alternatives C through F when combined with other past, present, and reasonably foreseeable actions and ongoing environmental trends is expected to result in **minor** adverse cumulative impacts to sea turtles. | | | | **Offshore:** Similar to Alternatives C through F, the types of impacts from global climate change described for the No Action Alternative would occur under Alternative G, but as with the Proposed Action, this alternative could also contribute to a long-term net decrease in GHG emissions. Alternative G when combined with other past, present, and reasonably foreseeable actions and ongoing environmental trends is |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | potential climate change impacts would be **minor** adverse. | adverse cumulative impacts to sea turtles due to the anticipated shifts in distributions. | | | | | expected to result in **minor** adverse cumulative impacts to sea turtles. |
| Noise | **Offshore**: Under the No Action Alternative, human activities would continue to generate underwater noise with the potential to affect sea turtles. These short-term impacts on individuals are not expected to result in population-level effects; the effects of impulsive noise on sea turtles would therefore be **minor** adverse, while effects of non-impulsive noise on sea turtles would be **negligible** adverse because of the patchy distribution of sea turtles and limited likelihood of behavioral responses to expected noise levels. | **Offshore**: A temporary increase in underwater noise could impact sea turtles if they are present in the area during the time of RWF and offshore RWEC construction. Sea turtles that are close to impact pile driving or UXO detonations could experience a temporary or permanent loss of hearing sensitivity. Sea turtles could also respond to vessel approach and/or noise with a startle response and a temporary stress response.<br>Based on the combination of minimization measures and the low numbers of sea turtles expected in the RWF and RWEC, however, impacts to sea turtles from impact pile driving and UXO detonations are expected to be **negligible** to **minor** adverse and impacts to sea turtles from vessel noise would be **negligible** adverse. Likewise, underwater noise impacts from HRG surveys are expected to be **minor** adverse and aircraft noise impacts sea turtles are expected to be **negligible** adverse because exposures would be limited in extent and temporary in duration.<br>Project decommissioning would require the use of construction vessels of similar number and class as those used during construction, and would therefore range from **negligible** to **minor** adverse.<br>Sea turtle hearing is largely within the frequency range (< 1,200 Hz) of operational wind turbines; therefore, it is possible that wind turbine noise could be heard by sea turtles, although behavioral responses are unlikely based on the established threshold, resulting in **negligible** adverse effects.<br>Based on the above findings, noise-related impacts of the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts to sea turtles, depending upon the noise source. | **Offshore:** See Section 3.19.2.3.1 for construction analysis.<br>Alternatives C through F would include the same, or similar, operational and decommissioning noise-producing activities as those described for the Proposed Action but would be reduced based on the reduction in the number of WTGs and other operational elements. Thus, the impacts of operational and cumulative noise are also considered **negligible** to **minor** adverse. | | | | **Offshore:** See Section 3.19.2.3.1 for construction analysis.<br>Similar to Alternatives C through F, Alternative G would include the same, or similar, operational and decommissioning noise-producing activities as those described for the Proposed Action but would be reduced based on the reduction in the number of WTGs and other operational elements. Thus, the impacts of operational and cumulative noise are also considered **negligible** to **minor** adverse. |
| Presence of structures | **Offshore**: The addition of up to 3,113 new offshore foundations in the GAA could increase sea turtle prey availability by creating new hard-bottom habitat, increasing pelagic productivity in local areas, or promoting | **Offshore**: Construction and installation of offshore structures would have temporary **negligible** to **minor** adverse effects on sea turtles, varying in significance by species, due to underwater noise impacts related to impact pile driving and noise and disturbance from associated vessel activity. | **Offshore**: Alternatives C through F would result in impacts to sea turtles associated with the presence of WTG and OSS foundations that are similar to those described for the Proposed Action, but those effects would be reduced in extent. This would reduce the extent of long-term impacts on benthic habitat, water flow, prey aggregation, and fishing activity. This would also reduce the extent of antcipated hydrodynamic and reef effects. But given the offsetting nature of anticipated effects, the differences between alternatives on sea turltes | | | | **Offshore**: Similar to Alternatives C through F, Alternative G would result in impacts to sea turtles associated with the presence of WTG and OSS foundations that are similar to those described for the Proposed Action, but those effects would be reduced in extent. The overall |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | fish aggregations at foundations (Bailey et al. 2014). In contrast, broadscale hydrodynamic impacts could alter zooplankton distribution and abundance and concentrate recreational and commercial fishing around foundations, which could indirectly increase the potential for sea turtle entanglement in both lines and nets. Therefore, associated effects of structures on sea turtles through potential reef effects, hydrodynamic impacts, and concentration of fishing would be **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects. | Potential long-term, intermittent impacts could persist until decommissioning is complete and structures are removed. These O&M impacts would be **negligible** to **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects.<br>BOEM estimates a cumulative total of 3,190 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the GAA. For similar reasons as described above, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts and potential **minor** beneficial cumulative impacts to sea turtles. | would be uncertain. As with the Proposed Action, the overall impact to sea turtles from the presence of structures is not expected to be biologically significant due to the patchy distribution of sea turtles within the RWF and RWEC. Indirect effects on the prey base of some sea turtle species (i.e., invertebrates) from the presence of structures would occur. Potential long-term, intermittent impacts would persist until decommissioning is complete and structures are removed. These impacts would be **negligible** to **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects. | | | | impact to sea turtles from the presence of structures is not expected to be biologically significant due to the patchy distribution of sea turtles within the RWF and RWEC. Indirect effects on the prey base of some sea turtle species (i.e., invertebrates) from the presence of structures would occur. Potential long-term, intermittent impacts would persist until decommissioning is complete and structures are removed. These impacts would be **negligible** to **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects. |
| Vessel traffic | **Offshore**: Increased vessel traffic could result in sea turtle injury or mortality; however, the proportional increase in vessel traffic from baseline would be minimal. Despite the unlikely potential for individual fatalities, no population-level impacts on sea turtles are expected based on occurrence and potential exposure. Assuming other offshore wind projects employ similar minimization measures included in this Project (see Table F-1 in Appendix F), impacts would be further reduced and would be considered **negligible** to **minor** adverse. | **Offshore**: Vessel collisions with individual turtles could occur, resulting in mortalities. Because the abundance of sea turtles is anticipated to be generally low with patchy distribution, and the proportional increase in vessel traffic is also low, the number of sea turtles injured or killed by vessel strikes during Project construction would be low and would have negligible effects at the population level. Therefore, the potential effects of construction and decomissioning vessel collisions on sea turtles would be **minor** adverse.<br>O&M vessel use would represent a minimal increase in regional vessel traffic over the life of a facility and the effects to sea turtles are expected to be **negligible** to **minor** adverse.<br>An increase in vessel traffic poses an increased likelihood of collision-related injury and mortality relative to existing baseline conditions. Some sea turtles could be injured or killed as a result, but the number of individuals impacted is not likely to significantly increase the existing mortality rate from vessel strikes. Additionally, BOEM expects that similar EPMs would be included in future offshore wind projects, helping to minimize the vessel strike risk. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse; BOEM does not expect the viability of sea turtle populations to be affected. | **Offshore:** Alternative C to F would require the same types and number of construction O&M and decommissioning vessels producing the similar impacts to those described for the Proposed Action, but the number of vessel trips and overall duration of construction activity would be reduced. The risk of collisions, disturbance, and other associated effects on sea turtles would similarly be reduced consistent with the overall reduction in vessel trips required to construct each alternative configuration. Thus, vessel traffic associated with the RWF would be expected to increase less than those estimated for the Proposed Action. For the Proposed Action, Revolution Wind (Tech Environmental 2023) has estimated that Project O&M would involve up to four CTV and two SOV trips per month for wind farm O&M, or 2,280 vessel trips over the life of the Project. It can be assumed that Alternative D would require similar or slightly fewer vessel trips during O&M.<br>Therefore, the potential effects of vessel collisions on sea turtles would be **minor** adverse for the life of the Project; BOEM does not expect the viability of sea turtle populations to be affected. | | | | **Offshore:** Similar to Alternatives C through F, Alternative G would require the same types and number of construction, O&M, and decommissioning vessels producing similar impacts to those described for the Proposed Action, but the number of vessel trips and overall duration of construction activity would be reduced. The potential effects of vessel collisions on sea turtles would be **minor** adverse for the life of the Project; BOEM does not expect the viability of sea turtle populations to be affected. |

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### 3.19.2.2 Alternative A: Impacts of the No Action Alternative on Sea Turtles

#### 3.19.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for sea turtles (including search and rescue) (see Section 3.19.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the sea turtles GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.19.2.2.2 Cumulative Impacts

This section discloses potential sea turtles impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

#### Offshore Activities and Facilities

<u>Accidental releases and discharges:</u> BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore renewable energy facilities (30 CFR 585.105(a)). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). BOEM also requires applicants to develop spill response and containment plans to quickly address accidental spills of fuels, lubricants, and other contaminants. While marine vessels are an inherent source of accidental releases of trash, debris, and contaminants, these requirements would effectively avoid and minimize these impacts such that the resulting effects to sea turtles would be **negligible** adverse.

Trash or water quality contaminants could be accidentally released as a result of increased human activity associated with future offshore wind construction activities. All species of sea turtles have been documented ingesting plastic fragments (Bugoni et al. 2001; Hoarau et al. 2014; Nelms et al. 2016) and a variety of other anthropogenic waste (Tomás et al. 2002), likely mistaking debris for potential prey items (Schyuler et al. 2014). Ingesting trash or exposure to aquatic contaminants can be lethal to sea turtles. However, turtles may also be affected sublethally in a variety of ways, which could include experiencing depressed immune system function; poor body condition; and reduced growth rates, fecundity, and reproductive success (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). Sea turtles could additionally become entangled in debris, causing lethal or injurious impacts. Entanglement in lost fishing gear is a significant cause of mortality in both juvenile and adult sea turtles and was noted as a threat to recovery for multiple ESA-listed turtles in the marine environment (NMFS and USFWS 1991, 1992; NMFS et al. 2011). Based on a recent global review, 5.5% of encountered sea turtles were found to be entangled, and 90.6% of these were dead (Duncan et al. 2017). Lost or discarded fishing gear was associated with most of these entanglements, and many experts believed that these impacts could be causing population-level impacts in some areas. Aquatic contaminant exposure could also result in mortality, and sublethal effects could impact many of the species' physiological systems during all life stages (Bembenek-Bailey et al. 2019; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Furthermore, accidental releases could indirectly impact sea turtles by impacting prey species. However, all vessels would comply with USCG regulations, and wind farm construction projects would comply with additional BOEM requirements that would avoid and minimize accidental releases of trash or other debris. Therefore, potential accidental releases of trash or debris would not appreciably contribute to adverse impacts to sea turtles and would be **negligible** adverse.

Impacts to sea turtles from accidental spills and releases associated with ongoing future non–offshore wind activities are likely to increase over the next 30 years commensurate with increases in vessel traffic. Future offshore wind activities would contribute to this increased risk. A total of approximately 34 million gallons of coolants, fuels, oils, and lubricants could be stored within WTG foundations and OSSs across all projected offshore wind projects along the Atlantic Coast. A high-volume spill of toxic materials (fuels, lubricants, and other contaminants) could potentially injure or kill several individual sea turtles and adversely affect habitat suitability. Given that the affected habitats would be at or outside the northern limit of range of most species, the number of individuals impacted would be small relative to population size. In the unlikely event of a high-volume spill, impacts of this magnitude would constitute a moderate effect on sea turtles. BOEM anticipates that the likelihood of a major spill of petroleum products and other toxic substances during construction is very low (a 1 in 1,000 chance per year) due to vessel allisions, collisions, O&M activities, or weather events (Bejarano et al. 2013). WTGs and OSSs are generally self-contained and would not generate discharge. All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and the BSEE Oil spill response plans are required for each project and would provide for rapid spill response, clean-up, and other measures that would help to minimize potential impacts on affected resources. Given the low probability of a large spill event, impacts to sea turtles from this IPF are likely to be **negligible** adverse.

<u>Climate change:</u> Global climate change is an ongoing potential risk to sea turtles, although the associated impact mechanisms are complex, not fully understood, and difficult to predict with certainty. This is particularly true when considering how the effects of climate change may interact with other IPFs. Possible impacts to sea turtles due to climate change include increased storm severity and frequency; changes in nearshore habitat suitability caused by increased erosion from upland sources; exposure to disease; ocean acidification; and altered habitat, prey availability, ecology, and migration patterns (Hawkes et al. 2009).

However, some of these potential impacts could also contribute to potential benefits associated with the creation of artificial reef habitat and could represent an increasing impact over the life of the Project. The potential implications of these and other related environmental changes and how they interact with the effects of regional offshore wind development are complex and uncertain. For example, the distribution of leatherback sea turtles in the North Atlantic is shifting northward in response to changes in water temperature (McMahon and Hays 2006). Should this trend continue it could lead to increased interactions between this species and offshore wind farms on the mid-Atlantic OCS, potentially magnifying the impacts and benefits described above. Over time, climate change, in combination with coastal and offshore development, would alter existing habitats, potentially rendering some areas unsuitable for certain species and more suitable for others. As described in Section 3.19.1, sea turtle populations likely to be impacted by future offshore wind activities are stable or generally increasing from historic lows. Therefore, potential climate change impacts would be **minor** adverse.

<u>Noise:</u> Under the No Action Alternative, human activities would continue to generate underwater noise with the potential to affect sea turtles. Existing and future sources of anthropogenic underwater noise

include commercial, government and military, research, and recreational vessel activity; military sonar; geophysical surveys; and the development and operation of other wind energy projects on the OCS. Several wind energy projects could be developed between 2022 to 2030, and their construction periods could overlap, adding several new sources of underwater noise to baseline levels generated by vessel traffic. As discussed in Section 2.1.3, some projects could be constructed concurrently or could involve concurrent construction activities (e.g., impact pile driving) at two or more locations in proximity, creating the potential for larger and/or overlapping areas of underwater noise effects.

Existing and potential future anthropogenic noise sources generally fall into two categories: 1) impulsive noise, defined as the instantaneous change in sound pressure over a short period of time; and 2) non-impulsive noise, which could be intermittent or remain constant and stable over a given time period. Impulsive and non-impulsive noise sources associated with offshore wind projects are discussed in the sections below.

*Impulsive noise*: Existing and potential future sources of impulsive underwater noise in the GAA include impact pile driving used in nearshore and offshore construction activities and geological and geophysical surveys.

Sea turtles could experience any of the following three potential exposure scenarios under the No Action Alternative:

1. Concurrent exposure to noise from two or more impact hammers, operating within the same project or in adjacent projects
2. Non-concurrent exposure to noise from multiple pile-driving events within the same year
3. Exposure to two or more concurrent or non-concurrent pile-driving events over multiple years

The reader is referred to Section 3.15 for a discussion of these concurrent noise exposure scenarios.

Geological and geophysical surveys generate high-intensity impulsive sound with the potential to result in short-term and long-term impacts on sea turtles if they are present in the ensonified area. Offshore wind surveys typically involve HRG equipment, which can generate non-impulsive noise that is generally less intense than noise generated from other geological and geophysical survey methods. Potential impacts from HRG equipment include sub-bottom profilers (e.g., boomer and sparker categories of equipment) that could be audible to sea turtles.

None of the equipment being operated for these surveys that overlaps with the hearing range (30 Hz to 2 kHz) for sea turtles has source levels loud enough to result in PTS or TTS based on the peak or cumulative exposure criteria. Therefore, physical effects are extremely unlikely to occur. Sea turtles could exhibit a behavioral response when exposed to received levels of 175 dB re 1 µPa (rms), and some HRG is within their hearing range (below 2 kHz). For boomers and bubble guns, the distance to this threshold is 40 m, and is 90 m for sparkers. Thus, a sea turtle would need to be within 90 m of the source to be exposed to potentially disturbing levels of noise. We expect that sea turtles would react to this exposure by swimming away from the sound source; this would limit exposure to a short time period—just the few seconds it would take an individual to swim away to avoid the noise. The risk of exposure to potentially disturbing levels of noise is reduced by the use of PSOs to monitor for sea turtles. At the start of a survey, equipment cannot be turned on until the exclusion zone is clear for at least 30 minutes. This condition is expected to reduce the potential for sea turtles nearby to be exposed to noise that could be disturbing.

However, even in the event that a sea turtle is submerged and not seen by the PSO, in the worst case, it is expected that sea turtles would avoid the area ensonified by the survey equipment that they can perceive. Because the area where increased underwater noise would be experienced is transient and increased underwater noise would only be experienced in a particular area for only seconds, BOEM expects any effects to behavior to be minor and limited to a temporary disruption of normal behaviors, temporary avoidance of the ensonified area, and minor additional energy expenditure spent while swimming away from the noisy area. If foraging or migrations are disrupted, BOEM expects that they would quickly resume once the survey vessel has left the area. No sea turtles would be displaced from a particular area for more than a few minutes. While the movements of individual sea turtles would be affected by the sound associated with the survey, these effects would be temporary (seconds to minutes) and localized (avoiding an area no larger than 90 m), and there would be only a minor and temporary impact on foraging, migrating, or resting sea turtles as the vessel continues along a survey line. Effects to individual sea turtles from brief exposure to potentially disturbing levels of noise are expected to be minor and limited to a brief startle, a short increase in swimming speed, and/or short displacement and would be so small that they cannot be meaningfully measured, detected, or evaluated; therefore, effects are negligible.

BOEM has concluded that disturbance of sea turtles from underwater noise generated by site characterization and site assessment activities would likely result in temporary displacement and other behavioral or nonbiologically significant physiological consequences (i.e., no injury or mortality would occur), and impacts on sea turtles would be negligible adverse.

Impulsive underwater noise from impact pile driving during planned offshore wind development, due to the anticipated frequency and spatial extent of effects, represents the highest likelihood for exposure of individual sea turtles to adverse impacts from noise. Although these potential impacts are acknowledged, their potential extent and magnitude is unclear because sea turtle sensitivity and behavioral responses to underwater noise are a subject of ongoing study. Potential behavioral impacts could include altered submergence patterns, temporary disturbance, startle response (diving or swimming away), and temporary displacement of feeding/migrating and a temporary stress response, if present within the ensonified area (NSF and USGS 2011; Samuel et al. 2005). The accumulated stress and energetic costs of avoiding repeated exposure to pile-driving noise over a season or a life stage could have long-term impacts on survival and fitness (Navy 2018). Conversely, sea turtles could become habituated to repeated noise exposure over time and not suffer any long-term consequences (O'Hara and Wilcox 1990; Hazel et al. 2007). This type of noise habituation has been demonstrated even when the repeated exposures were separated by several days (Bartol and Bartol 2011; Navy 2018).

Sea turtles that are close to impact pile driving could experience a temporary or permanent loss of hearing sensitivity. In theory, reduced hearing sensitivity could limit the ability to detect predators and prey or find potential mates, reducing the survival and fitness of affected individuals. However, the role and importance of hearing in these biological functions for sea turtles remain poorly understood (Lavender et al. 2014). Impacts to sea turtles from construction-related noise would likely be limited to minor or moderate short-term impacts on a small number of individuals. These short-term impacts on individuals are not expected to result in population-level effects; the effects of impulsive noise on sea turtles would therefore be **minor** adverse overall.

*Non-impulsive noise*: Non-impulsive underwater noise sources in the GAA include baseline noise levels from activities not regulated by BOEM, such as commercial, military and government, research, and recreational vessel traffic; aircraft; and offshore development activities. The planned development of other wind energy facilities would contribute additional new sources of intermittent non-impulsive underwater noise, including helicopters and fixed-wing aircraft, construction and O&M vessels, and vibratory pile driving during construction. Operational noise from WTGs would constitute a low-level, non-impulsive underwater noise source throughout the life of a given project.

Helicopters and fixed-wing aircraft could be used during initial site surveys, protected species monitoring prior to and during construction, and facility monitoring. Sea turtle responses to aircraft noise and disturbance is not well documented. Bevan et al. (2018) observed no evident behavioral responses from sea turtles exposed to drones flown directly overhead at altitudes ranging from 60 to 100 feet. Helicopters and aircraft would operate at altitudes of 1,000 feet or more except when helicopters are landing or departing from service vessels. In development of American National Standards Institute (ANSI) guidelines for fishes and sea turtles, Popper et al. (2014) did not consider aircraft noise because it was not considered to pose a great risk. Based on this information, cumulative effects on sea turtles from aircraft used for wind energy development on the OCS would be expected to be negligible.

Vibratory pile driving used during submarine cable construction is the most intensive source of intermittent, non-impulsive underwater noise expected to result from planned offshore wind energy development. Vibratory pile-driving noise can exceed levels associated with behavioral disturbance in sea turtles but only within a short distance (i.e., less than 200 feet) from the source. Given this low exposure probability to vibratory pile-driving noise and the fact that vibratory pile-driving activities would be limited in extent, temporary in duration, and widely separated, vibratory pile-driving noise effects on sea turtles would be negligible adverse.

Construction and operational vessels are the most broadly distributed source of intermittent non-impulsive noise associated with offshore wind projects. Sea turtle exposure to underwater vessel noise would correspondingly increase as a result of planned offshore wind projects, especially during construction periods. Applying vessel activity estimates developed by BOEM based on its 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), vessel activity could peak in 2025, with as many as 210 vessels involved in the construction of reasonably foreseeable projects (see Section 2.1.3 for details). However, this increase must be considered relative to the baseline level of vessel traffic. The relatively low frequency range of turtle hearing (100–1,200 Hz) (Ketten and Bartol 2006; Lavender et al. 2014) overlaps the broad frequency spectrum of intermittent non-impulsive noise produced by vessels (10–1,000 Hz). Sea turtles could respond to vessel approach and/or noise with a startle response and a temporary stress response (NSF and USGS 2011). Overall, impacts to sea turtles from vessel noise would be negligible. Although sea turtles could become habituated to repeated noise exposure over time (Hazel et al. 2007), vessel noise effects for other wind farm development projects are expected to be broadly similar to noise levels from existing vessel traffic in the region. Nonetheless, periodic localized, intermittent, and temporary behavioral impacts on sea turtles could occur. Underwater noise generated by construction vessels would not exceed injury thresholds for turtles, as noise levels produced by vessels in general are below levels that could cause potential auditory threshold shifts. Behavioral responses to vessels have been reported but are thought to be more associated with visual cues, as opposed to auditory cues (Hazel et al. 2007), although both senses likely play a role in avoidance. A conservative assumption is that construction and support vessels could elicit behavioral changes in individual sea turtles near the vessels. It is assumed that these behavioral changes would be limited to evasive maneuvers such as diving, changes in swimming direction, or changes in swimming speed to distance themselves from vessels. Based on sea turtle responses to other types of disturbance (e.g., Bevan et al. 2018), turtle behavior is expected to return to normal when vessel noise dissipates. Given limited turtle sensitivity to underwater noise produced by vessels, the short-term nature of any behavioral responses, and the patchy distribution of sea turtles in the GAA, the effects of vessel noise from future activities on sea turtles would be negligible adverse.

Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct-drive systems like those proposed for the RWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 $dB_{RMS}$, occasionally reaching as high as 128 $dB_{RMS}$, in the 10-Hz to 8-kHz range. This is consistent with the noise levels observed at the BIWF (110 to 125 dB re 1 µPa SPL rms) (Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. Sea turtle hearing is largely within the frequency range (< 1,200 Hz) for operational wind turbines; therefore, it is possible that wind turbine noise could be heard by sea turtles, although behavioral responses are unlikely based on the established threshold (175 $dB_{RMS}$ re 1 µPa). This indicates that operational noise effects from other future actions would likely be negligible adverse.

Overall, effects of non-impulsive noise on sea turtles would be **negligible** adverse because of the patchy distribution of sea turtles and limited likelihood of behavioral responses to expected noise levels.

Presence of structures: The addition of up to 3,088 new offshore foundations in the GAA could increase sea turtle prey availability by creating new hard-bottom habitat, increasing pelagic productivity in local areas, or promoting fish aggregations at foundations (Bailey et al. 2014). The artificial reefs created by these structures form biological hotspots that could support species range shifts and expansions and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). Section 3.13 discusses reef creation and altered water flow in detail. The significance of these ecological changes to sea turtles is unknown, but the biological productivity generated by reef effects could result in improved foraging opportunities for some species at project scales. For example, loggerhead turtles may benefit from the increased abundance of crustaceans and other prey species concentrated around offshore structures. On this basis, the presence of structures could produce permanent minor beneficial effects on sea turtles that would persist over the life of the Project.

In contrast, broadscale hydrodynamic impacts could alter zooplankton distribution and abundance (van Berkel et al. 2020). There is considerable uncertainty as to how these broader ecological changes would affect sea turtles in the future and how those changes will interact with other human-caused impacts. The effect of reef effects and hydrodynamic impacts on sea turtles and their habitats under the No Action Alternative could be adverse or beneficial, varying by species, and their extent and magnitude is unknown.

The presence of structures could also concentrate recreational and commercial fishing around foundations, which could indirectly increase the potential for sea turtle entanglement in both lines and nets (Gall and Thompson 2015; Nelms et al. 2016; Shigenaka et al. 2010). Entanglement in both lines and nets could lead to injury and mortality due to abrasions, loss of limbs, and increased drag, leading to reduced foraging efficiency and ability to avoid predators (Barreiros and Raykov 2014; Gregory 2009; Vegter et al. 2014). Between 2016 and 2018, 186 sea turtles were documented as hooked or entangled with recreational fishing gear (BOEM 2021a). Due to the high number of foundations in a given lease area, it is likely that recreational and for-hire fisheries would avoid overcrowding structures by dispersing effort across many WTG foundations. However, the risk of entanglement and hooking or ingestion of marine debris could slightly increase from recreational and for-hire fishing since both fishers and turtles may be attracted to the same areas.

If structures result in vessel displacement or gear shifts, the potential impact to sea turtles is uncertain. Increased risk would not be expected by vessel displacement due to the patchy distribution of sea turtles. However, it could result in a potential increase in the number of vertical lines in the water column if there is no commensurate reduction in fixed-gear types as compared to mobile gear. In such circumstances of a greater shift from mobile gear to fixed gear, there would be a potential increase in the number of vertical lines, resulting in an increased risk of sea turtle interactions with fishing gear. Therefore, associated effects of structures on sea turtles through potential reef effects, hydrodynamic impacts, and concentration of fishing would be **minor** adverse.

<u>Vessel traffic:</u> Vessel strike is an increasing concern for sea turtles. The percentage of loggerhead sea turtles stranded with injuries consistent with vessel strikes increased from approximately 10% in the 1980s to 20.5% in 2004, although an unknown number may have been struck postmortem (NMFS and USFWS 2007). Sea turtles are expected to be most susceptible to vessel collision in shelf waters, where they forage. Furthermore, they cannot reliably avoid being struck by vessels exceeding 2 knots (Hazel et al. 2007); typical vessel speeds in the GAA could exceed 10 knots. Up to 210 vessels associated with offshore wind development could be operating in the GAA during the peak construction period in 2025. Additional fishing vessels could also be present in the vicinity due to the expected increase in fish biomass around the WTG structures. Increased vessel traffic could result in sea turtle injury or mortality; however, the proportional increase in vessel traffic from baseline would be minimal (refer to Section 3.16 and COP Appendix R [DNV GL Energy USA, Inc. 2020]). Despite the unlikely potential for individual fatalities, no population-level impacts on sea turtles are expected based on occurrence and potential exposure. Assuming other offshore wind projects employ the same minimization measures included in this Project (see Table F-1 in Appendix F), impacts would be further reduced and would be considered **minor** adverse.

#### 3.19.2.2.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts associated with the Project to sea turtles would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on sea turtles, primarily through, but not limited to, construction-related lighting, noise, habitat alternation, collision risk, and the artificial reef effect.

Based on the current science, BOEM anticipates that the impacts of ongoing activities, especially vessel traffic, commercial and recreational fisheries gear interaction, and climate change, would be **minor**. In addition to ongoing activities, reasonably foreseeable activities other than offshore wind development include increased vessel traffic; new submarine cables and pipelines; channel-deepening activities; and the installation of new towers, buoys, and piers. BOEM anticipates that the impacts of reasonably foreseeable activities other than offshore wind would be minor. BOEM expects that the combination of ongoing activities and reasonably foreseeable activities other than offshore wind development to result in minor impacts on sea turtles, driven primarily by increasing vessel traffic and interactions with commercial and recreational fisheries gear.

The combined impact-level criteria in Table 3.3-2 and Table 3.3-3 in Chapter 3 are used to characterize the combined effects of all IPFs likely to occur in the GAA under the No Action Alternative. BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts from construction and operational noise and exposure to vessel traffic and **minor** beneficial impacts to sea turtles from increased biological productivity created by reef effects. Those impacts would range from short term to long term in duration. Future offshore wind activities are expected to contribute considerably to several IPFs, the most prominent being the presence of structures—namely foundations, scour/cable protection, and pile-driving noise.

The No Action Alternative would forgo any monitoring that Revolution Wind has committed to perform, the result of which could provide an understanding of the effects of offshore wind development, benefit future management of sea turtles, and inform planning of other offshore developments. However, other ongoing and future surveys could provide similar data.

### 3.19.2.3 Alternative B: Impacts of the Proposed Action on Sea Turtles

#### 3.19.2.3.1 Construction and Installation

##### Offshore Activities and Facilities

Construction impacts to sea turtles could occur from accidental releases and discharges, artificial lighting, seafloor disturbance, entrainment and impingement, underwater and airborne noise, vessel traffic (strikes and noise), and water quality degradation. The potential for these impacts to occur are discussed in detail by IPF.

<u>Accidental releases and discharges:</u> During construction of the RWF and RWEC, there could be a short-term risk of sanitary and other waste fluids or fuels and other petrochemicals accidentally entering the water. If sea turtles were to be exposed to an oil spill or a discharge of waste material, studies indicate that respiration, skin, some aspects of blood chemistry and composition, and salt gland function could be significantly impacted in exposed individuals (Vargo et al. 1986). Any nonroutine spills or accidental releases that could result in negligible and short-term impacts to surface water resources would be avoided or minimized through the implementation of the Project SPCC plan and other EPMs (see Table F-1 in Appendix F). Impacts on sea turtles from accidental spills or releases of pollutants are considered negligible because of the low probability of the risk and EPM implementation.

Trash and debris that enter the water represent a risk factor to sea turtles because the turtles could ingest or become entangled in debris, causing lethal or injurious impacts. Pollution (e.g., plastic) is often mistaken for food such as jellyfish and ingested, which can block intestinal tracts, causing injury or mortality. See Section 3.15.2 for additional debris and entanglement analysis. Personnel working offshore would receive training on sea turtle and marine debris awareness. Impacts on sea turtles from accidental deposits of trash or debris associated with RWF are considered minor because implementation of proposed EPMs would lower the probability of such risk.

BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore energy facilities (30 CFR 585.105(a)). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). The Project would comply with these requirements (VHB 2023). Given these restrictions, the short-term impacts to sea turtles from trash and debris from the Project would be **negligible** adverse.

Construction vessels also pose a potential risk for Project-related accidental spills. As described in Section 3.21.2.2.1, the chance of a spill occurring due to vessel allisions or collisions would be low (once per 1,000 years). In the unlikely event an allision or collision involving Project vessels or components resulted in a high-volume spill, impacts on water quality would be minor to moderate adverse and temporary to long term, depending on the type and volume of material released and the specific conditions (e.g., depth, currents, weather conditions) at the location of the spill. Project EPMs, permit requirements, controls, and procedures would be implemented as part of the Project to reduce the potential or extent of offshore spills, thereby avoiding or minimizing impacts on water quality. Should a spill occur, response and containment procedures would limit the reach of the spill to a localized area, where changes to water quality would be detectable and would exceed water quality standards. Given the low potential for spills and minimal risk of exposure to small temporary spills, the risk from construction-related spills is **negligible** to **minor** adverse.

Noise: A temporary increase in underwater noise is the most likely construction-related factor that could impact sea turtles if they are present in the area during the time of RWF and offshore RWEC construction. Construction noise sources include impact and vibratory pile driving, UXO detonation, HRG surveys, construction vessels, and helicopters and fixed-wing aircraft.

The current literature and effect analysis guidance regarding sensitivity to underwater noise effects vary depending on the source. Popper et al. (2014) reviewed available data and suggested the threshold levels of 207 peak decibels (dB re 1 µPa) and 210 decibels referenced to the sum of cumulative pressure in micropascals squared, normalized to 1 second (dB re 1 $\mu Pa^2s$) for injurious (i.e., hearing loss) underwater noise for sea turtles. These recommended criteria are for mortality and potential mortal injury. NMFS has considered injury onset for PTS (i.e., permanent hearing injury) beginning at 232 dB re 1 µPa and 204 dB re 1 $\mu Pa^2s$ and TTS (i.e., a temporary and recoverable loss of hearing sensitivity) beginning at 226 peak dB re 1 µPa and 189 cumulative dB re 1 $\mu Pa^2s$ (Navy 2017). Exposure modeling for the extent of injurious effects from impulsive underwater noise was completed by Kusel et al. (2023) using the Navy (2017) thresholds, including a behavioral response SPL threshold of 175 rms dB re 1 µPa. These thresholds apply to juvenile, subadult, and adult life stages.

Table 3.19-3 summarizes thresholds for underwater noise effects and the maximum distances to injurious and behavioral effects from construction-related underwater noise levels from construction-related activities, including impact pile driving (Kusel et al. 2023), UXO detonation (Hannay and Zykov 2022), and HRG surveys (LGL 2022). These effects are described in greater detail below.

**Table 3.19-3. Distances to Sea Turtle Underwater Noise Injury and Behavioral Thresholds for Wind Turbine Generator and Offshore Substation Foundation Installation**

| Activity† | Number of Sites | Total Days | Noise Exposure Type | Exposure Threshold*,¥ | Range of Threshold Distances (feet)‡ |
|---|---|---|---|---|---|
| 12-m WTG monopile foundation installation | 100 | 33 | Peak injury | 232 | – |
| | | | Cumulative injury | 204 | 98–689 |
| | | | Behavioral or TTS | 175 | 1,903–2,920 |
| 15-m OSS monopile foundation installation | 2 | 2 | Peak injury | 232 | – |
| | | | Cumulative injury | 204 | 0–820 |
| | | | Behavioral or TTS | 175 | 2,362–3,182 |
| Temporary cofferdam installation | 1 | 14 | Cumulative injury | 220 | 102 |
| | | | Behavioral or TTS | 189 | 175 |
| UXO detonation | Undeter-mined€ | Undeter-mined€ | Peak injury | 232 | 112–689 |
| | | | Cumulative injury | 204 | 207–1,699 |
| | | | TTS | 189 | 354–8,235 |
| HRG surveys | 10,779 | 248 | Behavioral | 189 | 0–300 |
| Construction vessel operation | N/A | ~730 | Behavioral or TTS | 189 | – |

* Peak injury thresholds are SPL in dB re 1 μPa; cumulative injury thresholds are frequency-weighted SEL in dB re 1 $\mu Pa^2 \cdot s$ based on 24 hours of continuous exposure. The peak injury threshold is not recommended for estimating risk of injury from UXO detonation (Hannay and Zykov 2022).

† Installation scenario for 12-m monopile is 10,740 strikes/pile at installation rate of three piles/day. Installation scenario for 15-m monopile is 11,563 strikes/pile at installation rate of one pile/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction. Sound source scenario for UXOs assumes detonation of thirteen 1,000-pound explosives with 10 dB of sound source attenuation.

‡ Pile-driving values are maximum threshold distances modeled by Kusel et al. (2023) for winter conditions. UXO detonation values are the range of maximum distances modeled by Hannay and Zykov (2022) for 5- to 1,000-pound explosive devices. Both sets of values assume 10 dB of sound attenuation.

¥ Navy (2017)

€ The 16 UXOs identified as of February 2023, all within in the RWEC corridor, can be safely avoided by rerouting the cable route (Orsted 2023). However, additional devices could be identified prior to and during construction that cannot be safely avoided or relocated. Therefore, the need for UXO detonation cannot be entirely ruled out.

As shown in Table 3.19-3, impact pile driving and UXO detonation produce sufficient underwater noise to cause permanent hearing injury and behavioral effects on sea turtles. The combined impact area for pile driving is sufficiently large that the potential for hearing injury to some sea turtles cannot be discounted. As of February 2023, 16 UXOs have been identified in the RWEC corridor. Revolution Wind (Orsted 2023) has determined that all 16 devices can be safely avoided by shifting the cable route within the approved installation corridor without the need for detonation. However, it is possible that additional devices could be discovered in preconstruction surveys or during construction that cannot be avoided or safely relocated. BOEM has concluded that the need for UXO detonation cannot be entirely ruled out and therefore the potential effects of this activity on invertebrates are considered herein. UXO surveys completed to date have not identified any UXOs within the Lease Area or near the proposed foundation positions and have only identified UXOs within the RWEC corridor in state waters at the mouth of and outside Narragansett Bay (Revolution Wind 2022b). The locations where UXOs are most likely to be encountered are within the central portion of the RWF and on the RWEC corridor at the mouth and outside of Narragansett Bay (Ordtek, Inc. [Ordtek] 2021). Although to date there are no identified UXOs directly influencing the technical feasibility assessment of the foundation positions proposed in the RWF, the risk of emergent finds will continue to be a consideration in the continued design and refinement of the RWF. The extent and duration of exposure to potential injury-level effects from UXO detonation shown in Table 3.19-3 assumes the possible detonation of thirteen 1,000-pound devices. It is now understood that this is likely an overestimate and relatively small in comparison to pile driving. Even though it is improbable, should UXO detonation be required under the maximum impact scenario considered in this analysis, the risk of permanent hearing injury to sea turtles is relatively low.

Little is known about the role of sound perception in the sea turtle's typical activities. Although sea turtles have relatively unspecialized ears relative to other vertebrate species, their auditory organs appear to be specifically adapted to underwater hearing (Dow Piniak et al. 2012). Studies indicate that hearing in sea turtles is confined to lower frequencies, below 1,200 Hz, with the range of highest sensitivity between 100 and 700 Hz (Dow Piniak et al. 2012), with some variation between species (Bartol and Ketten 2006; Dow Piniak et al. 2012; Martin et al. 2012; Piniak et al. 2016). In captive enclosures and during NSF-funded at-sea seismic monitoring programs, sea turtles generally respond to seismic survey sound with behavioral changes such as startling, increasing swimming speed, and swimming away from and/or locally avoiding the source (McCauley et al. 2000; NSF and USGS 2011). The majority of pile-driving activities are expected to take place during daylight hours. However, pile driving could occur at any time during the night under specific circumstances,[3] and EPMs are incorporated to appropriately minimize the risks associated with this activity (see Appendix F). Sea turtles migrating through the area when pile driving occurs are expected to adjust their course to avoid the area where noise is elevated above 175 dB re 1 μPa. Depending on how close the individual is to the pile being driven, this could involve swimming a mile or more to avoid stressful noise levels. Such behavioral alterations could cause turtles to cease foraging or expend additional effort and energy avoiding the area. Presumably, turtles could continue foraging activities outside the area of elevated noise levels as adjacent habitat provides similar foraging opportunities. The sea turtle may experience physiological stress during this avoidance behavior, but this stressed state would be anticipated to dissipate over time once the turtle is outside the ensonified area. Either a temporary or permanent reduction in hearing sensitivity could be harmful for sea turtles, but the potential extent and magnitude is unclear because the role that hearing plays in sea turtle survival (e.g., for predator avoidance, prey capture, and navigation) is poorly understood (NSF and USGS 2011). The use of PSOs, exclusion and monitoring zones, and pile-driving soft start measures (see Table F-1 in Appendix F) would minimize the risk of sea turtle exposure to elevated underwater noise levels. PSO effectiveness will be enhanced using clearly defined requirements and guidance, including nighttime and low-visibility PSO protocols (see Appendix F). However, the efficacy of exclusion and monitoring zones

[3] Nighttime pile driving may be required under specific circumstances where foundation installation takes longer than anticipated and delaying installation until daylight could present risks to safety and/or structural stability.

would be less during periods of nighttime pile driving, potentially exposing more individuals to elevated underwater noise.

Foraging disruptions due to displacement would be temporary and are not expected to last longer than a few hours per day when pile driving occurs. This displacement would result in a relatively small energetic consequence that would not be expected to have long-term impacts on sea turtles. Construction activities could temporarily displace animals into areas that have a lower foraging quality or result in higher risk of interactions with ships or fishing gear. However, the duration of disturbance is limited to active pile driving, and displaced individuals are expected to have suitable foraging opportunities throughout the Lease Area outside the influence of noise disturbance. WTG and OSS monopile installation would require 1 to 4 hours of active pile driving per pile under typical circumstances, with difficult installations requiring up to 12 hours. The maximum installation rate for WTG installation is three piles per day. The installation rate for OSS monopiles is one per day.

Impact pile driving during construction is the loudest potential impulsive underwater noise source associated with the Project and would produce the most extensive effects. As discussed in Section 3.19.1.1, the potential significance of impulsive underwater noise is unclear because sea turtle sensitivity and behavioral responses to underwater noise are a subject of ongoing study. Potential behavioral impacts could include altered submergence patterns, temporary disturbance, startle response (diving or swimming away), and temporary displacement of feeding/migrating and a temporary stress response, if present within the ensonified area (NSF and USGS 2011; Samuel et al. 2005). The accumulated stress and energetic costs of avoiding repeated exposure to pile-driving noise over a season or life stage could have long-term impacts on survival and fitness (Navy 2018). Conversely, sea turtles could become habituated to repeated noise exposure over time and not suffer long-term consequences (O'Hara and Wilcox 1990). This type of noise habituation has been demonstrated even when the repeated exposures were separated by several days (Bartol and Bartol 2011; Navy 2018).

Kusel et al. (2023) developed estimates of the number of sea turtles that could be exposed to potential adverse noise-related effects from WTG and OSS foundation installation. They used a sophisticated exposure model to estimate the number of individuals by species that could be exposed to PTS, TTS, and other temporary physiological and behavioral effects from construction noise exposure. The analysis used a conservative construction schedule in which the WTG and OSS installation was concentrated during the highest density months for each species, with up to three piles per day for 30 days. Based on the established timing restrictions to protect marine mammal species (i.e., NARWs), construction would occur primarily during the summer months when sea turtles (especially loggerheads and leatherbacks) have a higher likelihood of being present. The density estimates supporting the analysis are therefore likely representative of densities when construction activities would occur. The exposure estimates presented in Table 3.19-4 assume a broadband attenuation of 10 dB and a Project construction duration of approximately 35 days, assuming an aggressive installation schedule of three WTG and one OSS foundations per day.

Hannay and Zykov (2022) used a similar model to estimate the threshold distances for PTS and TTS exposure from UXO detonation with 10 dB of sound attenuation. Turtles within 689 feet of UXO detonation could experience injury based on the threshold of 232 dB re 1 $\mu Pa^2 s$. Turtles within 1,699 feet exposed to multiple UXO detonations in a single day could experience accumulated injury from based on the 204 dB SEL dB re 1 $\mu Pa^2 s$. Turtles within 8,235 feet of UXO detonation could experience behavioral impacts based on the threshold of 189 dB re 1 $\mu Pa^2s$. The UXO detonation plan would include the same or similar sound attenuation, PSOs, and site exclusion EPMs used for pile driving (see Table F-1, Appendix F) to avoid and minimize adverse impacts to sea turtles. These exposure estimates do not consider the benefits to sea turtles from avoiding accidental uncontrolled UXO detonations that could occur in the absence of the Project. Zykov (2022) developed an exposure model to estimate the number of individuals by species that could be exposed to PTS and TTS from UXO detonation. The exposure scenario for UXOs assumes that thirteen 1,000-pound devices would require detonation within the RWF and RWEC work areas and that the devices are distributed such that the exposure areas would not overlap. Zykov (2022) determined that less than one individual leatherback and less than one individual loggerhead sea turtle could be exposed to PTS or TTS effects from UXO detonation in the RWEC corridor, and none would be exposed to these effects from detonations in the RWF. No Kemp's Ridley or green sea turtles are likely to be exposed to PTS or TTS effects in either area.

**Table 3.19-4. Estimated Number of Sea Turtles Experiencing a Permanent Threshold Shift and Temporary Threshold Shift or Behavioral Effects from Construction-Related Impact Pile Driving**

| Species | Source | PTS Cumulative Sound Exposure (number of indivuals) | PTS from Peak Sound Pressure Exposure (number of indivuals) | TTS or Behavioral Effects (number of indivuals) | Effect Significance* |
|---|---|---|---|---|---|
| Kemp's ridley turtle | Impact pile driving | < 0.01 | 0 | < 1 | Negligible |
| | UXO detonation† | – | 0 | 0 | |
| Leatherback turtle | Impact pile driving | < 1 | 0 | 8 | Minor |
| | UXO detonation† | – | < 1 | 0.8 | |
| Loggerhead turtle | Impact pile driving | < 1 | 0 | 4 | Minor |
| | UXO detonation† | – | < 1 | 0.7 | |
| Green turtle ‡ | Impact pile driving | < 0.01 | 0 | < 1 | Negligible |
| | UXO detonation† | – | 0 | 0 | |

Source: Kusel et al. (2023), Zykov (2022)

Note: Modeled exposure estimates based on impact hammer installation of one hundred 12-m and two 15-m monopiles. Installation scenario assumes use of a noise attenuation system achieving 10-dB effectiveness. Values < 1 indicate a modeled exposure estimate of greater than 0 but less than 0.5 affected individual, which is considered a result of zero for regulatory purposes.

* See impact significance criteria definitions in Chapter 3, Table 3.3-2.

† Take estimates assume potential exposure to detonation of thirteen 1,000-pound devices in the RFW and RWEC.

‡ Kraus et al. (2016) did not observe any green sea turtles in the RI/MA WEA. Densities of Kemp's ridley sea turtles are used as a conservative estimate.

Sea turtles that are close to impact pile driving could experience a temporary or permanent loss of hearing sensitivity. However, the potential effects on sea turtles are reduced through the implementation of EPMs and additional minimization measures (see Appendix F), including PSOs, soft starts, and noise attenuation systems. Reduced hearing sensitivity could limit the ability to detect predators and prey or find potential mates, reducing the survival and fitness of affected individuals, but the role and importance of hearing in these biological functions for sea turtles remain poorly understood (Lavender et al. 2014). Based on the combination of minimization measures and the low numbers of sea turtles expected in the RWF and RWEC, impacts to sea turtles from impact pile driving are expected to be **negligible** to **minor** adverse.

Vibratory pile driving could be used to install cofferdams for the RWEC sea-to-shore transition at Quonset Point. Similar to the effects of the impulsive impact hammer, only minor impacts to sea turtles from vibratory pile driving are expected because of the combination of minimization measures used and the low densities of sea turtles in the RWF and RWEC. Noise from vibratory pile driving at the sea-to-shore transition would be constrained within the natural geography of Narragansett Bay. Vibratory pile-driving noise is unlikely to exceed recommended sea turtle injury thresholds and would only exceed behavioral thresholds within 175 feet of the source (Kusel et al. 2023). Given the limited spatial extent of these potential effects, sea turtles are more likely to respond to disturbance from construction vessels staging on-site before pile driving begins. This suggests that the potential for exposure to vibratory pile-driving noise is limited at best, with vessel noise and disturbance being the more likely source of potential behavioral effects.

HRG surveys use a combination of sonar-based methods to map shallow geophysical features. Up to 10,779 linear miles of preconstruction surveys would be conducted to support Project installation. The equipment is towed behind a moving survey vessel attached by an umbilical cable. HRG equipment operating at frequencies below 2,000 Hz (typically sub-bottom profilers) may be audible to sea turtles. Equipment such as echosounders and side-scan sonars operate at higher frequencies andwould be outside the hearing range of sea turtles,therefore having no effect on these species. The equipment only operates when the vessel is moving along a survey transect, meaning that the ensonified area is intermittent and constantly moving. BOEM (2021b) evaluated evaluated potential underwater noise effects on sea turtles from HRG surveys and concluded there is no possibility of PTS in sea turtles from HRG sound sources because of the brief and intermittent disturbances that a vessel could have on individuals. Some HRG survey noise sources would exceed the behavioral effects threshold up to 300 feet from the source, depending on the type of equipment used, but given the limited extent of potential noise effects and the EPMs used in this Project (e.g., soft start measures, shutdown procedures, protected species monitoring protocols, use of qualified and NOAA-approved PSOs, and noise attenuation systems), adverse impacts to sea turtles are unlikely to occur. While low-level behavioral exposures could occur, these would be limited in extent and temporary in duration (Kusel et al. 2023). Therefore, underwater noise impacts from HRG surveys are expected to be **minor** adverse.

The relatively low frequency range of turtle hearing (100–1,200 Hz) (Ketten and Bartol 2006; Lavender et al. 2014) overlaps the broad frequency spectrum of noise produced by vessels (10–1,000 Hz). Sea turtles could respond to vessel approach and/or noise with a startle response and a temporary stress response (NSF and USGS 2011). However, Hazel et al. (2007) suggested that turtles could habituate to vessel sounds in marine areas that experience regular vessel traffic. This could reduce the behavioral impacts of vessel noise but could increase the potential for vessel collision (refer to Vessel traffic below).

Underwater noise generated by construction vessels would not exceed injury thresholds for turtles, as noise levels produced by vessels in general are below levels that could cause potential auditory threshold shifts. Behavioral responses to vessels have been reported but are thought to be more associated with visual cues, as opposed to auditory cues (Hazel et al. 2007), although both senses likely play a role in avoidance. A conservative assumption is that construction and support vessels could elicit behavioral changes in individual sea turtles near the vessels. It is assumed that these behavioral changes would be limited to evasive maneuvers such as diving, changes in swimming direction, or changes in swimming speed to distance themselves from vessels. Overall, impacts to sea turtles from vessel noise would be **negligible** adverse.

Fixed-wing aircraft could be used during construction for marine mammal monitoring, and helicopters could be used for crew transport to and from construction vessels. Monitoring aircraft would operate at an altitude of 1,000 feet. Noise levels generated by helicopters and propeller-driven aircraft at this altitude range from 65 to 85 dBA (Behr and Reindel 2008; Brown and Sutherland 1980). Noise from crew transport helicopters would increase during approach and departure from vessel landing pads. Currently, no published studies describe the impacts of aircraft overflights on sea turtles, although anecdotal reports indicate that sea turtles respond to aircraft by diving (BOEM 2017). While helicopter traffic could cause some temporary non-biologically significant behavioral reactions, including startle responses (diving or swimming away), altered submergence patterns, and a temporary stress response (BOEM 2017; NSF and USGS 2011; Samuel et al. 2005), these brief responses would be expected to dissipate once the aircraft has left the area. The potential effects of aircraft noise and disturbance on sea turtles are therefore expected to be **negligible** adverse.

Overall, based on the limited likelihood of exposure and implementation of effective EPMs and minimization measures, the noise effects on sea turtles during construction would be **negligible** to **minor** adverse.

<u>Presence of structures:</u> Effects on sea turtles from the construction and installation of WTG and OSS foundations would result primarily from underwater noise impacts related to impact pile driving and noise and disturbance from associated vessel activity. These impacts are described under the applicable IPFs for each type of disturbance. Indirect effects on sea turtles, such as reduced availability of forage or prey, could also result from impacts on benthic habitat and invertebrate prey species. These effects, including the anticipated acreages of benthic habitat affected by the presence of structures, are described in Sections 3.6.2.2.1 and 3.6.2.3.1. While indirect effects to invertebrate prey resources would occur, these impacts are not likely to significantly affect the availability of prey and forage resources for sea turtles because of their broad resource base and the minimal anticipated adverse effect to invertebrates during the construction phase. Therefore, construction and installation of offshore structures would have temporary, **negligible** to **minor** adverse effects on sea turtles, varying in significance by species.

<u>Vessel traffic:</u> Changes in vessel traffic resulting from the Proposed Action are a potential source of adverse effects on sea turtles. Propeller and collision injuries from boats and ships are common in sea turtles and an identified source of mortality (Hazel et al. 2007; Shimada et al. 2017). Hazel et al. (2007) also reported that individuals may become habituated to repeated exposures over time, when not accompanied by an overt threat. Project construction vessels could collide with sea turtles, posing a temporary increase in the risk of injury or death to individual sea turtles. However, implementation of a range of EPMs to avoid vessel collisions (see Appendix F, Table F-1) are expected to minimize the risk of

collisions with sea turtles. These include adherence to NOAA guidance for collision avoidance and a combination of additional measures, including approved speed restrictions for all vessels within marine mammal SMAs and DMAs. All vessel crews would receive training to ensure these EPMs are fully implemented for vessels in transit. Once on station, the construction vessels either remain stationary when installing the monopiles and WTG/OSS equipment or move slowly (i.e., at less than 10 knots) when traveling between foundation locations. Cable laying and HRG survey vessels also move slowly, with typical operational speeds of less than 1 and approximately 4 knots, respectively.

Based on information provided by Revolution Wind (Tech Environmental 2023), BOEM estimates that Project construction would require up to 1,407 one-way trips by various classes of vessels between the RWF and regional ports in Rhode Island, Massachusetts, Connecticut, New Jersey, Virginia, and Maryland, as well as ports in Europe, over the 2-year construction period. This equates to approximately 59 trips per month, or 704 trips per year. Large construction vessels and barges would account for an estimated 23% of these one-way trips, with the remainder comprising CTVs and other small support vessels. The construction and installation vessels used for Project construction and installation are described in COP Tables 3.11, 3.12, and 10-3 and include jack-up WTG construction and installation vessels, foundation construction and installation vessels, supply vessels and feeder barges, bunkering vessels, cable-laying vessels, crew transport vessels, and various safety and support craft. Typical large construction and installation vessels used in this type of project range from 325 to 350 feet in length, from 60 to 100 feet in beam, and draft from 16 to 20 feet (Denes et al. 2021). Crew transport and various support vessels range in size from 20 to 100 feet. In addition, approximately 10,779 linear miles of preconstruction HRG surveys are anticipated to support micrositing of the WTG foundations and cable routes. HRG surveys could occur during any month of the year and would require a maximum of 248 total vessel days.

BOEM developed a representative analysis of construction vessel effects on regional traffic volume by evaluating the potential increase in transits across a set of analysis cross sections relative to baseline levels of vessel traffic. These cross sections were developed by DNV GL Energy USA, Inc. (2020) to support the COP and are shown in Figure 3.15-2. Using the port of origin information provided by Revolution Wind (Tech Environmental 2023), the estimated 704 construction vessel trips per year would cross transects 13-17 when leaving the RWF and could cross several different transects depending on the destination port. This would equate to a 30% increase in vessel transits across these transects. However, the Automatic Identification System (AIS) data used in transect analysis do not include many recreational vessels and virtually all commercial fishing vessels when actively fishing. These vessel types account for the vast majority of vessel activity. For example, DNV GL Energy USA, Inc. (2020) estimated over 19,000 one-way trips per year by commercial fishing vessels between the RWF and area ports. When these vessel trips are included, Project construction would result in a 3.1% increase in vessel transits per year across transects 13-17. In summary, this assessment indicates that construction vessels would likely increase vessel traffic to some degree, and large vessel traffic would measurably increase during the 2-year construction period. This indicates the potential for increased risk of sea turtle collisions in the absence of planned EPMs and other requirements.

Revolution Wind anticipates that up to 33 RWF construction vessel trips could originate from ports in the Gulf of Mexico. Although no specific ports have been identified for construction support, the travel distance from the Lease Area to the Gulf of Mexico region can be estimated from broad vessel traffic patterns observable in AIS data (BOEM et al. 2022). The minimum travel distance from the Lease Area to an observable area of traffic separation approximately 150 miles due west of Key West, Florida, is approximately 1,550 miles. Travel distance from this point to Gulf of Mexico non-local ports ranges from approximately 475 miles (to the Port of Mobile, Alabama) to 850 miles (to the Port of Corpus Christi, Texas). This equates to total travel distances ranging from 1,925 to 2,400 miles.

Sea turtles are likely to be most susceptible to vessel collision in coastal foraging areas crossed by construction vessels traveling between the RWF and offshore RWEC and area ports. Hazel et al. (2007) indicated that sea turtles may not be able to avoid being struck by vessels at speeds exceeding 2 knots, and collision risk increases with increasing vessel speed. Habituation to noise may also increase the risk of vessel collision. However, avoidance behaviors observed suggest that a turtle's ability to detect an approaching vessel is more dependent on vision than sound, although both may play a role in eliciting behavioral responses. Construction vessel speeds could periodically exceed 10 knots during transits to and from area ports, posing an increase in collision risk relative to baseline levels of vessel traffic. During construction, vessels generally either remain stationary when installing the monopiles and WTG/OSS equipment or move slowly (i.e., at less than 10 knots) when traveling between foundation locations. Cable-laying vessels move slowly, on the order of 3 to 30 miles per day, with a maximum speed of approximately 1.2 miles per hour. Project EPMs include the implementation of NOAA vessel guidelines (see Appendix F) for marine mammal and sea turtle strike avoidance measures, including vessel speed restrictions. Nevertheless, collisions with individual turtles could occur, resulting in mortalities. Because the abundance of sea turtles is anticipated to be generally low with patchy distribution, and the proportional increase in vessel traffic is also low, the number of sea turtles injured or killed by vessel strikes during Project construction would be low and would have negligible effects at the population level. Therefore, the potential effects of construction vessel collisions on sea turtles would be **minor** adverse.

#### 3.19.2.3.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

Accidental releases and discharges: The RWF would undergo maintenance as needed, which would necessitate vessels and other equipment at the facility for the life of the Project. This presents an opportunity for accidental discharge or spills of fuels and/or fluids during maintenance activities. Spill response EPMs (see Table F-1 in Appendix F) employed during construction would be implemented during maintenance activities. These EPMs are expected to avoid or minimize water quality impacts from accidental spills or releases of pollutants during O&M activities. Impacts on sea turtles from accidental spills or releases of pollutants are considered **minor** adverse because of the low probability of the risk and EPMs (refer to Section 3.21 for additional details).

Noise: WTG operations, O&M and monitoring vessels, and postconstruction HRG surveys would generate underwater noise detectable by sea turtles. Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct-drive systems like those proposed for the RWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 $dB_{RMS}$, occasionally reaching as high as 128 $dB_{RMS}$, in the 10-Hz to 8-kHz range. This is consistent with the noise levels observed at the BIWF (110 to 125 dB re 1 µPa SPL rms) (Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct-drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects on sea turtles could be greater than those considered herein, but these findings have not been validated. The Project would generate operational noise throughout the life of the RWF. As noted previously, sea turtle hearing is largely within the frequency range (< 1,200 Hz) for operational wind turbines; therefore, it is possible that wind turbine noise could be heard by sea turtles, although behavioral responses are unlikely based on the established threshold.

Little is known currently about how sea turtles use hearing in their natural environment (Lavender et al. 2014); therefore, it is difficult to interpret the potential effects of long-term, non-impulsive noise generated by the WTGs. O'Hara and Wilcox (1990) reported that loggerheads avoid sources of low-frequency sound in the 25- to 1,000-Hz range. The sound levels produced during operation are less than the behavioral and injurious thresholds defined by NMFS for sea turtles. However, potential responses to underwater noise generated by WTG operation could include avoidance of the noise source. Operational noise levels would not cause injury to sea turtles but could alter the behavior of individuals close to the structure. Localized behavioral long-term effects from operational noise would be **negligible** adverse because of the limited likelihood of behavioral effects.

While sea turtles would likely be able to detect O&M vessels in the vicinity, this would not necessarily translate to biologically significant effects. For example, Hazel et al. (2007) concluded that sea turtles appear to be relatively insensitive to vessel noise, relying on their vision to detect approaching vessels. Sea turtles may respond to vessel approach and/or noise with a startle response (diving or swimming away) and a temporary stress response (NFS and USGS 2011). In contrast, Samuel et al. (2005) indicated that vessel noise can affect sea turtle behavior, especially their submergence patterns. BOEM anticipates that the potential effects of noise from O&M vessels would elicit brief responses to the passing vessel that would dissipate once the vessel or the turtle left the area. For these reasons, BOEM anticipates that sea turtle exposure to vessel noise would be minimal, and responses if any, would be temporary and biologically insignificant, with individuals returning to normal behaviors once the vessel has passed.

Up to 1,062 linear miles of postconstruction HRG surveys could be conducted each year for the first 4 years of Project operations to ensure transmission cables are maintaining desired burial depths. This equates to approximately 25 days of HRG survey activity per year. The related effects on sea turtles would be similar in nature to those described for construction-related HRG surveys in Section 3.19.2.2.1 but reduced in extent and duration. The limited behavioral responses to HRG survey equipment and vessels would be similar to those described above for general O&M vessel noise.

Project decommissioning would require the use of construction vessels of similar number and class as those used during construction. Underwater noise and disturbance levels generated during decommissioning would be similar to those described above for construction, with the exception that pile driving would not be required. The monopiles would be cut below the bed surface for removal using a cable saw or abrasive waterjet. Noise levels produced by this type of cutting equipment are generally indistinguishable from engine noise generated by the associated construction vessel (Pangerc et al. 2016). Therefore, this decommissioning equipment would not contribute to additional noise effects above and beyond those already considered for construction vessel noise. The short-term effects of Project decommissioning on sea turtles would therefore range from **negligible** to **minor** adverse.

<u>Presence of structures:</u> The WTG and OSS foundations, exposed portions of the offshore RWEC, and associated scour protection would result in a long-term conversion of existing complex and non-complex bottom habitat to new stable, hard surfaces. Once construction is complete, these surfaces would be available for colonization by sessile organisms and would draw species that are typically attracted to hard-bottom habitat (Causon and Gill 2018; Langhamer 2012). Refer to Section 3.6.2.2.2, 3.6.2.3.2, and 3.13.2.2 for a detailed overview of potential changes in food web dynamics caused by reef effects. Over time, this reef effect would increase the amount of forage and shelter available for sea turtles.

The WTG and OSS foundations constitute potential obstacles in the water column for the life of the Project until decommissioning. Given that sea turtles are highly mobile and the structures are only 36 to 45 feet in diameter and would be separated by approximately 1 mile, the structural alterations of the water column are unlikely to pose a direct barrier to foraging, migration, or other behaviors of sea turtles. However, the presence of WTG structures could indirectly affect sea turtles by potentially altering prey distribution or promoting fish aggregations and thus concentrating fishing vessels at the foundations. This range of potential impacts is discussed in the following paragraphs.

Human-made structures, especially tall, vertical structures like WTG and OSS foundations, may also alter local water flow at a fine scale and could result in localized impacts on sea turtle prey distribution and abundance. These localized effects typically dissipate within a relatively short distance from the structure (Miles et al. 2017); effects would likely dissipate within 300 to 400 feet of each monopile foundation. However, there is potential for regional impacts to wind wave energy, mixing regimes, and upwelling (van Berkel et al. 2020), and these changes in water flow caused by the presence of the WTG structures could influence sea turtle prey distribution at a broader spatial scale. The distribution of fish, invertebrates, and other marine organisms on the OCS is determined by the seasonal mixing of warm surface and cold bottom waters, which determines the primary productivity of the system (Chen et al. 2018; Lentz 2017; Matte and Waldhauer 1984). Although there is a high degree of uncertainty, the presence of WTG structures could affect conditions in ways that alter these dynamics, potentially increasing primary productivity near the structures by disrupting vertical stratification and bringing nutrient-rich waters to the surface (Carpenter et al. 2016; Schultze et al. 2020a). However, this increase in primary productivity may not translate to a beneficial increase in sea turtle prey abundance if the increased productivity is consumed by filter feeders, such as mussels, that colonize the surface of the structures (Slavik et al. 2019). Considering the largely localized nature of potential effects to primary production surrounding WTGs (van Berkel et al. 2020), the likelihood of broader benefits for sea turtles is minimal.

The overall effects of offshore structure development on ocean productivity, sea turtle prey species, and, therefore, sea turtles, are difficult to predict with certainty and are expected to vary by location, season, and year, depending on broader ecosystem dynamics. The addition of up to 102 new offshore foundations could increase sea turtle prey availability by creating new hard-bottom habitat, increasing pelagic productivity in local areas, or promoting fish aggregations at foundations (Bailey et al. 2014). These aterations may increase foraging opportunities for loggerhead and Kemp's ridley sea turtles with preferences for more bottom-dwelling invertebrate prey. Increased primary and secondary productivity in proximity to structures could also increase the abundance of jellyfish, a prey species for leatherback sea turtles (English et al. 2017; NMFS and USFWS 1992). The artificial reefs created by these structures form biological hotspots that could support species range shifts and expansions and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017).

In contrast, broadscale hydrodynamic impacts could lead to localized changes in zooplankton distribution and abundance (van Berkel et al. 2020). A growing body of research has demonstrated that offshore wind farms could have observable effects on oceanographic conditions at scales ranging to tens of miles down field from wind farm sites (e.g., Christiansen et al. 2022; Daewel et al. n.d. [2023]; Dorell et al. 2022; Floeter et al. 2022; Raghukumar et al. 2022), although the extent of these effects and the resulting significance on biological processes are likely to vary considerably between different oceanographic environments (van Berkel et al. 2020). Van Berkel et al. (2020) and Schultze et al. (2020b) note that environments characterized by strong seasonal stratification, such as the Mid-Atlantic Bight, are likely to be less sensitive to changes and disruptions to oceanographic processes from wind farm effects. As discussed in Section 3.6.2.3.2, hydrodynamic modeling conducted by Johnson et al. (2021) indicated project-related shifts in larval transport and settlement density, but these shifts are not expected to have broad-scale impacts on invertebrate populations. There is considerable uncertainty as to how these localized ecological changes would affect sea turtles and how those changes would interact with other human-caused impacts. The effect of these IPFs on sea turtles and their habitats could be positive or negative, varying by species, and their extent and magnitude is unknown. Recent studies have also found increased biomass for benthic fish and invertebrates, and possibly for pelagic fish, sea turtles, and birds, around offshore wind facilities (Pezy et al. 2018; Raoux et al. 2017; Wang et al. 2019), translating to potential increased foraging opportunities for sea turtle species. However, an increase in biomass could result in limited benefits to higher trophic levels, depending on species composition and prey preferences (Pezy et al. 2018).

Increased fish biomass around the structures could also attract commercial and recreational fishing activity, creating an elevated risk of injury or death from gear entanglement and ingestion of debris (Barreiros and Raykov 2014; Gregory 2009; Vegter et al. 2014). As noted above, lost/discarded fishing gear was associated with a majority of sea turtle entanglements in a global review (Duncan et al. 2017). However, through implementation of EPMs related to management of debris surrounding the WTGs (see Table FF-1 in Appendix FF), the increase in entanglement risk is expected to be minimal.

The presence of structures could result in multiple types of impacts, with potentially opposing outcomes for sea turtles. The presence of structures could indirectly concentrate recreational fishing around foundations, which could indirectly increase the potential for sea turtle ingestion of or entanglement in lines, nets, and other lost or discarded fishing gear (Gall and Thompson 2015; Nelms et al. 2016; Shigenaka et al. 2010). However, the addition of structures could benefit sea turtles by locally increasing pelagic productivity and prey availability for sea turtles. The overall impact to sea turtles is not expected to be biologically significant due to the patchy distribution of sea turtles in the northern portion of the GAA where the RWF and RWEC are located. Potential long-term, intermittent impacts could persist until decommissioning is complete and structures are removed. These impacts would be **negligible** to **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects.

Decommissioning would remove the structures from the water column and effectively eliminate any operational effects of the presence of structures. No specific methods for decommissioning and removal of structures have been proposed, as the planned removal would occur at the end of the Project lifetime. The COP provides no indication that decommissioning would involve lines, rigging, or other equipment that could pose a potential entanglement risk to sea turtles. The Project would develop a decommissioning plan that specifies the methods and equipment proposed for structure removal. That plan would be subject to independent environmental compliance and regulatory review.

Vessel traffic: Revolution Wind (Tech Environmental 2023) has estimated that Project O&M would involve up to one CTV trip each week and one SOV trip every other week to the RWF over the life of the Project. CTV trips shared between the RWF and other offshore energy projects and daughter craft activity could account for an additional 23 vessel trips per year. In total, Project O&M would require an estimated 3,030 vessel trips over the life of the Project. These trips would originate either from an O&M facility located either in Montauk, New York, or Davisville, Rhode Island. One or more CTVs ranging from 62 to 95 feet in length would be purpose built to service the RWF over the life of the Project. SOVs are larger mobile work platforms, on the order of 215 to 305 feet long and 60 feet in beam, equipped with dynamic positioning systems used for more extensive, multiday maintenance activities (Ulstein 2021). Larger vessels similar to those used for construction could be required for unplanned maintenance, such as repairing scour protection or replacing damaged WTGs. Those activities would occur on an as-needed basis. Additional vessel trips would be required over the life of the Project forseafloor surveys and subsurface inspections. A minimum of three postconstruction seafloor bathymetry surveys would be conducted to assess foundation scour and correct if needed. Project fishery monitoring and benthic habitat monitoring surveys would also be conducted annually, as discussed above. Vessels used would be similar to those used for preconstruction HRG surveys.

In general, O&M-related vessel activities would represent a small increase in regional vessel traffic compared to existing conditions. Project O&M could involve up to 10 one-way vessel trips between the RWF and O&M facility or other area ports each month. By comparison, hundreds of large vessels and thousands of smaller vessels, many of the latter comparable in size to a CTV, travel through the areas between the wind farm and proposed O&M facility locations each month (Section 3.15.2.2.1). O&M vessel use would therefore represent a minimal increase in regional vessel traffic over the life of a facility and the effects to sea turtles are expected to be negligible adverse.

As detailed in Appendix F, all survey vessels would comply with speed restrictions and other minimization measures to minimize risk of collision with sea turtles, making the risk of vessel strikes from Project monitoring vessels unlikely. As described in the previous section, the applicant has voluntarily committed to specific EPMs, including vessel timing and speed restrictions, to avoid and minimize vessel-related risks to sea turtles (see Appendix F, Table F-1). Based on the generally low density of sea turtles in the Lease Area and the anticipated vessel trips during operations, there is a low risk of encountering a sea turtle. The operational conditions combined with planned EPMs (see Appendix F for all vessel strike avoidance measures) would minimize collision risk during construction and installation. During periods of low visibility, trained crew would use increased vigilance to avoid sea turtles. Because vessel strikes are not an anticipated outcome given the relatively low number of vessel trips and implementation of effective monitoring and EPMs. BOEM concludes vessel strikes have a low probability of occurrence and therefore would have a minor anticipated effect on sea turtles. In the unlikely event of a sea turtle strike by any vessel supporting the Project, Revolution Wind must immediately cease the activities until BOEM is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with all applicable laws (e.g., ESA) and COP approval conditions.

As with construction, a similar increase in vessel round trips during decommissioning is expected to increase the relative risk of vessel strike for sea turtles. The implementation of NOAA guidelines (see Appendix F) as an EPM is intended to minimize the potential of vessel strikes for sea turtles by reducing vessel speed and maintaining a separation distance from sighted turtles. Collisions, if they do occur, are expected to be fatal to individuals. Because the abundance of sea turtles in the RWF and RWEC is anticipated to be generally low with patchy distribution, and the proportional increase in vessel traffic is also low, the number of sea turtles injured or killed by vessel strikes as a result of Project decommissioning would be low and would have negligible effects at the population level. Therefore, potential effects of vessel strikes on sea turtles from vessels supporting Project decommissioning would be minor adverse. Overall, the anticipated effect to sea turtles from vessel traffic associated with O&M and decommissioning would be **minor** adverse.

#### 3.19.2.3.3 Cumulative Impacts

### Offshore Activities and Facilities

Accidental releases and discharges: Toxic contaminants and marine debris are recognized as significant sources of sea turtle injury and mortality and are leading threats to successful species conservation and recovery. The Proposed Action would increase commercial vessel activity on the OCS, creating a potential source for accidental spills, trash, and debris. BOEM estimates that the Project would result in a negligible, up to a 2% increase in total chemical usage in the GAA relative to the No Action Alternative. When combined with other offshore wind projects, up to approximately 34 million gallons of coolants, oils, fuels, and lubricants could cumulatively be stored within WTG foundations and the OSS within the GAA. Compliance with USCG regulations and BOEM requirements to minimize the risk of accidental spills and/or release of trash and debris would limit the volume and extent of Project-related trash/debris or invasive species potentially released accidentally. Additionally, as discussed in Section 3.19.1.1, the volumes of trash/debris potentially released accidentally under the No Action Alternative would be negligible and would not contribute to potential adverse impacts. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse because of the regulatory protections and limited likelihood of sea turtle exposure.

Climate change: The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action, but the Proposed Action could also contribute to a long-term net decrease in GHG emissions. As described in Section 3.19.1.1, the interactions between climate change and other potential impacts associated with the Proposed Action are complex and difficult to predict with certainty. Northward shifts in sea turtle distributions due to warming waters could result in magnification of the anticipated impacts due to increased exposure. However, this magnification includes potential benefits associated with the creation of artificial reef habitat and could represent an increasing impact over the life of the Project. Based on the potential for increased exposure to the various effects of the Proposed Action described above, the Proposed Action when combined with other past, present, and reasonably foreseeable actions is expected to result in **minor** adverse cumulative impacts to sea turtles due to the anticipated shifts in distributions.

Noise: The Proposed Action would result in localized, temporary, negligible to minor impacts to sea turtles through the generation of impulsive and non-impulsive underwater noise associated with offshore wind construction activities. BOEM estimates a cumulative total of 3,190 offshore WTGs and OSS foundations could be developed in the GAA for sea turtles between 2022 and 2030. Sea turtles are anticipated to occur at generally low densities (see Section 3.19.1) near wind farms in the region, reducing the probability of individual exposure to noise effects. Noise sources associated with the

Proposed Action could add to the ambient noise environment under the No Action Alternative if noise sources overlap temporally or geographically. Pile driving would represent the most significant source of noise. As noted in Section 3.19.1.1, there are three possible exposure scenarios for pile-driving noise: 1) concurrent exposure from two or more impact hammers for the same or adjacent projects; 2) non-concurrent exposure from multiple pile-driving events in the same years; 3) exposure to concurrent and non-concurrent pile-driving events over multiple years. Although the extent, duration, and magnitude of exposure would vary based on Project -specific factors, the effects would be similar in nature to those described for the Proposed Action. Although exposure to pile-driving noise could disrupt behaviors of individual sea turtles, it is not expected to impair essential behavioral patterns. This is due to the temporary, localized nature of the effects and because normal behaviors are expected to resume once the sea turtle is no longer exposed to the noise. Permanent hearing impairment could occur to some individuals, but science has not determined whether changes in hearing ability would negatively impact the ability of sea turtles to feed, navigate, find suitable habitats, and reproduce. Due to the limited information about noise-related stress responses in sea turtles, physiological stress responses may likely occur concurrently with any other response, such as hearing impairment or behavioral disruptions.

For impulsive noise, BOEM anticipates that projects would employ soft starts during pile driving to allow the small number of turtles in the region to leave the area before underwater noise increases to injurious levels. Additionally, the implementation of sound attenuation systems, PSO exclusion and shutdown zones, and other planned EPMs (see Appendix F) would further reduce the likelihood of injury from the potential moderate cumulative impacts associated with pile driving. Vibratory pile driving associated with the sea-to-shore transition would create non-impulsive underwater noise, but similar to the effects of the impulsive impact hammer, only minor impacts to sea turtles are expected because of the combination of minimization measures used and the low densities of sea turtles in the RWF and RWEC. Potential behavioral effects are more likely to be related to vessel noise and disturbance than the vibratory pile driving itself.

With regard to other non-impulsive noise sources, potential behavioral impacts on sea turtles from vessel traffic noise would be intermittent and temporary as animals and vessels pass near each other. During construction and operation, helicopter traffic could cause some temporary behavioral reactions in sea turtles, but energy expenditures would be minimal.

Based on the above findings, noise-related impacts of the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts to sea turtles, depending upon the noise source.

<u>Presence of structures</u>: The Proposed Action would result in long-term negligible and minor beneficial impacts to sea turtles through the installation of 102 structures (100 WTGs and two OSSs) to conditions under the No Action Alternative. The installation of monopile foundations would alter the character of the ocean environment, and their presence could affect sea turtle behavior. Increased prey availability, attraction to structures, and/or displacement could occur as a result of the installation of WTG facilities. As described in Section 3.19.2.2.2, structures associated with offshore wind farms are expected to provide some level of reef effect and could benefit sea turtle foraging by creating new hard-bottom habitat, increasing pelagic productivity in local areas, or promoting prey aggregations on foundations.

Some level of displacement of sea turtles out of the Lease Area and into areas with a higher potential for interactions with ships or recreational or commercial fishing gear could occur, particularly during construction phases, when elevated underwater noise levels occur. These intermittent impacts would persist until decommissioning is complete and structures are removed. Impacts could occur as a result of increased interaction with fishing gear, although annual monitoring, reporting, and cleanup of fishing gear around the base of the WTGs would reduce the extent of these impacts.

BOEM estimates a cumulative total of 3,190 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the GAA. For similar reasons as described above, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts and potential **minor** beneficial cumulative impacts to sea turtles.

Vessel traffic: The Proposed Action would result in minor impacts to sea turtles through the addition of construction and maintenance vessels within the GAA. This increased offshore wind-related vessel traffic during construction, and associated noise impacts, could result in localized, intermittent impacts on sea turtles, resulting in brief minor behavioral responses that would be expected to dissipate once the vessel or the individual has left the area. However, BOEM expects that these brief responses of individuals to passing vessels would be unexpected given the patchy distribution of sea turtles; no stock- or population-level effects would be expected. Additionally, the Proposed Action would implement EPMs (see Table F-1 in Appendix F) to minimize vessel strikes.

BOEM estimates a peak of 262 vessels supporting offshore wind development will be operating in the GAA over the next decade, of which up to 59 would be associated with the Proposed Action construction and six would be associated with O&M. This increase in vessel traffic poses an increased likelihood of collision-related injury and mortality relative to existing baseline conditions. Some sea turtlescould be injured or killed as a result, but the number of individuals impacted is not likely to significantly increase the existing mortality rate from vessel strikes. Additionally, BOEM expects that similar EPMs will be included in future offshore wind projects, helping to minimize the vessel strike risk. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse; however, BOEM does not expect the viability of sea turtle populations to be affected.

#### 3.19.2.3.4 Conclusions

Project construction and installation, O&M, and decommissioning would impact sea turtles through exposure to vessel traffic, underwater noise impacts, temporary habitat disturbance, and long-term habitat conversion. Individual sea turtles could be injured or killed by vessel collisions and underwater noise exposure during ProjectP construction, but the exposure risk is low and the number of individuals impacted would likely be small. Temporary habitat disturbance, including alteration of the seafloor and suspended sediment and burial effects, would be limited in extent and well below levels likely to have biologically significant effects on any sea turtle species. Reef effects created by the presence of offshore wind structures could beneficially increase foraging opportunities for species, such as loggerhead sea turtles, that forage on benthic crustaceans and other invertebrates.

On this basis, BOEM anticipates that the Proposed Action would result in **negligible** to **minor** adverse impacts to sea turtles, including **minor** beneficial impacts for species that are able to exploit the increased biological productivity created by reef effects on offshore wind structures. Overall, the impacts of the Proposed Action alone on sea turtles would likely be **minor** beneficial to **minor** adverse. Although some of the proposed activities and/or IPFs analyzed could overlap, BOEM does not anticipate that these combined effects would alter the overall significance determination because they would not alter impacts on any species to such a degree that measurable population-level effects would occur.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from negligible to minor adverse and minor beneficial for some sea turtle species. The impact-level criteria are used to characterize effects of all IPFs. Applying these criteria, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** adverse impacts on sea turtles in the GAA because unavoidable adverse impacts on individual sea turtles could occur that coincide with other adverse effects resulting from climate change, but those impacts are unlikely to measurably affect the viability of any sea turtle species at the population level.

### 3.19.2.4 Alternatives C, D, E, and F

#### 3.19.2.4.1 Construction and Installation

#### Offshore Activities and Facilities

<u>Noise:</u> Construction of Alternatives C through F would result in similar underwater noise impacts on sea turtles from foundation installation to those described for the Proposed Action in Section 3.19.2.2.1, but those impacts would be reduced in extent and duration because fewer structures would be installed. This would reduce the number of days of impact pile driving required to construct the Project and the associated extent and duration of underwater noise. Reducing the number of structures would also reduce the required extent of HRG surveys under each alternative relative to the Proposed Action. Compared to the spatial and temporal extent of HRG surveys for the Proposed Action (10,779 miles over 248 days), the maximum extent of HRG surveys would be reduced for Alternative C (7,616 miles over 175 days), Alternative D (10,142 miles over 233 days), and Alternative E (8,846 miles over 204 days). Alternative F would be equivalent to any of the selected configurations of Alternatives C through E. The potential distribution of UXOs within the RWF is not currently known, but the largest devices are most likely to be encountered within the central portion of the RWF and in state waters on the RWEC corridor at the mouth of and outside of Narragansett Bay (Ordtek 2021). The RWEC configuration would remain the same across all alternatives, and the probable area of occurrence within the RWF is sufficiently large that it is not possible to determine how changes in alternative configuration would affect the likelihood of UXO encounters. Therefore, impacts to sea turtles from UXO detonation are considered to be the same across all alternatives.

Differences in the extent and duration for the Proposed Action and the different configurations proposed for Alternatives C through E are summarized in Tables 3.19-5, 3.19-6, and 3.19-7, respectively, based on the total number of WTG and OSS foundations requiring pile driving and underwater noise injury and behavioral effects thresholds. These tables display the number of structures installed and estimated days of pile-driving activity required to construct each alternative. As shown, while the extent and duration of potential noise exposure from impact pile-driving activities would vary between layouts, these effects would be similar in magnitude and general scale to the Proposed Action. Therefore, noise effects on sea turtles from the construction phase of each alternative would likewise vary by species and range from

**negligible** to **minor** adverse. The potential use of larger capacity WTGs under Alternative F could result in more extensive operational noise impacts than the Proposed Action, but insufficient information is available to characterize differences in effect.

**Table 3.19-5. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) to Sea Turtles from Revolution Wind Farm Foundation Installation for the Proposed Action and Proposed Configurations for Alternative C***

| Exposure Type | Threshold Distance (feet)† | Proposed Action | C1 | C2 |
|---|---|---|---|---|
| Peak injury | – | 100 sites/ 35 days | 64 sites/ 22 days | 65 sites/ 22 days |
| Cumulative injury | 98–689 | | | |
| Behavioral or TTS | 1,903–2,920 | | | |

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites and seasonal conditions.

**Table 3.19-6. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) for Sea Turtles from Revolution Wind Farm Foundation Installation for the Proposed Action and Proposed Configurations for Alternative D***

| Exposure Type | Threshold Distance (feet)† | Proposed Action | D1 | D1+D2 | D1+D2+D3 | D1+D3 | D2 | D2+D3 | D3 |
|---|---|---|---|---|---|---|---|---|---|
| Peak injury | – | 100 sites/ 35 days | 93 sites/ 31 days | 92 sites/ 31 days | 93 sites/ 31 days | 85 sites/ 28 days | 86 sites/ 29 days | 85 sites/ 28 days | 78 sites/ 26 days |
| Cumulative injury | 98–689 | | | | | | | | |
| Behavioral | 1,903–2,920 | | | | | | | | |

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites and seasonal conditions.

**Table 3.19-7. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) for Sea Turtles from Revolution Wind Farm Foundation Installation for the Proposed Action and Proposed Configurations for Alternative E***

| Exposure Type | Threshold Distance (feet)† | Proposed Action | E1 | E2 |
|---|---|---|---|---|
| Peak injury | – | 100 sites/5 days | 64 sites/21 days | 81 sites/27 days |
| Cumulative injury | 98–689 | | | |
| Behavioral | 1,903–2,920 | | | |

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites and seasonal conditions.

Presence of structures: The presence of WTG and OSS monopile foundations associated with Alternatives C through F would result in similar impacts to sea turtles as those described for the Proposed Action in Section 3.19.2.2.2, but those impacts would be reduced in extent and would vary depending on the alternative selected. Refer to the tables in Section 3.6.2.4.2 for a summary of the number of structures proposed by alternative and configuration. Impacts of the presence of structures are expected to be relative to the total number of structures proposed (i.e., fewer structures would result in a smaller extent of impacts).

As with the Proposed Action, the overall impact to sea turtles from the presence of structures is not expected to be biologically significant due to the patchy distribution of sea turtles within the RWF and RWEC. Impacts from the presence of structures are expected to vary in relation to the total number of foundations proposed (i.e., fewer structures would result in less extensive impacts). For example, both configurations of Alternative C and Alternative E1 propose noticeably fewer WTG and OSS foundations compared to the Proposed Action and most configurations of Alternative D. Therefore, these alternatives would be expected to produce noticeably reduced impacts from this IPF by comparison. In general, presence of structures effects on sea turtles under Alternatives C through F would likely be less extensive compared to those resulting from the Proposed Action. Reef effects would be reduced commensurate with the number of foundations constructed under each alternative configuration.

At present, insufficient information is available to determine if differences in Project configuration between alternatives, specifically where foundations are located relative to sensitive benthic habitats, would contribute to a measurable difference in reef effects on sea turtles beyond those resulting from a simple reduction in the number of structures. As stated in Section 3.15.2.2.3, hydrodynamic effects are likely to lead to localized changes in the distribution of planktonic organisms (e.g., jellyfish) for certain sea turtle species, but shifts in prey distribution on the order of miles to tens of miles are unlikely to be biologically significant for species that migrate thousands of miles between seasonal habitats every year. Increased biological productivity resulting from reef effects could concentrate recreational fishing around foundations, which could theoretically increase the potential for harmful interactions with fishing gear. However, these reef effects would also benefit certain sea turtle species by increasing and concentrating prey availability. Therefore, while Alternatives C through F would likely alter and reduce the extent of measurable reef and hydrodynamic effects relative to the Proposed Action, those effects are likely to remain biologically insignificant. Potential long-term intermittent impacts would persist until decommissioning is complete and structures are removed. These impacts would also be **negligible** to **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects.

Vessel traffic: Construction of Alternatives C through F would result in a similar level of vessel traffic as the Proposed Action commensurate with the reduction in construction activities associated with fewer foundations and would vary depending on the alternative selected. An estimate of the reduced vessel trips per year associated with Alternatives C through F construction is not available; however, it is expected to be slightly less than the Proposed Action. Therefore, the potential effects of construction vessel collisions on sea turtles from each alternative would be **minor** adverse.

#### 3.19.2.4.2 Cumulative Impacts

### Offshore Activities and Facilities

The cumulative impacts analysis for Alternatives C, D, E, and F is provided in Table 3.19-2.

#### 3.19.2.4.3 Conclusions

The construction and installation, O&M, and decommissioning of Alternatives C through F would impact sea turtles through the same IPFs described for the Proposed Action. These impacts include exposure to increased vessel traffic, underwater noise impacts from Project construction and O&M, temporary habitat disturbance, and long-term habitat conversion. These adverse impacts would be avoided and minimized using the same EPM's as described in the Proposed Action (see Table F-1 in Appendix F). Alternatives C through F would also generate similar beneficial reef effects but over a smaller area and with a reduced number of reef-forming structures. The resulting effects to sea turtles would therefore be similar to those described for the Proposed Action but reduced in extent and/or duration. However, the overall reduction in impacts would not be sufficient to alter the impact determinations for any sea turtle species. On this basis, BOEM concludes that Alternatives C through F would result in **minor** adverse effects to sea turtles, with those effects partially offset by **minor** beneficial impacts for some sea turtle species.

### 3.19.2.5 Alternative G: Impacts of the Preferred Alternative on Sea Turtles

#### 3.19.2.5.1 Construction and Installation

##### Offshore Activities and Facilities

<u>Accidental releases and discharges:</u> Construction of Alternative G would result in a similar potential for accidental relaeases and discharges as the Proposed Action commensurate with the reduction in construction activities associated with 21 to 35 fewer foundations. Although expected to be slightly less than the Propsed Action, the risk from construction-related releases and discharges from Alternative G would be **negligible** to **minor** adverse.

<u>Noise:</u> Construction of Alternative G would result in similar underwater noise impacts on sea turtles from foundation installation to those described for the Proposed Action in Section 3.19.2.3.1, but those impacts would be reduced in extent and duration because 21 fewer structures would be installed. This would reduce the number of days of impact pile driving required to construct the Project and the associated extent and duration of underwater noise. The maximum extent of HRG surveys would be reduced (9,457 miles over 219 days) relative to the Proposed Action (10,779 miles over 248 days). The potential distribution of UXOs within the RWF is not currently known, but the largest devices are most likely to be encountered within the central portion of the RWF and in state waters on the RWEC corridor at the mouth of and outside Narragansett Bay (Ordtek 2021). The RWEC configuration would remain the same across all alternatives, and the probable area of occurrence within the RWF is sufficiently large that it is not possible to determine how changes in alternative configurations would affect the likelihood of UXO encounters. Therefore, impacts to sea turtles from UXO detonation are considered to be the same across all alternatives.

Differences in the number of sites and duration associated with foundation installation noise impacts between the Proposed Action and Alternative G are summarized in Table 3.6-8. These tables display the number of structures installed and estimated days of pile-driving activity required to construct each alternative. These effects would be roughly 35% less in magnitude and general scale to the Proposed Action. Therefore, noise effects on sea turtles from the construction phase of Alternative G would likewise vary by species and range from **negligible** to **minor** adverse.

**Table 3.19-8. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) to Sea Turtles from Revolution Wind Farm Wind Turbine Generator and Offshore Substation Foundation Installation under the Proposed Action and Alternative G***

| Exposure Type | Threshold Distance (feet)† | Proposed Action | Alternative G | Alternatives G1–G3 |
|---|---|---|---|---|
| Peak injury | – | 102 sites/<br>35 days | 81 sites/<br>28 days | 67 sites/<br>24 days |
| Cumulative injury | 98–820 | | | |
| Behavioral or TTS | 1,903–2,920 | | | |

* Installation scenario for a 12-m monopile is 10,740 strikes/pile at an installation rate of three piles/day. Installation scenario for a 15-m monopile is 11,563 strikes/pile at an installation rate of up to two piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2023) across modeled sites and seasonal conditions. Maximum threshold distances for WTG and OSS monopiles are 689 and 820 feet, respectively.

Presence of structures: The presence of WTG and OSS monopile foundations associated with Alternative G would result in similar impacts to sea turtles as those described for the Proposed Action in Section 3.19.2.3.2, but those impacts would be reduced in extent because 35 fewer structures would be installed. Refer to the tables in Section 3.6.2.4.2 for a summary of the number of structures proposed by alternative and configuration. Impacts of the presence of structures are expected to be relative to the total number of structures proposed (i.e., fewer structures would result in a smaller extent of impacts).

As with the Proposed Action, the overall impact to sea turtles from the presence of structures is not expected to be biologically significant due to the patchy distribution of sea turtles within the RWF and RWEC. Impacts from the presence of structures are expected to vary in relation to the total number of foundations proposed (i.e., fewer structures would result in less extensive impacts). Therefore, Alternative G would be expected to produce roughly 35% less impact from this IPF by comparison. Reef effects would be reduced commensurate with the fewer number of foundations constructed under Alternative G.

At present, insufficient information is available to determine if differences in Project configuration between alternatives, specifically where foundations are located relative to sensitive benthic habitats, would contribute to a measurable difference in reef effects on sea turtles beyond those resulting from a simple reduction in the number of structures. However, the proposed configuration of Alternative G was specifically selected to avoid and minimize impacts to large-grained complex and complex habitats of particular value for certain fish species of concern, which could benefit bottom-feeding loggerhead sea turtles. As stated in Section 3.15.2.2.3, hydrodynamic effects are likely to lead to localized changes in the distribution of planktonic organisms (e.g., jellyfish) for certain sea turtle species, but shifts in prey distribution on the order of miles to tens of miles are unlikely to be biologically significant for species that migrate thousands of miles between seasonal habitats every year. Potential reef effects from increased biological productivity concentrating recreational fishing around foundations and concentrating prey availability would similarly be reduced. Therefore, while Alternative G would reduce the extent of measurable reef and hydrodynamic effects relative to the Proposed Action, those effects are likely to remain biologically insignificant. Potential long-term intermittent impacts would persist until decommissioning is complete and structures are removed. These impacts would also be **negligible** to **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects.

Vessel traffic: Construction of Alternative G would result in a similar level of vessel traffic as the Proposed Action commensurate with the reduction in construction activities associated with 35 fewer foundations. An estimate of the reduced vessel trips per year associated with Alternative G construction is not available; however, it is expected to be slightly less than the Proposed Action. Therefore, the potential effects of construction vessel collisions on sea turtles from Alternative G would be **minor** adverse.

#### 3.19.2.5.2 Cumulative Impacts

#### Offshore Activities and Facilities

Accidental releases and discharges: Alternative G would increase commercial vessel activity on the mid-Atlantic OCS, creating a potential source for accidental spills, trash, and debris. As with the Proposed Action, BOEM estimates that Alternative G would result in a negligible, up to 2%, increase in total chemical usage in the GAA relative to the No Action Alternative. When combined with other offshore wind projects, up to approximately 34 million gallons of coolants, oils, fuels, and lubricants could cumulatively be stored within WTG foundations and the OSS within the sea turtles GAA. Compliance with USCG regulations and BOEM requirements to minimize the risk of accidental spills and/or release of trash and debris would limit the volume and extent of Project-related trash/debris or invasive species potentially released accidentally. Additionally, as discussed in Section 3.19.1.1, the volumes of trash/debris potentially released accidentally under the No Action Alternative would be negligible and would not contribute to potential adverse impacts. Therefore, cumulative impacts associated with Alternative G when combined with past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse because of the regulatory protections and limited likelihood of sea turtle exposure.

Climate change: The types of impacts from global climate change described for the No Action Alternative would occur under Alternative G, but Alternative G could also contribute to a long-term net decrease in GHG emissions. As described in Section 3.19.1.1, the interactions between climate change and other potential impacts associated with Alternative G are complex and difficult to predict with certainty. Northward shifts in sea turtle distributions due to warming waters could result in magnification of the anticipated impacts due to increased exposure. However, this magnification includes potential benefits associated with the creation of artificial reef habitat and could represent an increasing impact over the life of the Project. Based on the potential for increased exposure to the various effects of Alternative G described above, Alternative G when combined with other past, present, and reasonably foreseeable actions is expected to result in **minor** adverse cumulative impacts to sea turtles due to the anticipated shifts in distributions.

Noise: Alternative G would generate underwater noise effects during Project construction, throughout the operational life of the Project, and during Project decommissioning. Those impacts would be similar in magnitude and distribution but reduced in extent relative to the Proposed Action. These effects would combine with similar effects resulting from the construction, O&M, and decommissioning of other planned offshore wind projects on the mid-Atlantic OCS.

BOEM estimates a cumulative total of 3,155 offshore WTGs and OSS foundations could be developed by Alternative G in the GAA for sea turtles between 2022 and 2030. Sea turtles are anticipated to occur at generally low densities (see Section 3.19.1) near wind farms in the region, reducing the probability of individual exposure to noise effects. Noise sources associated with the Proposed Action could add to the ambient noise environment under the No Action Alternative if noise sources overlap temporally or geographically. Pile driving would represent the most significant source of noise. As noted in Section 3.19.2.2.2, there are three possible exposure scenarios for pile-driving noise: 1) concurrent exposure from two or more impact hammers for the same or adjacent projects; 2) non-concurrent exposure from multiple pile-driving events in the same years; and 3) exposure to concurrent and non-concurrent pile-driving events over multiple years. Although the extent, duration, and magnitude of exposure would vary based on Project-specific factors, the effects would be similar in nature to those described for the Proposed Action. Although exposure to pile-driving noise could disrupt behaviors of individual sea turtles, it is not expected to impair essential behavioral patterns. This is due to the temporary, localized nature of the effects and because normal behaviors are expected to resume once the sea turtle is no longer exposed to the noise. Permanent hearing impairment could occur to some individuals, but science has not determined whether changes in hearing ability would negatively impact the ability of sea turtles to feed, navigate, find suitable habitats, and reproduce. Due to the limited information about noise-related stress responses in sea turtles, physiological stress responses may likely occur concurrently with any other response, such as hearing impairment or behavioral disruptions.

For impulsive noise, BOEM anticipates that projects would employ soft starts during pile driving to allow the small number of turtles in the region to leave the area before underwater noise increases to injurious levels. Additionally, the implementation of sound attenuation systems, PSO exclusion and shutdown zones, and other planned EPMs (see Appendix F) would further reduce the likelihood of injury from the potential moderate cumulative impacts associated with pile driving. Vibratory pile driving associated with the sea-to-shore transition would create non-impulsive underwater noise, but similar to the effects of the impulsive impact hammer, only minor impacts to sea turtles are expected because of the combination of minimization measures used and the low densities of sea turtles in the RWF and RWEC. Potential behavioral effects are more likely to be related to vessel noise and disturbance than the vibratory pile driving itself.

With regard to other non-impulsive noise sources, potential behavioral impacts on sea turtles from vessel traffic noise would be intermittent and temporary as animals and vessels pass near each other. During construction and operation, helicopter traffic could cause some temporary behavioral reactions in sea turtles, but energy expenditures would be minimal.

Based on the above findings, noise-related impacts of Alternative G when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts to sea turtles depending upon the noise source.

<u>Presence of structures</u>: Alternative G would result in long-term negligible and minor beneficial impacts to sea turtles through the installation of 67 structures (65 WTGs and two OSSs) under Alternatives G1 to G3 relative to the No Action Alternative. The installation of monopile foundations would alter the character of the ocean environment, and their presence could affect sea turtle behavior. Increased prey availability, attraction to structures, and/or displacement could occur as a result of the installation of WTG facilities. As described in Section 3.19.2.2.2, structures associated with offshore wind farms are expected to provide

some level of reef effect and could benefit sea turtle foraging by creating new hard-bottom habitat, increasing pelagic productivity in local areas or promoting prey aggregations on foundations.

Some level of displacement of sea turtles out of the Lease Area and into areas with a higher potential for interactions with ships or recreational or commercial fishing gear could occur, particularly during construction phases, when elevated underwater noise levels occur. These intermittent impacts would persist until decommissioning is complete and structures are removed. Impacts could occur as a result of increased interaction with fishing gear, although annual monitoring, reporting, and cleanup of fishing gear around the base of the WTGs would reduce the extent of these impacts.

BOEM estimates a cumulative total of 3,155 offshore WTGs and OSS foundations for Alternative G plus all other future offshore wind projects in the sea turtles GAA. For similar reasons as described above, Alternative G when combined with past, present, and reasonably foreseeable projects would result in negligible to minor adverse cumulative impacts and potential minor beneficial cumulative impacts to sea turtles.

Vessel traffic: Alternative G would result in minor impacts to sea turtles through the addition of construction and maintenance vessels within the GAA for sea turtles. Those impacts would be similar, but reduced, in magnitude relative to the Proposed Action. This increased offshore wind–related vessel traffic during construction, and associated noise impacts, could result in localized, intermittent impacts on sea turtles, resulting in brief, minor behavioral responses that would be expected to dissipate once the vessel or the individual has left the area. However, BOEM expects that these brief responses of individuals to passing vessels would be unexpected given the patchy distribution of sea turtles; no stock- or population-level effects would be expected. Additionally, Alternative G would implement EPMs (see Table F-1 in Appendix F) to minimize vessel strikes.

BOEM estimates a peak of 262 vessels supporting offshore wind development will be operating in the sea turtles GAA over the next decade, of which up to 59 would be associated with Alternative G construction and six would be associated with O&M. This increase in vessel traffic poses an increased likelihood of collision-related injury and mortality relative to existing baseline conditions. Some sea turtlescould be injured or killed as a result, but the number of individuals impacted is not likely to significantly increase the existing mortality rate from vessel strikes. Additionally, BOEM expects that similar EPMs will be included in future offshore wind projects, helping to minimize the vessel strike risk. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse; however, BOEM does not expect the viability of sea turtle populations to be affected.

#### 3.19.2.5.3 Conclusions

The construction and installation, O&M, and decommissioning of Alternative G would impact sea turtles through the same IPFs described for the Proposed Action. These impacts include exposure to increased vessel traffic, underwater noise impacts from Project construction and O&M, temporary habitat disturbance, and long-term habitat conversion. These adverse impacts would be avoided and minimized using the same EPMs as described in the Proposed Action (see Table F-1 in Appendix F). Alternative G would also generate similar beneficial reef effects but over a smaller area and with a reduced number of reef-forming structures. The resulting effects to sea turtles would therefore be similar to those described for the Proposed Action but reduced in extent and/or duration. However, the overall reduction in impacts would not be sufficient to alter the impact determinations for any sea turtle species. On this basis, BOEM concludes that Alternative G would result in **minor** adverse effects to sea turtles, with those effects partially offset by **minor** beneficial impacts for some sea turtle species.

#### 3.19.2.6 Mitigation

Mitigation measures for sea turtles required through completed consultations, authorizations, and permits listed in Table 3.19-9 and in Appendix F, Table F-2, are incorporated into the Preferred Alternative (Alternative G). Additional mitigation measures identified by BOEM and cooperating agencies as a condition of state and federal permitting, or through agency-to-agency negotiations, are listed in Appendix F, Table F-3 and summarized here in Table 3.19-10. These measures, if adopted, would further define how the effectiveness and enforcement of EPMs would be ensured and improve accountability for compliance with EPMs by requiring the submittal of plans for approval by the enforcing agency(ies) and by defining reporting requirements. Because these measures ensure the effectiveness of and compliance with EPMs that are already analyzed as part of the Proposed Action, implementation of these measures would not further reduce the impact level of the Proposed Action from what is described in Section 3.19.2. BOEM and cooperating agencies have identified additional mitigation measures that could apply to the Project (Appendix F, Table F-3).

**Table 3.19-9. Mitigation and Monitoring Measures Resulting from Consultations for Sea Turtles (Appendix F, Table F-2)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| DRAFT NMFS BiOp Reasonable and Prudent Measures (RPMs) and Terms and Conditions (T&Cs)* | Draft NMFS Biological Opinion Proposed Reasonable and Prudent Measures were issued to BOEM for consideration on June 16, 2023.<br>Final NMFS Biological Opinion Proposed Reasonable and Prudent Measures to be issued to BOEM for consideration on July 21, 2023.<br>RPMs and Terms and Conditions to minimize the impact of incidental take of ESA-listed species were documented in the draft NMFS Biological Opinion dated June 16, 2023. These measures include adherence to mitigation measures specified in the final MMPA ITA to minimize impacts during pile driving and UXO detonation; compliance with requirements for vessel operations within the Delaware River and Delaware Bay included in the Incidental Take Statements provided with the Paulsboro Marine Terminal Biological Opinion (dated July 19, 2022); reporting requirements related to effects to, or interactions with, ESA-listed species; submittal of required plans (e.g., PSO Training Plan for Trawl Surveys, Passive Acoustic Monitoring Plan, Marine Mammal and Sea Turtle Monitoring Plan, Cofferdam Installation and Removal Monitoring Plan, Alternative Monitoring Plan/Night Time Pile Driving Monitoring Plan, Sound Field Verification Plan, North Atlantic Right Whale Vessel Strike Avoidance Plan) to NMFS GARFO with sufficient time for review, comment and approval; and conducting on-site observation and inspection to gather information on the effectiveness and implementation of measures to minimize and monitor incidental take. | These RPMs and Terms and Conditions would minimize the exposure of ESA-listed marine mammals to underwater noise impacts from impact and vibratory pile driving, UXO detonation, and HRG surveys. These RPMs and Terms and Conditions would also ensure that all incidental take that occurs is documented and reported to NMFS in a timely manner. Reporting requirements to document take would improve accountability for documenting take associated with the Proposed Action. In some cases, these RPMs and Terms and Conditions provide additional detail or clarification of measures that are included as part of the Proposed Action. Implementation of these RPMs and Terms and Conditions would provide incremental reductions in impacts on sea turtles but would not alter the overall impact determination of the Proposed Action. |
| Marine debris awareness training | The Lessee must ensure that vessel operators, employees, and contractors engaged in offshore activities pursuant to the approved COP complete marine trash and debris awareness training annually. The training consists of two parts: 1) viewing a marine trash and debris training video or slide show (described below) and 2) receiving an explanation from management personnel that emphasizes their commitment to the requirements. The marine trash and debris training videos, training slide packs, and other marine debris related educational material may be obtained at https://www.bsee.gov/debris or by | These measures would complement existing EPMs and regulatory requirements, ensuring that impacts from the accidental releases and discharges IPF would remain negligible adverse. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | contacting BSEE. The training videos, slides, and related material may be downloaded directly from the website. Operators engaged in marine survey activities must continue to develop and use a marine trash and debris awareness training and certification process that reasonably assures that their employees and contractors are in fact trained. The training process must include the following elements:<br>• Viewing of either a video or slide show by the personnel specified above<br>• An explanation from management personnel that emphasizes their commitment to the requirements<br>• Attendance measures (initial and annual)<br>• Recordkeeping and the availability of records for inspection by DOI<br>By January 31 of each year, the Lessee must submit to the DOI an annual report that describes its marine trash and debris awareness training process and certifies that the training process has been followed for the previous calendar year. The Lessee must send the reports via email to BOEM (at renewable_reporting@boem.gov) and to BSEE (at marinedebris@bsee.gov). | |
| Marine debris elimination | Materials, equipment, tools, containers, and other items used in Outer Continental Shelf (OCS) activities which could be lost or discarded overboard must be clearly marked with the vessel or facility identification. All markings must clearly identify the owner and must be durable enough to resist the effects of the environmental conditions to which they may be exposed. Materials, equipment, tools, containers, and other items used in OCS activities which could be lost or discarded overboard must be properly secured to prevent loss overboard. | These measures would complement existing EPMs and regulatory requirements, ensuring that impacts from the accidental releases and discharges IPF would remain negligible adverse. |
| Pile driving monitoring plan | BOEM, BSEE, and USACE would ensure that Revolution Wind prepares and submits to BSEE (via TIMSWeb and notification email at protectedspecies@bsee.gov) and BOEM (at renewable_reporting@boem.gov) for review and concurrence preferably 180 days but no later than 120 days before start of pile | Revolution Wind has committed to implementing passive acoustic monitoring, pile driving monitoring, PSO coverage, sound field verification, and shutdown zones as part of the Proposed Action. Compliance with these EPMs would be enforced by |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | driving. Reporting to BSEE would follow JOINT NTL 2023-N01, Appendix B. The Lessee must not conduct pile driving operations at any time when lighting or weather conditions (e.g., darkness, rain, fog, sea state) prevent visual monitoring of the full extent of the clearance and shutdown zones including not initiating pile driving earlier than 1 hour after civil sunrise or later than 1.5 hours prior to civil sunset.<br>Pile driving at night may only occur with prior approval of an Alternative Monitoring Plan (AMP). The Lessee must submit an AMP to BOEM and NMFS for review and approval at least 6 months prior to the planned start of pile-driving. This plan may include deploying additional observers, alternative monitoring technologies such as night vision, thermal, and infrared technologies, or use of PAM and must demonstrate the ability and effectiveness to maintain all clearance and shutdown zones during daytime as outlined below in Part 1 and nighttime as outlined in Part 2 to BOEM's and NMFS's satisfaction.<br>The AMP must include two stand-alone components as described below:<br>Part 1 – Daytime when lighting or weather (e.g., fog, rain, sea state) conditions prevent visual monitoring of the full extent of the clearance and shutdown zones. Daytime being defined as one hour after civil sunrise to 1.5 hours before civil sunset.<br>Part 2 – Nighttime inclusive of weather conditions (e.g., fog, rain, sea state). Nighttime being defined as 1.5 hours before civil sunset to one hour after civil sunrise.<br>If a protected marine mammal or sea turtle is observed entering or found within the shutdown zones after impact pile-driving has commenced, the Lessee would follow shutdown procedures outlined in the Protected Species Mitigation Monitoring Plan (PSMMP; Appendix B). The Lessee would notify BOEM and NMFS of any shutdown occurrence during piling driving operations within 24 hours of the occurrence unless otherwise authorized by BOEM and NMFS.<br>The AMP should include, but is not limited to the following information:<br>• Identification of night vision devices (e.g., mounted thermal/IR camera systems, hand-held or wearable NVDs, IR spotlights), if | BOEM, BSEE, and NMFS as indicated in Table F-2. Implementation and enforcement of these EPMs would minimize the potential for noise exposure sufficient to cause hearing injury and/or behavioral effects to sea turtles during of impact pile driving, vibratory pile driving, HRG surveys, and UXO detonation, as disclosed in the analysis of the Proposed Action. This agency-proposed mitigation measure specifies plan review and reporting requirements necessary to ensure pile driving monitoring plan effectiveness and enforcement. While adoption of these measures would increase accountability and ensure the effectiveness of EPMs, it would not alter the impact determination for any sea turtle species as analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | proposed for use to detect protected marine mammal and sea turtle species.<br>• The AMP must demonstrate (through empirical evidence) the capability of the proposed monitoring methodology to detect marine mammals and sea turtles within the full extent of the established clearance and shutdown zones (i.e., species can be detected at the same distances and with similar confidence) with the same effectiveness as daytime visual monitoring (i.e., same detection probability). Only devices and methods demonstrated as being capable of detecting marine mammals and sea turtles to the maximum extent of the clearance and shutdown zones will be acceptable.<br>• Evidence and discussion of the efficacy (range and accuracy) of each device proposed for low visibility monitoring must include an assessment of the results of field studies (e.g., Thayer Mahan demonstration), as well as supporting documentation regarding the efficacy of all proposed alternative monitoring methods (e.g., best scientific data available).<br>• Procedures and timeframes for notifying NMFS and BOEM of Revolution Wind's intent to pursue nighttime pile-driving.<br>• Reporting procedures, contacts and timeframes.<br>BOEM may request additional information, when appropriate, to assess the efficacy of the AMP. For mammals see Appendix B MMPA rule. | |
| PSO coverage | BOEM, BSEE, and the USACE must ensure that PSO coverage is sufficient to reliably detect sea turtles at the surface in exclusion and shutdown zones to execute any pile-driving delays or shutdown requirements. If, at any point prior to or during construction, the PSO coverage that is included as part of the Proposed Action is determined not to be sufficient to reliably detect ESA-listed whales and sea turtles within the clearance and shutdown zones, additional PSOs and/or platforms must be deployed. Determinations prior to construction must be based on review of the pile driving monitoring plan. Determinations during | Revolution Wind has committed to implementing passive acoustic monitoring, pile driving monitoring, PSO coverage, sound field verification, and shutdown zones as part of the Proposed Action. Compliance with these EPMs would be enforced by BOEM, BSEE, and NMFS as indicated in Table F-2. Implementation and enforcement of these EPMs would minimize the potential for noise exposure sufficient to cause hearing injury and/or behavioral effects to sea turtles during of impact pile driving, |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | construction must be based on review of the weekly pile driving reports and other information, as appropriate. | vibratory pile driving, HRG surveys, and UXO detonation, as disclosed in the analysis of the Proposed Action. This agency-proposed mitigation measure specifies plan review and reporting requirements necessary to ensure pile driving monitoring plan effectiveness and enforcement. While adoption of these measures would increase accountability and ensure the effectiveness of EPMs, it would not alter the impact determination for any sea turtle species as analyzed herein. |
| Sound field verification (SFV) | BOEM, BSEE, and NMFS may consider adjustments in the pre-start clearance and/or shutdown zones based on the initial SFV measurements. Revolution Wind will provide the initial results of each SFV measurement to BOEM, BSEE, and NMFS in an interim report after each monopile installation. Interim reports must be submitted as soon as they are available but no later than 48 hours after each installation.<br>Revolution Wind will conduct an SFV to empirically determine the distances to the isopleths corresponding to sea turtle hearing injury and behavioral effect thresholds, including at the locations corresponding to the modeled distances to those thresholds. If initial SFV measurements indicate distances to the isopleths are less than the distances predicted by modeling assuming 10-decibel (dB) attenuation, Revolution Wind may request a modification of the clearance and shutdown zones for impact pile driving. For a modification request to be considered, Revolution Wind must have conducted SFV on at least three piles to verify that zone sizes are consistently smaller than predicted by modeling. If initial SFV measurements from any foundation indicate distances to the isopleths are greater than the distances predicted by modeling, Revolution Wind would implement additional sound attenuation measures prior to conducting additional pile driving. Additional measures may include improving the efficacy of the implemented noise attenuation technology and/or modifying the piling schedule to reduce the sound source. If modeled zones cannot be achieved by these corrective actions, Revolution Wind must install an | Revolution Wind has committed to implementing passive acoustic monitoring, pile driving monitoring, PSO coverage, sound field verification, and shutdown zones as part of the Proposed Action. Compliance with these EPMs would be enforced by BOEM, BSEE, and NMFS as indicated in Table F-2. Implementation and enforcement of these EPMs would minimize the potential for noise exposure sufficient to cause hearing injury and/or behavioral effects to sea turtles during of impact pile driving, vibratory pile driving, HRG surveys, and UXO detonation, as disclosed in the analysis of the Proposed Action. This agency-proposed mitigation measure specifies plan review and reporting requirements necessary to ensure pile driving monitoring plan effectiveness and enforcement. While adoption of these measures would increase accountability and ensure the effectiveness of EPMs, it would not alter the impact determination for any sea turtle species as analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
| --- | --- | --- |
| | additional noise mitigation system to achieve the modelled ranges. Each sequential modification would be evaluated empirically by SFV of three additional foundations with the new sound attenuation technology. Additionally, in the event that SFV measurements continue to indicate distances to isopleths corresponding to hearing injury and behavioral effects thresholds are consistently greater than the distances predicted by modeling, BOEM, BSEE, or NMFS may expand the relevant clearance and shutdown zones and associated monitoring measures. | |
| Shutdown zone and pre-start clearance zone adjustment | BOEM, BSEE, and NMFS may consider adjustments in the pre-start clearance and/or shutdown zones based on the initial SFV measurements. Revolution Wind would provide the initial results of the SFV measurements to NMFS in an interim report after each monopile installation for the first three piles as soon as they are available but no later than 48 hours after each installation.<br>Revolution Wind would conduct an SFV to empirically determine the distances to the isopleths corresponding to hearing injury and behavioral effects thresholds for sea turtles, including at the locations corresponding to the modeled distances to these thresholds. If initial SFV measurements indicate distances to the isopleths are less than the distances predicted by modeling assuming 10-decibel (dB) attenuation, Revolution Wind may request a modification of the clearance and shutdown zones for impact pile driving. For a modification request to be considered by NMFS, Revolution Wind must have conducted SFV on at least three piles to verify that zone sizes are consistently smaller than predicted by modeling. If initial SFV measurements indicate distances to the isopleths are greater than the distances predicted by modeling, Revolution Wind would implement additional sound attenuation measures prior to conducting additional pile driving. Additional measures may include improving the efficacy of the implemented noise attenuation technology and/or modifying the piling schedule to reduce the sound source. If modeled zones cannot be achieved by these corrective actions, Revolution Wind would install an additional noise mitigation system to achieve the modelled ranges. Each sequential modification would be evaluated empirically by SFV. Additionally, in the | This measure would not modify the impact determination for noise effects on sea turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein. |

| **Mitigation Measure** | **Description** | **Expected Effect on Impacts from Action Alternatives** |
|---|---|---|
| | event that SFV measurements continue to indicate distances to isopleths corresponding to hearing injury and behavioral effects thresholds are consistently greater than the distances predicted by modeling, NMFS may expand the relevant clearance and shutdown zones and associated monitoring measures. | |
| Monitoring zones for sea turtles | BOEM, BSEE, and the USACE would ensure that Revolution Wind would monitor a 500 m clearance and shutdown zone for sea turtles for the full duration of all pile-driving activities and for 30 minutes following the cessation of pile-driving activities and record all observations in order to ensure that all take that occurs is documented. | This measure would not modify the impact determination for noise effects on sea turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein. |
| Vessel strike avoidance measures for sea turtles | Between June 1 and November 30, Revolution Wind must have a trained lookout posted on all vessel transits during all phases of the Project to observe for sea turtles. The trained lookout must communicate any sightings, in real time, to the captain so that the requirements in (e) below can be implemented.<br>a. The trained lookout must monitor https://seaturtlesightings.org/ prior to each trip and report any observations of sea turtles in the vicinity of the planned transit to all vessel operators/captains and lookouts on duty that day.<br>b. The trained lookout must maintain a vigilant watch and monitor a vessel strike avoidance zone (500 m) at all times to maintain minimum separation distances from ESA-listed species. Alternative monitoring technology (e.g., night vision and thermal cameras) must be available to ensure effective watch at night and in any other low-visibility conditions. If the trained lookout is a vessel crew member, this must be their designated role and primary responsibility while the vessel is transiting. Any designated crew lookouts would receive training on protected species identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements.<br>c. If a sea turtle is sighted within 100 m or less of the operating vessel's forward path, the vessel operator must slow down to 4 | Revolution Wind has committed to implementing a vessel strike avoidance policy, vessel separation distances, and vessel speed restrictions as part of the Proposed Action and as described in Table F-4. These measures include maintaining specified separation distances for NARW and unidentified large marine mammals, other large whales, and dolphins, porpoises, seals, and sea turtles. Revolution Wind's vessel strike avoidance policy directs that if an animal is sighted in the vessel's path, the vessel will divert or reduce speed and shift gears to neutral. Project design criteria to minimize vessel interactions with listed species would further clarify the distance at which vessels would divert their path and the distance at which vessels would reduce speed and shift to neutral. Adoption of these measures would further clarify requirements for vessel strike avoidance under the Proposed Action but would not alter the impact determinations for any sea turtle species as analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | knots (unless unsafe to do so) and then proceed away from the turtle at a speed of 4 knots or less until there is a separation distance of at least 100 m at which time the vessel may resume normal operations. If a sea turtle is sighted within 50 m of the forward path of the operating vessel, the vessel operator must shift to neutral when safe to do so wait for the turtle to pass beyond 50m and then engage engines and travel proceed away from the turtle at a speed of 4 knots until a separation distance of 100 m is observed The vessel may resume normal operations once it has passed the turtle.<br>d. Vessel captains/operators would avoid transiting through areas of visible jellyfish aggregations or floating sargassum lines or mats. In the event that operational safety prevents avoidance of such areas, vessels must slow to 4 knots while transiting through such areas.<br>e. All vessel crew members must be briefed in the identification of ESA-listed species of sea turtles and in regulations and best practices for avoiding vessel collisions. Reference materials must be available aboard all Project vessels for identification of sea turtles. The expectation and process for reporting of sea turtles (including live, entangled, and dead individuals) must be clearly communicated and posted in highly visible locations aboard all Project vessels, so that there is an expectation for reporting to the designated vessel contact (such as the lookout or the vessel captain), as well as a communication channel and process for crew members to do so.<br>f. The only exception is when the safety of the vessel or crew necessitates deviation from these requirements on an emergency basis. If any such incidents occur, they must be reported to NMFS and BSEE within 24 hours.<br>g. If a vessel is carrying a PSO or trained lookout for the purposes of maintaining watch for North Atlantic right whales, an additional lookout is not required and this PSO or trained | |

| **Mitigation Measure** | **Description** | **Expected Effect on Impacts from Action Alternatives** |
|---|---|---|
| | lookout must maintain watch for whales, giant manta rays, and sea turtles. | |
| Sampling gear | All sampling gear would be hauled out at least once every 30 days, and all gear must be removed from the water and all gear must be removed from the water and stored on land between survey seasons to minimize risk of entanglement. | Revolution Wind has committed to EPMs to avoid and minimize potential entanglement risk to sea turtles from implementation of the Fisheries and Benthic Monitoring Plan. BOEM and BSEE would enforce compliance with these EPMs to ensure that impacts to sea turtles from monitoring activities remain negligible. |
| Lost survey gear | If any survey gear is lost, all reasonable efforts that do not compromise human safety must be undertaken to recover the gear. All lost gear must be reported to NMFS (nmfs.gar.incidental-take@noaa.gov) and BSEE BSEE (via TIMSWeb and notification email at marinedebris@bsee.gov)) within 24 hours of the documented time of missing or lost gear. This report must include information on any markings on the gear and any efforts undertaken or planned to recover the gear. | Revolution Wind has committed to EPMs to avoid and minimize potential entanglement risk to sea turtles from implementation of the Fisheries and Benthic Monitoring Plan. This measure would complement existing EPMs and ensure that entanglement risk associated with survey activities and potential impacts on sea turtles remain negligible. |
| Sea turtle disentanglement | Vessels deploying fixed gear (e.g., pots/traps) would have adequate disentanglement equipment (i.e., knife and boathook) onboard. Any disentanglement would occur consistent with the Northeast Atlantic Coast STDN disentanglement guidelines (https://www.reginfo.gov/public/do/DownloadDocument?objectID=102486501) and the procedures described in *Careful Release Protocols for Sea Turtle Release with Minimal Injury* (NOAA Technical Memorandum 580; https://repository.library.noaa.gov/view/noaa/3773) (NOAA 2008). | Revolution Wind has committed to EPMs to avoid and minimize potential entanglement risk to sea turtles from implementation of the Fisheries and Benthic Monitoring Plan. This measure would complement existing EPMs and ensure that entanglement risk associated with benthic monitoring gear and potential impacts on sea turtles remains negligible. |
| Sea turtle/Atlantic sturgeon identification and data collection | Any sea turtles or Atlantic sturgeon caught and/or retrieved in any fisheries' survey gear must first be identified to species or species group. Each ESA-listed species caught and/or retrieved must then be properly documented using appropriate equipment and data collection forms. Biological data, samples, and tagging must occur as outlined below. Live, uninjured animals should be returned to the water as quickly as possible after completing the required handling and documentation. | Revolution Wind has committed to EPMs to avoid and minimize potential entanglement risk to sea turtles from implementation of the Fisheries and Benthic Monitoring Plan. This measure would not modify the impact determination for sea turtles but would provide the information necessary to ensure |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | a. The *Sturgeon and Sea Turtle Take Standard Operating Procedures* must be followed (NOAA 2021a; https://media.fisheries.noaa.gov/dammigration/sturgeon_&_sea_turtle_take_sops_external.pdf).).<br>b. Survey vessels must have a passive integrated transponder (PIT) tag reader onboard capable of reading 134.2-kilohertz and 125-kilohertz encrypted tags (e.g., Biomark GPR Plus Handheld PIT Tag Reader), and this reader be used to scan any captured sea turtles and sturgeon for tags. Any recorded tags must be recorded on the take reporting form (see below).<br>c. Genetic samples must be taken from all captured Atlantic sturgeon (alive or dead) to allow for identification of the distinct population segment (DPS) of origin of captured individuals and tracking of the amount of incidental take. This must be done in accordance with the *Procedure for Obtaining Fin Clips from Sturgeon for Genetic Analysis* (NOAA 2019; https://media.fisheries.noaa.gov/dammigration/sturgeon_genetics_sampling_revised_june_2019.pdf).<br>i. Fin clips must be sent to a NMFS-approved laboratory capable of performing genetic analysis and assignment to DPS of origin. To the extent authorized by law, BOEM is responsible for the cost of the genetic analysis. Arrangements must be made for shipping and analysis in advance of submission of any samples; these arrangements must be confirmed in writing to NMFS within 60 days of the receipt of this incidental take statement (ITS). Results of genetic analysis, including assigned DPS of origin, must be submitted to NMFS within 6 months of the sample collection.<br>ii. Subsamples of all fin clips and accompanying metadata forms must be held and submitted to a tissue repository (e.g., the Atlantic Coast Sturgeon Tissue Research Repository) on a quarterly basis. The Sturgeon Genetic Sample Submission Form is available | that these effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | for download at https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-take-reporting-programmatics-greater-atlantic.<br>d. All captured sea turtles and Atlantic sturgeon must be documented with required measurements and photographs. The animal's condition and any marks or injuries mustbe described. This information must be entered as part of the record for each incidental take. A NMFS Take Report Form would be filled out for each individual sturgeon and sea turtle (download at: https://media.fisheries.noaa.gov/2021-11/Sturgeon-Sea-Turtle-Take-SOPs-external-11032021.pdf). | |
| Sea turtle/Atlantic sturgeon handling and resuscitation guidelines | Any sea turtles or Atlantic sturgeon caught and retrieved in gear used in fisheries surveys must be handled and resuscitated (if unresponsive) according to established protocols and whenever at-sea conditions are safe for those handling and resuscitating the animal(s) to do so. Specifically:<br>a. Priority mustbe given to the handling and resuscitation of any sea turtles or sturgeon that are captured in the gear being used, if conditions at sea are safe to do so. Handling times for these species should be minimized (i.e., kept to 15 minutes or less) to limit the amount of stress placed on the animals.<br>b. All survey vessels must have copies of the sea turtle handling and resuscitation requirements found at 50 CFR 223.206(d)(1) prior to the commencement of any on-water activity (download at: https://media.fisheries.noaa.gov/ dammigration/sea_turtle_handling_and_resuscitation_measures.pdf). These handling and resuscitation procedures must be carried out any time a sea turtle is incidentally captured and brought onboard the vessel during the proposed actions.<br>c. If any sea turtles that appear injured, sick, or distressed, are caught and retrieved in fisheries survey gear, survey staff must immediately contact the Greater Atlantic Region Marine Animal Hotline at 866-755-6622 for further instructions and guidance | This measure would not modify the impact determination for sea turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | on handling the animal, and potential coordination of transfer to a rehabilitation facility. If unable to contact the hotline (e.g., due to distance from shore or lack of ability to communicate via phone), the USCG should be contacted via VHF marine radio on Channel 16. If required, hard-shelled sea turtles (i.e., non-leatherbacks) may be held on board for up to 24 hours following handling instructions provided by the Hotline, prior to transfer to a rehabilitation facility.<br>d. Attempts must be made to resuscitate any Atlantic sturgeon that are unresponsive or comatose by providing a running source of water over the gills as described in the sturgeon resuscitation guidelines (NOAA 2020; https://media.fisheries.noaa.gov/dammigration-miss/Resuscitation-Cards-120513.pdf).<br>e. Provided that appropriate cold storage facilities are available on the survey vessel, following the report of a dead sea turtle or sturgeon to NMFS, and if NMFS requests, any dead sea turtle or Atlantic sturgeon must be retained on board the survey vessel for transfer to an appropriately permitted partner or facility on shore as safe to do so.<br>f. Any live sea turtles or Atlantic sturgeon caught and retrieved in gear used in any fisheries survey must ultimately be released according to established protocols and whenever at-sea conditions are safe for those releasing the animal(s) to do so. | |
| Take notification | GARFO Protected Resources Division (PRD) and BSEE must be notified as soon as possible of all observed takes of sea turtles and Atlantic sturgeon occurring as a result of any fisheries survey. Specifically:<br>a. GARFO PRD and DOI (BOEM and BSEE) must be notified within 24 hours of any interaction with a sea turtle or sturgeon (nmfs.gar.incidental- take@noaa.gov and DOI via TIMSWeb and notification email at protectedspecies@bsee.gov). The report must include at a minimum 1) survey name and applicable information (e.g., vessel name, station number); 2) GPS | This measure would not modify the impact determination for sea turtles but would provide a reporting and enforcement mechanisms to ensure that impacts to sea turtles do not exceed the levels analyzed herein. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | coordinates describing the location of the interaction (in decimal degrees); 3) gear type involved (e.g., bottom trawl, longline); 4) soak time, gear configuration, and any other pertinent gear information; 5) time and date of the interaction; and 6) identification of the animal to the species level. Additionally, the email must transmit a copy of the NMFS Take Report Form (download at: https://media.fisheries.noaa.gov/2021-07/Take%20Report%20Form%2007162021.pdf?null) and a link to or acknowledgement that a clear photograph or video of the animal was taken (multiple photographs are suggested, including at least one photograph of the head scutes). If reporting within 24 hours is not possible due to distance from shore or lack of ability to communicate via telephone, fax, or email, reports must be submitted as soon as possible; late reports must be submitted with an explanation for the delay.<br>b. At the end of each survey season, a report must be sent to NMFS that compiles all information on any observations and interactions with ESA-listed species. This report must also contain information on all survey activities that took place during the season including location of gear set, duration of soak/trawl, and total effort. The report on survey activities must be comprehensive of all activities, regardless of whether ESA-listed species were observed. | |
| Monthly/ annual reporting requirements | BOEM and BSEE would ensure that Revolution Wind submits regular reports (in consultation with NMFS) necessary to document the amount or extent of take that occurs during all phases of the proposed action. Details of reporting must be coordinated between Revolution Wind, NMFS, BOEM, and BSEE. All reports would be sent to: nmfs.gar.incidental- take@noaa.gov and BSEE via TIMSWeb and notification email at protectedspecies@bsee.gov. | This measure would not modify the impact determination for sea turtles but would provide a reporting and enforcement mechanisms to ensure that impacts to sea turtles do not exceed the levels analyzed herein. |
| Data collection | BOEM and BSEE would ensure that all Project design criteria and BMPs incorporated in the Atlantic data collection consultation for offshore | This measure would not modify the impact determination for sea turtles but would provide the |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | wind activities (Baker and Howson 2021) shall be applied to activities associated with the construction, maintenance and operations of the Revolution Wind Project as applicable. | information necessary to ensure that these effects do not exceed the levels analyzed herein. |
| Periodic underwater surveys, reporting of monofilament and other fishing gear around WTG foundations | BOEM would require the Lessee to monitor potential loss of fishing gear WTG foundations by surveying at least ten percent of the total installed foundations annually. Survey design and effort may be modified based upon previous survey results after review and concurrence by BOEM. The Lessee must conduct surveys by remotely operated vehicles, divers, or other means to determine the locations and amounts of marine debris. The Lessee must submit annual reports to BOEM and BSEE by no later than April of the year following the survey. Survey reports would meet all requirements specified in Appendix F, Table F-2. Required data and reports may be archived, analyzed, published, and disseminated by BOEM. | This measure would not modify the impact determination for sea turtles, but it would provide the information necessary to ensure that effects do not exceed the levels analyzed herein. |

* Information in these rows was taken directly from the final biological opinion (NMFS 2023) and has not been edited.

**Table 3.19-10. Additional Mitigation and Monitoring Measures Under Consideration for Sea Turtles (Appendix F, Table F-3)**

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| Federal survey mitigation | There are 14 NMFS scientific surveys that overlap with wind energy development in the northeast region and eight of these surveys overlap with the Project. As per NMFS and BOEM Survey Mitigation strategy actions 1.3.1, 1.3.2, 2.1.1, and 2.1.2 (Hare et al. 2022), within 120 calendar days of COP Approval, the Lessee must submit to BOEM a draft survey mitigation agreement between NMFS and the Lessee. The survey mitigation agreement will describe how the Lessee will mitigate the Project impacts on the eight NMFS surveys. If after consultation with NMFS NEFSC, BOEM deems the survey mitigation agreement acceptable, the mitigation will be considered required as a term and condition of the Project's COP approval.<br>As soon as reasonably practicable, but no later than 30 days after the issuance of the Project's COP Approval, the Lessee will initiate | This measure provides a mechanism to avoid and minimize adverse impacts of project O&M on scientific surveys used to monitor the status of sea turtle populations and their forage and prey organisms. The implementation of this measure would ensure that federal surveys continue to provide the data and information necessary to monitor sea turtle population status. Federal survey data will be used to ensure that impacts to sea turtles remain within the levels considered in this FEIS, and to address uncertainties identified in impact analysis. |

| Mitigation Measure | Description | Expected Effect on Impacts from Action Alternatives |
|---|---|---|
| | coordination with NMFS NEFSC to develop the survey mitigation agreement described above. Mitigation activities specified under the agreement will be designed to mitigate the Project impacts on the following NMFS NEFSC surveys: (a) Spring Bottom Trawl survey; (b) Autumn Multi-species Bottom Trawl survey; (c) Ecosystem Monitoring survey; (d) NARW aerial survey; (e) Aerial marine mammal and sea turtle survey; (f) Shipboard marine mammal and sea turtle survey; (g) Atlantic surfclam and ocean quahog survey; and (h) Atlantic sea scallop survey. At a minimum, the survey mitigation agreement will describe actions needed and the means to address impacts on the affected surveys due to the preclusion of sampling platforms and impacts on statistical designs. In terms of statistical design, the project will be viewed as a discrete stratum in surveys that use a random stratified design. Other anticipated Project impacts on NMFS surveys such as changes in habitat and increased operational costs due to loss of sampling efficiencies may also be addressed in the agreement.<br><br>The survey mitigation agreement will identify activities that will result in the generation of data equivalent to data generated by NMFS's affected surveys for the duration of the Project. The survey mitigation agreement will describe the implementation procedures by which the Lessee will work with NEFSC to generate, share, and manage the data required by NEFSC for each of the surveys impacted by the Project, as mutually agreed upon between the Lessee and NMFS/NEFSC. The survey mitigation agreement must also describe the Lessee's participation in the NMFS NEFSC Northeast Survey Mitigation Program to support activities that address regional-level impacts for the surveys listed above. | |

#### 3.19.2.6.1 Measures Incorporated into the Preferred Alternative

Mitigation measures required through completed consultations, authorizations, and permits listed in Table 3.19-9 and in Appendix F, Table F-2, are incorporated into Alternative G (Preferred Alternative). BOEM has identified additional measures in Table 3.19-10 as incorporated in the Preferred Alternative. These measures, if adopted, would further define how the effectiveness and enforcement of EPMs would be ensured and improve accountability for compliance with EPMs by requiring the submittal of plans for approval by the enforcing agency(ies) and by defining reporting requirements. Because these measures ensure the effectiveness of and compliance with EPMs that are already analyzed as part of the Proposed Action, implementation of these measures would not further reduce the impact level of the Proposed Action from what is described in Section 3.19.2.

# 3.20 Visual Resources (see section in main EIS)

# 3.21 Water Quality

## 3.21.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Water Quality

### 3.21.1.1 Offshore Water Quality

Geographic analysis area: The GAA for offshore water quality impacts comprises coastal and marine waters within 10 miles of Project components and within 15.5 miles of waterways for ports that could be used during the Project (Figure 3.21-1). This analysis area was chosen by analyzing a worst-case scenario of an incidental oil discharge under the Project, which would equate to the simultaneous release of all oils used by all Project components and vessels.

Affected environment: Offshore waters in the offshore water quality analysis area comprise coastal waters (e.g., ports and harbors, bays, and estuaries; marine waters) located within the state territory (within 3 nm of shore) and within federal waters. The coastal waters, including the Long Island Sound, Block Island Sound, Rhode Island Sound, Narragansett Bay, and Atlantic Ocean, are located offshore and include existing port facilities in New York, Connecticut, Rhode Island, Virginia, Massachusetts, Maryland, and New Jersey that could be used for the Project. Because of their highly seasonal variations in temperature, stratification, and productivity, marine waters are considered temperate. Water currents near the shoreline of the landing site flow predominantly southwest and northeast, and water currents in the northern and southeastern portions of the offshore portion of the Lease Area flow predominantly south and east (RPS 2022). Along the proposed RWEC, currents were measured up to approximately 0.2 m/s, which increased to approximately 0.4 m/s at Narragansett Bay (RPS 2022).

Near the Lease Area, NOAA reported annual increases in relative sea level trends at seven tide stations (NOAA 2021a, 2021b, 2021c, 2021d, 2021e, 2021f, 2021g), including four along the Long Island coast (Bridgeport, Port Jefferson, New London, and Montauk), two along the Rhode Island coast (Newport and Providence), and one along the Massachusetts coast (Woods Hole) with increases ranging from approximately 2.4 millimeters per year at Providence, Rhode Island, to 3.41 millimeters per year at Montauk, New York. These increasing sea levels in addition to storm surges that are increasing in both frequency and magnitude have contributed to coastal erosion that has led to eroded shorelines and increased susceptibility to flooding (New York Sea Grant 2018; Rhode Island Coastal Resources Management Council 2014).

Offshore water quality is characterized by dissolved oxygen (DO), chlorophyll *a*, nutrients (phosphorus and nitrogen), pathogens, contaminants (metals, polychlorinated biphenyls [PCBs], and organic and inorganic pollutants), turbidity, and point and nonpoint source pollution. These parameters, which are described in COP Section 4.2.2, influence coastal and marine environments and are indicators of ecosystem health. In general, salinity levels in the region have low variability. Salinity ranged from 23.7 to 28.4 practical salinity unit (psu) in Narragansett Bay from 2005 through 2015, as well as 32 to 33 psu in the broader New England lease area between 1980 and 2007 (BOEM 2021a).

As described in COP Section 4.2.4, surface water temperatures fluctuate up to 59 degrees Fahrenheit (°F) seasonally, with bottom waters experiencing smaller seasonal temperature fluctuations of approximately 41°F. Water temperatures are highest in July and August when the water column becomes stratified; RWF surface water temperatures are close to 68°F, while bottom waters are approximately 50°F. During the winter, average surface water temperatures range from approximately 39°F to 41°F, with bottom waters staying slightly warmer at the southern edge of Rhode Island Sound.

The Project, including offshore facilities and ports, would be located within the northeast and mid-Atlantic regions of the United States, as defined by the EPA (2012). Overall water quality along the Atlantic coast has been rated “fair” to “good” (EPA 2012). The Mid-Atlantic region’s water quality has been rated as generally “good,” and the northeast region’s water quality has been rated “fair” (EPA 2012). Water quality in the Long Island Sound from the Port Jefferson area eastward has generally improved or remained “very good” over the past decade (University of Maryland 2018). In general, water quality improves north to south from Narragansett Bay to the OCS (EPA 2012). Seventy percent of Rhode Island coastal waters are categorized as Type 1 (i.e., waters abut shorelines in natural undisturbed conditions) and Type 2 (i.e., waters are adjacent to predominantly residential areas; docks are allowed but other more intensive uses are not) (Rhode Island Division of Planning 2016). The water quality of estuarine waters off the coast of Rhode Island, including Narragansett Bay and nearby coastal ponds, has experienced degradation from nutrients and stormwater runoff carrying contaminants, although overall water quality in the area is generally good (Rhode Island Division of Planning 2016).

DO concentrations for offshore waters along the Atlantic coast and in the northeast region have been rated as generally “fair” (EPA 2012). DO concentrations have been rated as “good” within the Mid-Atlantic region (EPA 2012). Low DO concentrations have been measured at Long Island Sound monitoring stations (EPA 2012); however, water quality surveys at stations in the Rhode Island Sound revealed DO concentrations in surface and bottom waters above established levels for the “highest quality marine waters” (RI CRMC 2010). The upper reaches of Narragansett Bay and urbanized tidal rivers and embayments have been more heavily impacted by urbanized areas, which has led to continued water quality degradation, including low DO levels from excess nutrient (nitrogen) runoff (Rhode Island Division of Planning 2016). Chlorophyll *a* concentrations in samples from Rhode Island Sound and Block Island Sound were variable but representative of oceanic systems and comparable to each other and other coastal systems (RI CRMC 2010; RPS 2022). In Narragansett Bay, chlorophyll *a* concentrations were slightly higher compared to the overall northeast coast region (RI CRMC 2010; VHB 2023).

Pathogens and nutrients, which are transported from point and nonpoint sources of pollution to coastal waters through stormwater and wastewater discharges (RI CRMC 2016), are the most prevalent pollutants degrading water quality in Rhode Island (Rhode Island Division of Planning 2016). There have been no documented reports of harmful algal blooms or waterborne pathogen outbreaks in the Block Island Sound or Rhode Island Sound (EPA 2012; RI CRMC 2010); however, excess nutrients (nitrogen) in Narragansett Bay have led to oxygen depletion events (hypoxia and anoxia) that have degraded water quality conditions (EPA 2012; Rhode Island Division of Planning 2016). Dissolved nutrients from Narragansett Bay, in addition to those from Long Island Sound, reach OCS waters and contribute to degraded water quality conditions (VHB 2023). Nutrient levels in Rhode Island waters have decreased over the past 15 years (RI CRMC 2016; VHB 2023), and Rhode Island’s southern shoreline waters have overall remained acceptable for both swimming and shellfishing (Rhode Island Division of Planning 2016). Dissolved inorganic phosphorus (a form of phosphorus in fertilizers) concentrations at monitoring stations in the Long Island Sound and Narragansett Bay were rated as “poor” (0.05–0.20 milligram per liter) (EPA 2012).

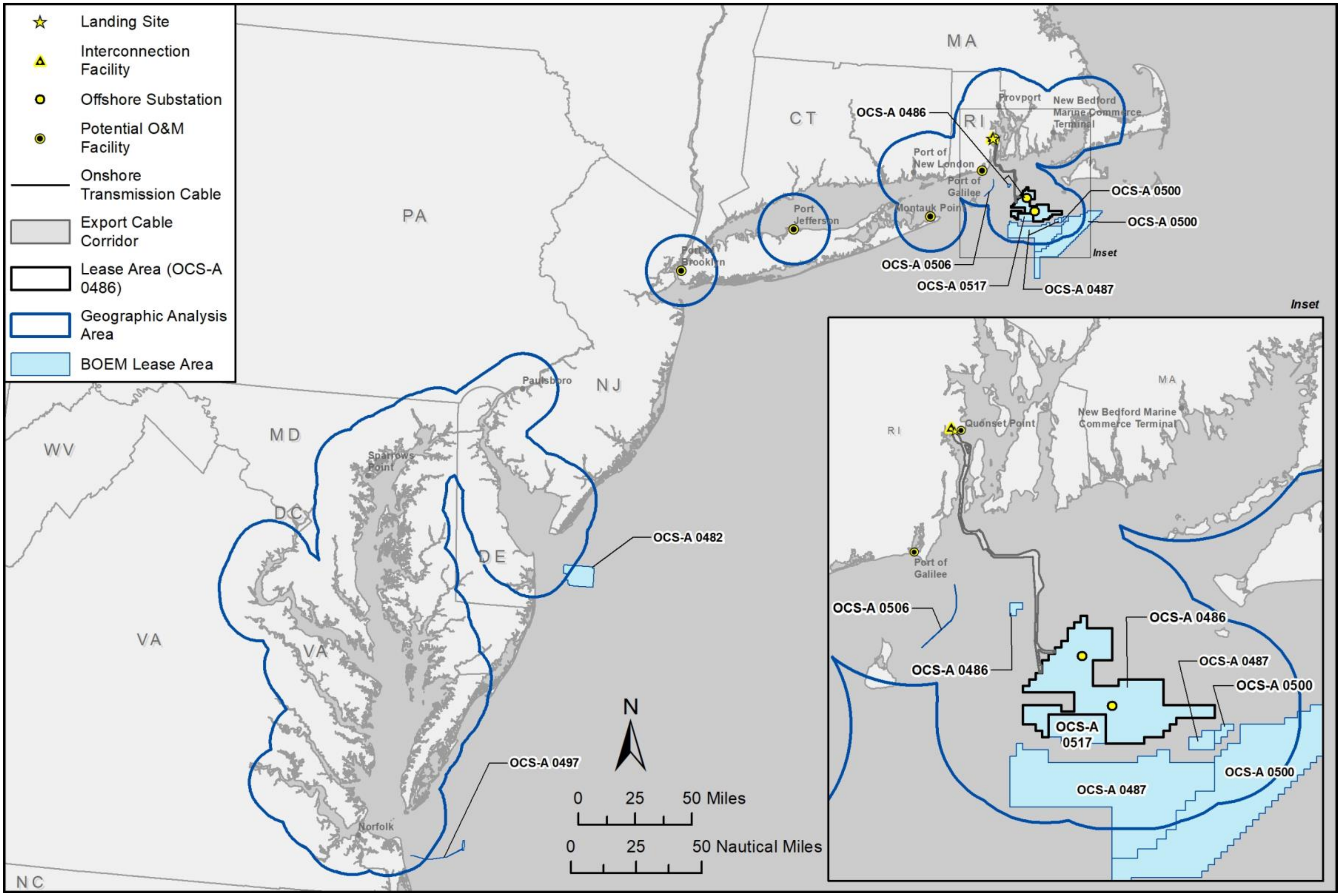


**Figure 3.21-1. Geographic analysis area for offshore water quality.**

Data are limited for water-column contaminant levels. In the Rhode Island Sound, organic contaminants were below detectable limits (USACE 2004; VHB 2023). Higher concentrations of heavy metals and PCBs have been identified in the northern reaches of Narragansett Bay compared to lower reaches (VHB 2023). Past investigations in and around the analysis area have not identified metal, PCB, or organic and inorganic pollutant concentrations above ambient water quality criteria (RI CRMC 2010). Contaminants could also reside within the sediment column and contribute to water quality conditions if disturbed. The Narragansett Bay is rated as “poor” for sediment toxicity (EPA 2012).

Turbidity is influenced by currents and storms, which lead to the resuspension of clay, silt, and fine-grained sand that comprise the sediment. Federal marine waters typically have very low concentrations of total suspended solids. Past investigations in the Rhode Island Sound revealed a range of turbidity levels from 0.1 to 7.4 milligram per liter of total suspended solids (USACE 2004; VHB 2023). Within the Narragansett Bay, annual average visibility depth in 2017–2019 ranged from 1.7 to 2.3 meters. See COP Section 4.2 for additional information regarding physical oceanographic and meteorological conditions within the analysis area.

#### 3.21.1.2 Onshore Water Quality

Geographic analysis area: The GAA for onshore water quality impacts comprises the watersheds and groundwater basins that cross or fall within the Lease Area (Figure 3.21-2). This analysis area was chosen to capture the extent of the natural network of waterbodies that could be affected by construction and operations activities of the Project.

Affected environment: The onshore analysis area for surface water encompasses the Lower West Passage subwatershed (Hydrologic Unit Code 010900040908), where all Project components would be located (see Figure 3.21-2). The Lower West Passage subwatershed includes more than 500 surface water features (USGS 2004). The Project’s onshore facilities would not cross surface waterbodies. The nearest surface water features to the Lease Area that would contribute to flows to and from the Lease Area include 10 perennial streams/rivers, three artificial paths, 16 swamps/marshes, and 12 perennial lakes/ponds. These waterbodies, which are identified in Figure 3.21-2, would have the greatest influence on or from the Project and are therefore the focus of this analysis of onshore water quality impacts.

Surface water quality within the onshore water quality analysis area is generally good. None of the surface waterbodies near the Lease Area are currently listed as impaired (Rhode Island DEM 2021a). There is only one named waterbody—Mill Creek—near the Lease Area. Mill Creek, including its tributaries, is designated as Class B (Rhode Island DEM 2021b), which includes waters that are designated for fish and wildlife habitat and primary and secondary contact recreational activities (250 RICR 150.05 (Rhode Island Department of State 2018).

Groundwater resources are limited in the analysis area. The Project would be located (at its closest point) approximately 0.1 mile west of the Conanicut Island Aquifer, which is a sole source aquifer (URI Environmental Data Center and Rhode Island GIS 2016a). At its nearest points, the Project would be located approximately 1.2 miles east of the nearest groundwater recharge area and 2 miles east of the Pettaquamscutt groundwater reservoir, which is classified as a Class GAA groundwater (URI Environmental Data Center and Rhode Island GIS 2016b, 2016c). Class GAA groundwaters are known or presumed suitable for drinking water use without treatment and fall within a water supply priority for the area (Rhode Island DEM 2009).

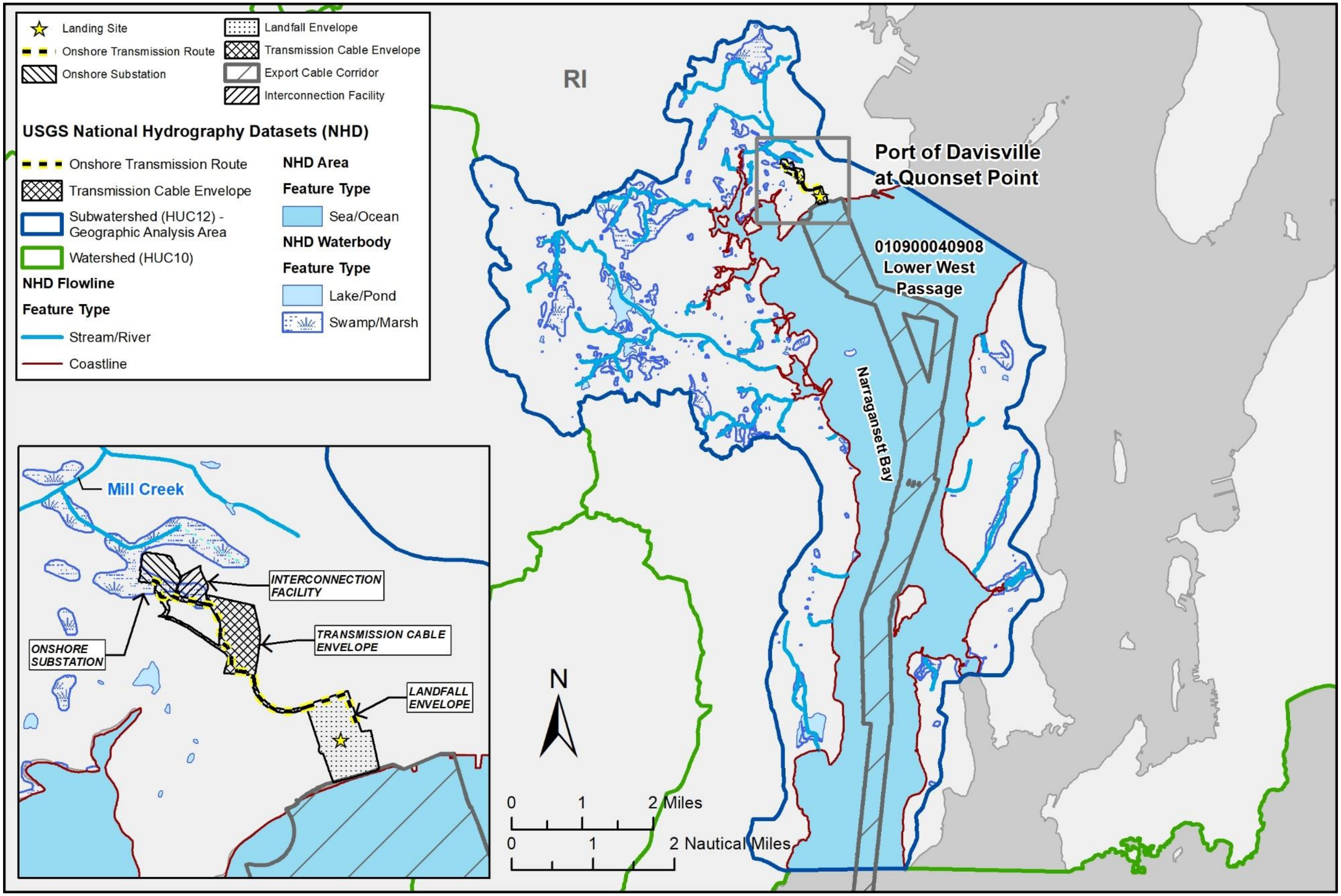


**Figure 3.21-2. Geographic analysis area for onshore water quality.**

There are 12 hazardous waste generating facilities near the Project (EPA 2021a). One of these facilities, the Senesco Marine Repair Yard, is approximately 0.7 mile from the eastern edge of the Project and 0.5 mile from the northeast corner of the cable corridor. The Senesco Marine Repair Yard has a current CWA violation within the past 12 months due to a violation of their NPDES permit (EPA 2021b). There is one hazardous waste cleanup site (EPA ID#: RID063900690) that includes the landfall work area (EPA 2021c). The waste storage container areas and tanks at this site have been "clean closed" in accordance with Resource Conservation and Recovery Act regulations, and there are no current identified violations at the facility (EPA 2021c, 2021d).

### 3.21.2 Environmental Consequences

#### 3.21.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). The Project design parameters that would influence the magnitude of the impacts on offshore waters include the number of WTGs and distance of installed IAC. Construction and operations activities for fewer WTGs and a shorter IAC distance could result in similar or lower impacts than described in Section 3.21.2.2. For onshore waters, the Project design parameters that would influence the magnitude of the impacts include the location of and construction of or within the OnSS, ICF, and landfall work area. However, EPMs implemented during both construction and decommissioning, as well as a facility-specific spill plan implemented during O&M, would decrease the potential for impacts to onshore waters. Likewise, the implementation of the Project OSRP would help minimize impacts on offshore water quality from spills. These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for water quality across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E1-4 in Appendix E1.

Table 3.21.1 discloses IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action follows the table. Detailed analysis of other considered action alternatives is also provided below the table if the analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4 to facilitate reader comparison across alternatives.

The conclusion section within each alternative analysis discussion includes a rationale for the overall impact determination. The overall impact of any alternative would be **minor** adverse because the effects would be small, and the resource would be expected to recover completely without remedial or mitigating action.

**Table 3.21-1. Alternative Comparison Summary for Water Quality**

<table>
<tr>
<th>Impact-Producing Factor</th>
<th>No Action Alternative</th>
<th>Alternative B<br>(Proposed Action)<br>Up to 100 WTGs</th>
<th>Alternative C<br>(Habitat Alternative)<br>64 or 65 WTGs</th>
<th>Alternative D<br>(Transit Alternative)<br>78 to 93 WTGs</th>
<th>Alternative E<br>(Viewshed Alternative)<br>64 or 81 WTGs</th>
<th>Alternative F<br>(Higher Capacity Turbine Alternative)<br>56 WTGs</th>
<th>Alternative G<br>(Preferred Alternative)<br>65 WTGs</th>
</tr>
<tr>
<td>Accidental releases and discharges</td>
<td>Offshore: Routine spills would result in little change to water quality and would therefore be localized, short term, and minor adverse. In the unlikely event an allision or collision involving Project vessels or components resulted in a large spill, impacts on water quality would be minor to moderate adverse, and would range from short term to long term, depending on the type and volume of material released, the specific conditions (e.g., depth, currents, weather conditions) at the location of the spill, and effectiveness of the cleanup techniques deployed.<br><br>Vessel operators would be required to comply with federal and international requirements for the management of shipboard trash and the USCG ballast water management requirements outlined in 33 CFR 151 and 46 CFR 162. Accidental releases of trash and debris would be infrequent and negligible adverse, and any allowed vessel discharges, such as bilge and ballast water, would be restricted to uncontaminated or appropriately treated liquids.</td>
<td>Offshore: Fuels and oils would be required for Proposed Action offshore equipment, vessels, and infrastructure. The volumes of fuels and oils and number of vessels required during O&M and decommissioning would be less than that required during construction and installation. Should a spill occur, response and containment procedures would limit the reach of the spill to a localized area, where changes to water quality would be detectable and would exceed water quality standards. As a result, adverse impacts on water quality would be short term, with spills generally dispersing within days (BOEM 2015), and minor to moderate adverse, depending on the severity of the spill.<br><br>In the unlikely event an allision or collision involving Project vessels or components results in a large spill, impacts on water quality would also be minor to moderate adverse, and short term to long term, depending on the type and volume of material released and the specific conditions (e.g., depth, currents, weather conditions) at the location of the spill.<br><br>Accidental releases of trash and debris would be infrequent and negligible adverse because Project actions would comply with federal and international requirements for management of shipboard trash and USCG regulations regarding waste and discharge.<br><br>The Proposed Action could add accidental releases of fuels, oils, or hazardous material; sediment; and/or trash and debris to conditions under the No Action Alternative. BOEM estimates that the Project would result in an up-to-20% increase in total chemical usage over the No Action Alternative within the offshore water quality GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with the USCG requirements for the prevention and control of oil and fuel spills. Additionally, training and awareness of EPMs (see Table F-1 in Appendix F) proposed for waste management and mitigation of marine debris would be required of Revolution Wind Project personnel. For this reason, the Proposed Action</td>
<td colspan="4">Offshore: Alternatives C through F would reduce the number of WTG foundations. This would require less fuels and oils associated with equipment, vessels, and infrastructure; less fuels and oils stored at WTGs; and less volumes of associated trash and debris. Differences in estimated total fuel and oil storage by alternative are disclosed in Appendix E4 and range from 444,000 gallons (Alternative F) to 563,000 gallons (Alternative D). These alternatives would also likely reduce the number and duration of vessels required during construction and installation, O&M, and decommissioning activities. Under all action alternatives, Project EPMs (see Table F-1 in Appendix F), permit requirements, controls, and procedures would be implemented as part of the Project to reduce the potential or extent of offshore spills, thereby avoiding or minimizing impacts on water quality. Therefore, impacts under these alternatives would be similar to the Proposed Action: short term to long term negligible to moderate adverse.<br><br>Ongoing and planned actions, including those under Alternatives C through F, would require fuels and oils. Any Project-related accidental spills or discharges, including those associated with vessel allisions or collisions, would add to water quality impacts from other planned actions, albeit at potentially slightly lower volumes than the Proposed Action under these alternatives. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in short-term to long-term and minor to moderate adverse cumulative impacts on water quality.</td>
<td>Offshore: Alternative G would reduce the number of WTG foundations. This would require less fuels and oils associated with equipment, vessels, and infrastructure; less fuels and oils stored at WTGs; and less volumes of associated trash and debris as compared to the Proposed Action. Alternative G is estimated to result in a total fuel and oil storage of 473,000 gallons (see Appendix E4). This alternative would also likely reduce the number and duration of vessels required during construction and installation, O&M, and decommissioning activities. Project EPMs (see Table F-1 in Appendix F), permit requirements, controls, and procedures would be implemented as part of the Project to reduce the potential or extent of offshore spills, thereby avoiding or minimizing impacts on water quality. Therefore, impacts under this alternative would be similar to the Proposed Action: short term to long term negligible to moderate adverse.<br><br>Ongoing and planned actions, including those under Alternative G, would require fuels and oils. Any Project-related accidental spills or discharges, including those associated with vessel allisions or collisions, would add to water quality impacts from other planned actions, albeit at potentially slightly lower volumes than the Proposed Action under these alternatives. Therefore, Alternative G when combined with past, present, and reasonably foreseeable activities would result in short-term to long-term and minor to moderate adverse cumulative impacts on water quality.</td>
</tr>
</table>

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | | when combined with other past, present, and reasonably foreseeable projects would result in short-term to long-term **minor** to **moderate** adverse impacts. | | | | | |
| | **Onshore:** Surface and groundwater bodies would be monitored and managed to meet water quality standards and drinking water resource protections. As a result, adverse impacts from future onshore wind activities supporting OSW on onshore water quality under the No Action Alternative would be short term to long term **negligible** to **minor** adverse. | **Onshore:** Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, the adverse impact on water quality would be short term **negligible** to **minor** adverse. | **Onshore:** Alternatives C through F would not change Project onshore activities; therefore, impacts would be the same as the Proposed Action: short term **negligible** to **minor** adverse. | | | | **Onshore:** Alternative G would not change Project onshore activities; therefore, impacts would be the same as the Proposed Action: short term **negligible** to **minor** adverse. |
| Anchoring and new cable emplacement/ maintenance | **Offshore:** Disturbances to the seafloor during anchoring would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to the anchorage area. BOEM anticipates that future offshore wind projects would use dredging only when necessary and would rely on other cable-laying methods for reduced impacts (such as jet plow or mechanical plow) where feasible. Furthermore, these impacts from individual projects would not overlap with one another spatially or temporally. As a result, adverse impacts on offshore water quality under the No Action Alternative would be **minor** adverse and temporary. | **Offshore**: Changes to water quality would be detectable but would not result in degradation of water quality that would exceed water quality standards. As a result, adverse impacts on offshore water quality from anchoring, potential in situ munitions and explosives of concern (MEC)/UXO disposal, and cable placement activities under the Proposed Action would be **minor** adverse and temporary.<br>BOEM estimates a cumulative total of 10,158 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects and 5,066 acres of anchoring-related disturbance for the Proposed Action plus all other future offshore wind projects. Suspended sediment concentrations during activities other than dredging would be within the range of natural variability typical for the affected area. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in short-term **minor** adverse cumulative impacts to water quality. | **Offshore:** Alternatives C through F would reduce the number of WTGs and scour protections associated with IACs. This would reduce seafloor disturbances during construction and installation, O&M and decommissioning. Differences in estimated acres of anchoring by alternative are disclosed in Appendix E4 and range from 1,812 acres (Alternative F) to 2,985 acres (Alternative D). Project design for IACs and the export cable has not occurred for Alternatives C through F; therefore, a comparison of cabling-related disturbance is not available. However, best professional judgment suggests that the footprint of the IAC, OSS-link cable, and RWEC would change and be slightly reduced to match the reduced number of WTGs. EPMs in Table F-1 in Appendix F would be implemented to avoid or minimize impacts to water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, impacts to water quality under these alternatives would be similar to the Proposed Action: **minor** adverse and temporary.<br>Total anchoring and cabling seafloor disturbance that could occur from ongoing and planned actions, including those actions under Alternatives C through F, would be similar but slightly reduced from the Proposed Action (see Appendix E4 for a comparison of cumulative anchoring acreage estimates). Project-related seafloor disturbances would add to water quality impacts. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in short-term and **minor** adverse cumulative impacts on water quality. | | | | **Offshore:** Alternative G would reduce the number of WTGs and scour protections associated with IACs. This would reduce seafloor disturbances during construction and installation, O&M, and decommissioning. Alternative G would result in 2,098 acres of anchoring and 3,400 acres of cabling disturbance (see Appendix E4). EPMs in Table F-1 in Appendix F would be implemented to avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, impacts to water quality under this alternative would be similar to the Proposed Action: **minor** adverse and temporary.<br>Total anchoring and cabling seafloor disturbance that could occur from ongoing and planned actions, including those actions under Alternative G, would be similar but slightly reduced from the Proposed Action (see Appendix E4 for a comparison of cumulative anchoring acreage estimates). Project-related seafloor disturbances would add to water quality impacts. Therefore, Alternative G when combined with past, present, and reasonably foreseeable activities would result in short-term and **minor** adverse cumulative impacts on water quality. |
| | **Onshore:** Degradations to onshore water quality from future onshore activities would be localized and temporary to long | **Onshore:** The implementation of EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would | **Onshore:** Alternatives C through F would not change Project onshore activities; therefore, impacts would be the same as the Proposed Action: short term **negligible** to **minor** adverse. | | | | **Onshore:** Alternative G would not change Project onshore activities; therefore, impacts |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | term, depending on the nature of the activities, although overall water quality is expected to continue to meet Rhode Island water quality standards (250 RICR 150.05). As a result, adverse impacts from future activities on onshore water quality under the No Action Alternative would be temporary to long term **negligible** to **minor** adverse**.** | comply with all permit and regulatory requirements related to water quality. As a result, adverse impacts on onshore water quality under the Proposed Action would be short term **negligible** to **minor** adverse. | | | | | would be the same as the Proposed Action: short term **negligible** to **minor** adverse. |
| Port utilization | **Offshore:** Port activities could increase vessel traffic, suspension and turbidity from in-water work, and the risk of accidental spills or discharges. However, these actions would be localized, and port improvements would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on offshore water quality under the No Action Alternative would be short term to long term **minor** adverse. | **Offshore:** Port-related actions would be localized, and port activities would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on offshore water quality under the Proposed Action would be short to long term but **minor** adverse.<br>Cumulative impacts associated with the Proposed Action and past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse. | **Offshore:** The types and extent of port activities under Alternatives C through F would be the same as those described for the Proposed Action. Therefore, impacts would be short to long term but **minor** adverse.<br>Cumulative impacts associated with Alternatives C through F and past, present, and reasonably foreseeable future activities would be the same as described for the Proposed Action: **negligible** to **minor** adverse. | | | | **Offshore:** The types and extent of port activities under Alternative G would be the same as those described for the Proposed Action. Therefore, impacts would be short to long term but **minor** adverse.<br>Cumulative impacts associated with Alternative G and past, present, and reasonably foreseeable future activities would be the same as described for the Proposed Action: **negligible** to **minor** adverse. |
| | **Onshore**: Future expansion or modification of existing ports in addition to increased use could increase land disturbance and the risk of accidental spills or discharges. However, these actions would be localized, and port improvements would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on onshore water quality under the No Action Alternative would be short to long term but **negligible** to **minor** adverse. | **Onshore:** The implementation of EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, adverse impacts on onshore surface water quality under the Proposed Action would be temporary to short term **negligible** to **minor** adverse. | **Onshore:** Alternatives C through F would not change Project onshore activities; therefore, impacts would remain the same as the Proposed Action: temporary to short term **negligible** to **minor** adverse. | | | | **Onshore:** Alternative G would not change Project onshore activities; therefore, impacts would remain the same as the Proposed Action: temporary to short term **negligible** to **minor** adverse. |
| Presence of structures | **Offshore:** Structures could disturb seafloor within the water quality GAA from foundation and scour protection installation and disrupt bottom current patterns, leading to increased movement, suspension, and deposition of sediments. BOEM anticipates that developers would implement best management practices to minimize seafloor disturbance from foundations, scour, and cable installation. As a result, | **Offshore:** BOEM estimates that the Project would result in an up-to-56% increase in total structures over the No Action Alternative within the offshore water quality GAA. EPMs in Table F-1 in Appendix F would be implemented to minimize seafloor disturbance from foundations and scour. As a result, adverse impacts on offshore water quality under the Proposed Action would be short term **minor** adverse.<br>Because of the limited extent of impacts and BOEM's expectation that Revolution Wind and | **Offshore:** Alternatives C through F would reduce the number of WTGs and scour protection associated with foundations. This would require fewer acres of seafloor disturbance during construction and installation, O&M, and decommissioning that could disrupt bottom current patterns and lead to scouring; however, the types of seafloor disturbance and changes to patterns and flows would be similar. For comparison, Alternatives C and E would reduce seafloor disturbance associated with foundation construction by up to 35%, Alternative D would reduce seafloor disturbance by up to 21.5%, and Alternative F would reduce seafloor disturbance by up to 43%, as compared to the maximum-case scenario for the Proposed Action. Implementation of Alternative F in conjunction with Alternatives C, D, and E would further reduce seafloor disturbance for these alternatives by up to 8%, 21.5%, and 8%, respectively. As a result, impacts to offshore water quality under Alternatives C through F | | | | **Offshore:** Alternative G would reduce the number of WTGs and scour protection associated with foundations. This would require fewer acres of seafloor disturbance during construction and installation, O&M, and decommissioning that could disrupt bottom current patterns and lead to scouring; however, the types of seafloor disturbance and changes to patterns and flows would be similar. For comparison, Alternative G would reduce seafloor disturbance associated with |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) Up to 100 WTGs | Alternative C (Habitat Alternative) 64 or 65 WTGs | Alternative D (Transit Alternative) 78 to 93 WTGs | Alternative E (Viewshed Alternative) 64 or 81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) 65 WTGs |
|---|---|---|---|---|---|---|---|
| | impacts on offshore water quality under the No Action Alternative would be localized, short term, and **minor** adverse. | other developers would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality, the Proposed Action when combined with past, present, and reasonably foreseeable projects would also result in **minor** adverse and long-term impacts to water quality. | would be similar to the Proposed Action: short term **minor** adverse. See Table E-4 in Appendix E for foundation construction footprint calculations per alternative.<br>Alternatives C through F would result in an up-to-31% to 52% increase in structures from the No Action Alternative. New structures related to Alternatives C through F would add to seafloor disturbances and disruptions to bottom current patterns that would lead to scouring and associated water quality impacts. However, for similar reasons as the Proposed Action, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in long-term and **minor** adverse cumulative impacts on water quality. | | | | foundation construction by up to 35%, as compared to the maximum-case scenario for the Proposed Action. As a result, impacts to offshore water quality under Alternative G would be similar to the Proposed Action: short term **minor** adverse. See Table E-4 in Appendix E for foundation construction footprint calculations.<br>Alternative G would result in a 37% increase in structures from the No Action Alternative. New structures related to Alternative G would add to seafloor disturbances and disruptions to bottom current patterns that would lead to scouring and associated water quality impacts. However, for similar reasons as the Proposed Action, Alternative G when combined with past, present, and reasonably foreseeable activities would result in long-term and **minor** adverse cumulative impacts on water quality. |
| | **Onshore:** The presences of structures from future onshore activities supporting OSW would result in an increase in impervious surfaces that could contribute to stormwater runoff to nearby waterbodies. These activities would be expected to comply with any applicable permit requirements to implement erosion and stormwater controls to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on onshore water quality under the No Action Alternative would be short to long term **negligible** to **minor** adverse**.** | **Onshore:** The implementation of EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, impacts on onshore water quality under the Proposed Action would be localized, short term, and **negligible** to **minor** adverse. | **Onshore:** Alternatives C through F would not change Project onshore activities; therefore, impacts would be the same as the Proposed Action: short term **negligible** to **minor** adverse. | | | | **Onshore:** Alternative G would not change Project onshore activities; therefore, impacts would be the same as the Proposed Action: short term **negligible** to **minor** adverse. |

### 3.21.2.2 Alternative A: Impacts of the No Action Alternative on Water Quality

#### 3.21.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for water quality (see Section 3.21.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.21.2.2.2 Cumulative Impacts

##### Offshore Water Quality

This section discloses potential offshore water quality impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

Accidental releases and discharges: Future offshore wind activities could contribute to changes in offshore water quality from a spill or release during routine vessel or equipment use, a spill at an offshore wind facility, a spill during construction and installation due to a vessel allision or collision, or the accidental discharge of trash and debris.

Numerous offshore wind projects could occur with overlapping construction schedules between 2022 and 2032 (see Appendix E). This EIS estimates that up to approximately 2.9 million gallons of coolants, fuels, oils, and lubricants could be stored within WTG foundations and the OSS within the offshore water quality GAA. Other chemicals, including grease, paints, and sulfur hexafluoride, would also be used at the offshore wind projects. BOEM anticipates that the likelihood of a major spill of these chemicals during construction due to vessel allisions, collisions, O&M activities, or weather events is very low (once per 1,000 years) (Bejarano et al. 2013). All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and BSEE. OSRPs are required for each project and would provide for rapid spill response, cleanup, and other measures that would help to minimize potential impacts on affected resources from spills. WTGs and OSSs are generally self-contained and would not generate discharge (see COP Appendix D). Vessels would also have onboard containment measures that would further reduce the impact of a spill in the event of an allision or collision.

A release during construction or operations of offshore wind projects would generally be classified as “routine” and minor adverse because of the size of the release (i.e., spills less than 10 barrels, or 420 gallons) and its rapid dispersion (BOEM 2015). Routine spills would result in little change to water quality and would therefore be localized, short term, and **minor** adverse. In the unlikely event an allision or collision involving Project vessels or components resulted in a large spill, impacts on water quality would be **minor** to **moderate** adverse, and would range from short term to long term, depending on the type and volume of material released, the specific conditions (e.g., depth, currents, weather conditions) at the location of the spill, and effectiveness of the cleanup techniques deployed.

Vessel operators would be required to comply with federal and international requirements for the management of shipboard trash and the USCG ballast water management requirements outlined in 33

CFR 151 and 46 CFR 162. Accidental releases of trash and debris would be infrequent and **negligible** adverse, and any allowed vessel discharges, such as bilge and ballast water, would be restricted to uncontaminated or appropriately treated liquids.

Anchoring and new cable emplacement/maintenance: Offshore wind activities would contribute to changes in offshore water quality from resuspension and deposition of sediments during anchoring. BOEM estimates that approximately 1,862 acres of seafloor could be impacted by anchoring under the No Action Alternative within the offshore water quality GAA. Disturbances to the seafloor during anchoring would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to the anchorage area. Currents and storms currently contribute to turbidity throughout the water column from the resuspension of clay, silt, and fine-grained sand making up the sediment. As a result, adverse impacts on offshore water quality under the No Action Alternative would be **minor** adverse and temporary.

BOEM estimates that approximately 6,149 acres of seafloor could be impacted by cable placement under the No Action Alternative within the offshore water quality GAA due to reasonably foreseeable offshore wind development. Similar to anchoring, these activities would contribute to changes in offshore water quality from the resuspension and deposition of sediment. Sediment suspension and deposition from offshore wind projects would be limited in terms of extent and duration.

BOEM anticipates that future offshore wind projects would use dredging only when necessary and would rely on other cable laying methods for reduced impacts (such as jet plow or mechanical plow) where feasible. Furthermore, these impacts from individual projects would not be expected to overlap with one another spatially or temporally. For these reasons, sediment suspension associated with other wind projects would be localized, **minor** adverse, and temporary.

Port utilization: Offshore wind development would use nearby ports as described in Chapter 2 and could also require port expansion or modification, resulting in increased vessel traffic or increased suspension and turbidity from in-water work. These activities could also increase the risk of accidental spills or discharges. However, these actions would be localized, and port improvements would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on offshore water quality under the No Action Alternative would be short term to long term **minor** adverse.

Presence of structures: Reasonably foreseeable offshore wind projects are estimated to result in no more than 181 structures by 2030 within the offshore water quality GAA. These structures could disturb up to 228 acres of seafloor within the water quality GAA from foundation and scour protection installation and disrupt bottom current patterns, leading to increased movement, suspension, and deposition of sediments. Scouring, which could lead to impacts on water quality through the formation of sediment plumes (Harris et al. 2011), would generally occur in shallow areas with tidally dominated currents. Structures could reduce wind-forced mixing of surface waters, whereas water flowing around the foundations could increase vertical mixing (Carpenter et al. 2016; Cazenave et al. 2016). Results from a recent BOEM (2021b) hydrodynamic model of four different WTG build-out scenarios of the offshore RI/MA WEA found that offshore wind projects could alter local and regional physical oceanic processes (e.g., currents, temperature stratification) through their influence on currents from WTG foundations and by extracting energy from the wind. The results of the hydrodynamic model study show that the introduction of offshore wind structures into the offshore area modifies the oceanic responses of current magnitude, temperature, and wave heights by 1) reducing the current magnitude through added flow resistance, 2) influencing the temperature stratification by introducing additional mixing, and 3) reducing current magnitude and wave height by extracting of energy from the wind by the OSW turbines. Alterations in currents and mixing would affect water quality, including DO, but would vary seasonally and regionally. WTGs and OSSs associated with reasonably foreseeable offshore wind projects would be placed in average water depths of 100 to 200 feet where current speeds are relatively low, and offshore cables would be buried where possible. Cable armoring would be used where burial is not possible, such as in hard-bottomed areas. BOEM anticipates that developers would implement best management practices to minimize seafloor disturbance from foundations, scour, and cable installation. As a result, impacts on offshore water quality under the No Action Alternative would be localized, short term, and **minor** adverse.

The exposure of offshore wind structures, which are mainly made of steel, to the marine environment can result in corrosion to the structures without protective measures. Corrosion is a general problem for offshore infrastructures, and corrosion protection systems are necessary to maintain the structural integrity. Protective measures for corrosion (e.g., coatings, cathodic protection systems) are often in direct contact with seawater and have different potentials for emissions, e.g., galvanic anodes emitting metals, such as aluminum, zinc, and indium, and organic coatings releasing organic compounds due to weathering and/or leaching. The current understanding of chemical emissions for offshore wind structures is that emissions appear to be low, suggesting a low environmental impact, especially if compared to other offshore activities, but these emissions may become more relevant for the marine environment with increased numbers of offshore wind projects and a better understanding of the potential long-term effects of corrosion protection systems (Kirchgeorg et al. 2018).

#### *Conclusions*

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts to offshore water quality associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on water quality from offshore spills or discharge, resuspension and deposition of sediments, scouring, or changes to current patterns and mixing.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities would be minor to moderate adverse due to short-term erosion and sedimentation, discharges, and dispersal of contaminants during routine spills. As described in Appendix E1, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable offshore activities other than offshore wind would be minor to moderate adverse due to temporary or short-term disturbance to sediments during construction activities.

BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts because the effects would be small and the resource would recover completely.

### Onshore Water Quality

This section discloses potential onshore water quality impacts associated with future offshore wind development (without the Proposed Action). The cumulative impact analysis for the No Action

Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

Accidental releases and discharges: Reasonably foreseeable onshore activities supporting OSW could contribute to changes in water quality from accidental releases and discharges, dispersal of contaminants during routine spills, or accidental releases of contaminated or hazardous materials or debris if surface water bodies are intersected. Routine spills that reach surface water would be expected to disperse rapidly (BOEM 2015).

Future onshore activities supporting OSW would be expected to comply with any applicable permit requirements, including spill controls, to minimize, reduce, or avoid impacts on surface water and groundwater quality. Degradations to onshore water quality from future onshore activities are expected to be localized and temporary to long term, depending on the nature of the activities, although overall water quality is expected to continue to meet Rhode Island water quality standards (250 RICR 150.05) (Rhode Island Department of State 2018). Surface and groundwater bodies would be monitored and managed to meet water quality standards and drinking water resource protections. As a result, adverse impacts from future onshore activities supporting OSW on onshore water quality under the No Action Alternative would be short term to long term **negligible** to **minor** adverse.

New cable emplacement/maintenance: Future onshore activities supporting OSW could result in changes to water quality from cable-related land disturbance, such as surficial digging, land clearing, trenching, HDD, and use of vehicles, that could contribute to erosion and sedimentation. These activities would be expected to comply with any applicable permit requirements to implement erosion and stormwater controls to minimize, reduce, or avoid impacts on water quality. Degradations to onshore water quality from future onshore activities are expected to be localized and temporary to long term, depending on the nature of the activities, although overall water quality is expected to continue to meet Rhode Island water quality standards (250 RICR 150.05). Waterbodies would be monitored and managed to meet water quality standards and drinking water resource protections. As a result, adverse impacts from future activities on onshore water quality under the No Action Alternative would be temporary to long term **negligible** to **minor** adverse.

Port utilization: Future onshore activities supporting OSW are expected to continue to use ports and would likely require expansion or modification of existing onshore port facilities in the analysis area. These port-related activities would include land disturbance.

Future expansion or modification of existing ports in addition to increased use could also increase the risk of accidental spills or discharges. However, these actions would be localized, and port improvements would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on onshore water quality under the No Action Alternative would be short to long term but **negligible** to **minor** adverse. Port activities would not include surficial digging that could encounter groundwater; as a result, there are no potential impacts on groundwater from port use (Rhode Island Department of State 2018).

Presence of structures: The presences of structures from future onshore activities supporting OSW would result in an increase in impervious surfaces that could contribute to stormwater runoff to nearby waterbodies. These activities would be expected to comply with any applicable permit requirements to implement erosion and stormwater controls to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on onshore water quality under the No Action Alternative would be short term to long term **negligible** to **minor** adverse.

### *Conclusions*

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on onshore water quality associated with the Project would not occur. However, ongoing and future activities would continue to contribute temporary to long-term impacts on water quality from onshore erosion and sedimentation, or discharges, dispersal of contaminants during routine spills.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities and connected onshore activities would be **negligible** to **minor** adverse due to short-term erosion and sedimentation, discharges, and dispersal of contaminants during accidental and routine spills. As described in Appendix E1, BOEM anticipates that the range of impacts for ongoing and reasonably foreseeable offshore activities other than offshore wind would be **negligible** to **minor** adverse primarily due to temporary or short-term disturbance to sediments during port expansion and other onshore construction and installation activities (e.g., beach and coastal restoration projects). Other reasonably foreseeable non–offshore wind IPFs with potential for routine and/or accidental releases or sediment disturbance are either 1) not expected to overlap with the GAA spatially and temporally or 2) would not be expected to have measurable impacts on the overall water quality in the GAA as discussed in Appendix E1.

BOEM anticipates that the impacts associated with future offshore wind activities in the GAA for onshore water quality combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts because the effects would be small and the resource would recover completely without remedial or mitigating action.

## 3.21.2.3 Alternative B: Impacts of the Proposed Action on Water Quality

### 3.21.2.3.1 Construction and Installation

### Offshore Activities and Facilities

<u>Accidental releases and discharges:</u> Fuels and oils would be required for Proposed Action offshore construction and installation equipment, vessels, and infrastructure over the approximately 15-month construction and installation period. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. Most inadvertent spills of fuels and oils used during construction and installation would be classified as routine and minor adverse because of their size (i.e., spills less than 10 barrels, or 420 gallons) and rapid dispersion (BOEM 2015). As described in Section 3.21.1.2, the likelihood of a spill due to construction and installation activities and weather events is low (once per 1,000 years). A draft OSRP has been prepared for the Project and includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills (see COP Appendix D).

Fuels and oils would be used and stored at WTGs and OSSs. A maximum of approximately 3,204 gallons of coolants, fuels, oils and lubricants would be stored at each WTG (or a total of approximately 320,400 gallons for the maximum 100 proposed WTGs), and a maximum of 132,400 gallons of fuels, oils, and lubricants would be stored at each OSS (or a total of approximately 264,800 gallons for the two proposed OSSs). Secondary containment measures would be implemented for all diesel tanks at WTGs (VHB 2023). Under the Proposed Action, the highest possible spill would be the inadvertent release of fuels and oils stored at WTGs and OSSs, which would contain up to 585,200 gallons of fuels and oils. Project EPMs (see Table F-1 in Appendix F), permit requirements, controls, and procedures would be implemented as part of the Project to reduce the potential or extent of offshore spills, thereby avoiding or minimizing impacts on water quality. Should a spill occur, response and containment procedures would limit the reach of the spill to a localized area, where changes to water quality would be detectable and would exceed water quality standards. As a result, adverse impacts on water quality would be short term, with spills generally dispersing within days (BOEM 2015), and **minor** to **moderate** adverse, depending on the severity of the spill.

Construction of the Proposed Action would require as many as 59 vessels. Vessels would be equipped with spill containment and cleanup materials, and any accidental spill or release of fuels, oils, or other hazardous materials would be managed through the Project’s OSRP (VHB 2023). All construction-related vessels would be required to comply with regulatory requirements related to the prevention and control of spills and discharges (VHB 2023). The chance of a spill occurring due to vessel allisions or collisions would be low (once per 1,000 years). In the unlikely event an allision or collision involving Project vessels or components results in a large spill, impacts on water quality would be **minor** to **moderate** adverse, and short term to long term, depending on the type and volume of material released and the specific conditions (e.g., depth, currents, weather conditions) at the location of the spill.

The Proposed Action could also result in accidental releases of trash and debris from vessels or in situ MEC/UXO disposal into offshore waters. EPMs in Table F-1 in Appendix F would be implemented to avoid or minimize impacts on water quality from releases of trash or debris. Accidental releases of trash and debris would be infrequent and **negligible** adverse because vessels would comply with federal and international requirements for management of shipboard trash and USCG regulations regarding waste and discharge. Foreign-flagged vessels would also have a USCG-compliant and certified ballast water management system. Any allowed vessel discharges, such as bilge and ballast water, would be restricted to uncontaminated or appropriately treated liquids. Should an accidental release occur, it would be limited to the localized area; adverse impacts on water quality would be short term **minor** to **moderate** adverse.

Existing restoration and protection initiatives established for offshore areas, including those developed as part of the Long Island Sound Study initiative (Long Island Sound Study 2021), Bay Assessment & Response Team (Rhode Island DEM 2021c), Rhode Island Beach Monitoring Program (Rhode Island Department of Health 2021), and Rhode Island Environmental Monitoring Collaborative (RIEMC 2021), would help identify and manage water quality degradations, should they occur.

<u>Anchoring and new cable emplacement/maintenance:</u> Approximately 3,178 acres and 4,009 acres of seafloor could be impacted by anchoring and cable placement, respectively, under the Proposed Action within the offshore water quality GAA. Potential in situ MEC/UXO disposal could also result in sediment suspension and disturbance. Disturbances to the seafloor would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to the anchorage, disposal, or cable placement area. Sediment modeling completed for the Proposed Action indicates that sediment suspension and deposition would occur during in-water offshore activities (RPS 2022). The modeling showed that in most locations

the total suspended solids plumes are limited to the bottom 10 feet of the water column and are temporary at any given location. Suspended sediments would settle within hours or days, including up to 6.7 hours in the RWF IAC, 61 hours in the RWEC-OCS, approximately 70 hours along the RWEC-RI, and 70 hours at the landing site where HDD would occur.

EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. Changes to water quality would be detectable but would not result in degradation of water quality that would exceed water quality standards. As a result, adverse impacts on offshore water quality from anchoring and cable placement activities under the Proposed Action would be **minor** adverse and temporary.

Port utilization: The Project would use nearby ports for a construction hub, for WTG storage and pre-commissioning, and for foundation marshalling and fabrication. These activities would result in increased vessel traffic and increased in-water activities, which would contribute to increased suspension and turbidity. As many as 59 vessels would be required during construction and installation. These activities could also increase the risk of accidental spills or discharges. Port-related actions would be localized, and port activities would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. In addition, EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality. As a result, adverse impacts on offshore water quality under the Proposed Action would be short to long term but **minor** adverse.

It is not known at this time if port expansions or modifications would be required for the Proposed Action (VHB 2023). If so, these activities would require in-water work, including vessel use, that would increase sediment suspension and turbidity. Impacts from these activities would be similar to those described above for port uses.

Presence of structures: The Proposed Action would result in up to 100 monopile foundations for WTGs and two monopile foundations for OSSs within the GAA for offshore water quality. These structures could temporarily disturb up to approximately 3,172 acres (31.1 acre per foundation) during seafloor preparation. Foundations would encompass a total footprint of approximately 71 acres (0.7 acre per foundation) of seafloor disturbance and scour protection. Seafloor disturbance would occur from foundation and scour protection installation, and the presence of structures would disrupt bottom current patterns and lead to increased movement, suspension, and deposition of sediments. Project-related scouring could impact water quality through the formation of sediment plumes, and structures could reduce wind-forced mixing of surface waters. Flows around foundations could increase vertical mixing of the water column. These changes in currents and mixing would affect water quality but would vary seasonally and regionally. EPMs in Table F-1 in Appendix F would be implemented to minimize seafloor disturbance from foundations and scour, including the installation of scour protection and cable armoring where burial is not possible, that would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, adverse impacts on offshore water quality under the Proposed Action would be localized, short term, and **minor** adverse.

### Onshore Activities and Facilities

Accidental releases and discharges: Onshore facilities would not cross surface waterbodies. Onshore construction equipment, vehicles, and infrastructure under the Proposed Action would require fuels and oils during the construction and installation period. Although unlikely due to distance to closest stream of 200 feet, any inadvertent spills occurring during construction and installation, such as the release of fuels and oils from vehicles or infrastructure, would be classified as routine and minor adverse (BOEM 2015).

Table F-1 in Appendix F includes EPMs to avoid or minimize potential spill impacts on water quality, to comply with all general construction permit requirements, and to implement runoff controls and buffers. In addition, Revolution Wind would develop and implement a stormwater pollution prevention plan and HDD inadvertent release plan to protect nearby surface waters. Although these procedures would reduce the likelihood and extent of routine spills, spills in or near surface waterbodies would contribute to detectable changes that could result in an exceedance of water quality standards. Therefore, the adverse impact on water quality would be short term **minor** adverse.

There are no groundwater resources crossed by the Project. As described in Section 3.21.1.3, the nearest groundwater recharge area would be approximately 1.2 miles from the Project. At this distance, the risk of any inadvertent spill or release to groundwater during construction and installation of the Project would be **negligible** adverse.

New cable emplacement/maintenance: The Project would require the installation of permanent (over the life of the Project) onshore export cable (i.e., the RWEC). This activity would require temporary (up to 18 months) ground-disturbing activities including surficial digging, land clearing, trenching, HDD, and use of equipment and vehicles. The RWEC route does not directly intersect any surface waterbody; however, surface disturbance associated with installation could contribute to erosion and sedimentation in nearby surface waterbodies, thereby leading to changes in water quality. Overall construction activities and Project infrastructure would disturb more than 1 acre, and discharges would therefore need to be permitted through a general construction permit under the NPDES program. Revolution Wind would also develop a stormwater pollution prevention plan as part of the permitting process that would result in implementation of erosion and sediment controls prior to and during construction and installation. EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, adverse impacts on onshore water quality under the Proposed Action would be localized, short term, and **negligible** to **minor** adverse.

The distance between Project-related land-disturbing activities and the nearest groundwater recharge area (1.2 miles) would result in **negligible** adverse risks of a spill or release reaching groundwater resources.

Port utilization: The Project would use nearby ports to support construction and installation of the Proposed Action. Increased use and related activities at ports could increase the risk of accidental spills or discharge to nearby surface waterbodies. Inadvertent spills or releases during construction and installation would be classified as routine and would be localized, short term, and minor adverse. It is not known at this time if port expansions or modifications would be required. If so, these activities would require surface disturbances that would contribute to erosion and sedimentation in nearby surface waterbodies, thereby leading to changes to water quality.

EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, adverse impacts on onshore surface water quality under the Proposed Action would be temporary and **negligible** to **minor** adverse. No impacts on groundwater are anticipated from port use during onshore construction and installation because there would be no required surface disturbance that could encounter groundwater or result in water quality degradations through runoff into groundwater recharge areas.

<u>Presence of structures:</u> The presence of structures from the Proposed Action would result in an increase in impervious surfaces (20 acres) that could contribute to stormwater runoff to nearby surface waterbodies. The OSS would encompass approximately 16 acres, and the onshore ICF would temporarily encompass approximately 4 acres. Fill materials would be used for installation of structures. None of the onshore facilities of the RWEC route directly intersect any surface waterbody; however, surface disturbance associated with installation of onshore facilities could contribute to erosion and sedimentation in nearby surface waterbodies, thereby leading to changes in water quality. EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As described under the new cable emplacement/maintenance IPF, discharges would be permitted through a general construction permit under the NPDES program. Revolution Wind would also develop a stormwater pollution prevention plan as part of the permitting process that would result in implementation of erosion and sediment controls prior to and during construction and installation. As a result, impacts on onshore water quality under the Proposed Action would be localized, short term, and **negligible** to **minor** adverse. The distance between Project-related land-disturbing activities and the nearest groundwater recharge area (1.2 miles) would result in minimal risk of runoff reaching groundwater resources; **negligible** adverse impacts on groundwater are anticipated from the presence of structures during onshore construction and installation.

### 3.21.2.3.2 Operations and Maintenance and Decommissioning

### Offshore Activities and Facilities

<u>Accidental releases and discharges:</u> O&M and decommissioning of the offshore portion of the Project would lead to similar adverse impacts on water quality from inadvertent spills or releases that could occur during construction and installation. The volumes of fuels and oils and number of vessels required during O&M and decommissioning would be less than that required during construction and installation (VHB 2023). The same Project features and EPMs described for offshore construction and installation (see Section 3.21.2.2.1) would be implemented during O&M and decommissioning to avoid or minimize potential spill impacts on water quality. Most inadvertent spills of fuels and oils used during O&M and decommissioning would be classified as routine and minor adverse. Should a routine spill occur, it would be temporarily detectable and would disperse rapidly, thereby limiting the magnitude and extent of changes to water quality. Therefore, changes to water quality would be localized, short term, and **minor to moderate** adverse, depending on the severity of potential spills or releases.

<u>Anchoring and new cable emplacement/maintenance:</u> Anchoring and cable-related activities during O&M and decommissioning would contribute to changes in offshore water quality from the resuspension and deposition of sediment. O&M and decommissioning of the offshore portion of the Project would lead to similar minor adverse and temporary adverse impacts on water quality from anchoring and new cable emplacement and maintenance that would occur during construction and installation. Fewer anchoring

activities would occur during O&M and decommissioning activities compared to construction and installation. Cable activities would also be less frequent during O&M and decommissioning and would typically include maintenance activities that would result in less seafloor disturbance than installation activities during construction and installation. EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As described for construction and installation (see Section 3.21.2.2.1), suspended sediments would typically settle within hours or days, and the extent of deposition would be limited. Changes to water quality from anchoring and cable activities would be detectable but would not result in degradation of water quality that would exceed water quality standards. As a result, adverse impacts on offshore water quality under the Proposed Action would be **minor** adverse and temporary.

<u>Port utilization:</u> The Project would use nearby ports to support O&M and decommissioning of the Project. As described under offshore construction and installation, these activities would result in increased vessel traffic and increased in-water activities, which would contribute to increased suspension and turbidity. Up to 16 vessels would be required during O&M and decommissioning. These activities could also increase the risk of accidental spills or discharges. See offshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on offshore water quality under the Proposed Action would be short to long term but **minor** adverse.

<u>Presence of structures:</u> O&M would not result in additional structures that would lead to impacts on water quality. During decommissioning, structures would be removed to a depth of 15 feet below the seafloor (VHB 2023), which would reduce in-water structures that have disrupted bottom current patterns and led to scouring (as described for construction and installation). Water quality during O&M would remain the same, whereas water quality during decommissioning could result in short-term changes to water quality; however, these changes would be limited in terms of duration and extent (similar to those described for construction and installation of structures). See offshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on offshore water quality under the Proposed Action would be short term **minor** adverse.

### Onshore Activities and Facilities

<u>Accidental releases and discharges:</u> O&M activities would require vehicles and equipment that require the use of fuels, oils, and lubricants. The volumes of fuels and oils and number of vehicles required during O&M and decommissioning would be less than that required during construction and operations (VHB 2023). Although unlikely due to distance to closest surface waterbody of 200 feet, any inadvertent spills in onshore waters during O&M or decommissioning would be classified as routine and **minor** adverse (BOEM 2015). See onshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on onshore surface water quality under the Proposed Action would be short term **minor** adverse. Similar to onshore construction and installation, O&M and decommissioning activities would be distanced far enough from groundwater recharge areas (at least 1.2 miles) that the risk of a spill or release reaching groundwater resources would be **negligible** adverse.

<u>New cable emplacement/maintenance:</u> O&M would require limited land disturbance should maintenance be required for underground infrastructure (i.e., transmission cable). Decommissioning of the onshore portion of the Project would lead to the same types of impacts on surface water quality from erosion,

sedimentation as described under construction and installation. See onshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on offshore water quality under the Proposed Action would be temporary and **negligible** to **minor** adverse.

The distance between Project-related land-disturbing activities and the nearest groundwater recharge area (1.2 miles) would result in limited risks of a spill or release reaching groundwater resources; **negligible** adverse impacts on groundwater are anticipated from land disturbance during onshore O&M and decommissioning.

<u>Port utilization:</u> The Project would use nearby ports to support O&M and decommissioning of the Project. As described for onshore construction and installation, increased use and related activities at ports could increase the risk of accidental spills or discharge to nearby surface waterbodies. See onshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on onshore surface water quality under the Proposed Action would be temporary and **minor** adverse. **Negligible** adverse impacts on groundwater are anticipated from port use during onshore construction and installation because there would be no required surface disturbance that could encounter groundwater or result in water quality degradations through runoff into groundwater recharge areas.

<u>Presence of structures:</u> O&M would not result in additional structures that would lead to impacts on water quality. During decommissioning, structures would be removed in compliance with applicable laws and regulations at that time (VHB 2023). Water quality during O&M and decommissioning would remain the same, whereas water quality during decommissioning could result in short-term changes to water quality; however, these changes would be limited in terms of duration and extent (similar to those described for construction and installation of structures). See onshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on offshore water quality under the Proposed Action would be short term **negligible** to **minor** adverse.

#### 3.21.2.3.3 Cumulative Impacts

#### Offshore Activities and Facilities

<u>Accidental releases and discharges:</u> The Proposed Action could noticeably add accidental releases of fuels, oils, or hazardous material; sediment; and/or trash and debris to conditions under the No Action Alternative. BOEM estimates that the Project would result in an up-to-56% increase in total chemical usage over the No Action Alternative within the offshore water quality GAA. This risk would be increased primarily during construction and installation, O&M, and decommissioning. When the Project is combined with other offshore wind projects, up to approximately 3.5 million gallons of coolants, fuels, oils, and lubricants could cumulatively be stored within WTG foundations and the OSS within the offshore water quality GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with the USCG requirements for the prevention and control of oil and fuel spills. Additionally, training and awareness of EPMs (see Table F-1 in Appendix F) proposed for waste management and mitigation of marine debris would be required of Revolution Wind Project personnel. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time. For this reason, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short-term to long-term **minor** to **moderate** adverse impacts.

<u>Anchoring and new cable emplacement/maintenance:</u> The Proposed Action would result in localized, temporary, and minor impacts to water quality through an estimated 3,204 acres of anchoring and

mooring-related disturbance. The Proposed Action would add to the estimated 1,862 acres of seafloor that could be impacted by anchoring from other reasonably foreseeable offshore wind activities. This would result in a cumulative total of 5,066 acres of anchoring-related disturbance for the Proposed Action, plus all other future offshore wind projects. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** adverse cumulative impacts to water quality.

The Proposed Action would result in localized, short-term, and minor adverse impacts to water quality through an estimated 4,009 acres of seafloor disturbance from cable installation, which would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to anchorage areas. This would result in additional turbidity effects, increasing seafloor disturbance due to cable installation, when compared to the No Action Alternative. BOEM estimates a cumulative total of 10,158 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects. Sediment modeling for the Proposed Action indicates that sediment suspension and deposition would occur within an area of up to 328 feet and would settle shortly (hours to days) after the release of sediment (Vinhateiro et al. 2018). Suspended sediment concentrations during activities other than dredging would be within the range of natural variability typical for the affected area. As a result, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** adverse cumulative impacts to water quality.

<u>Port utilization:</u> BOEM expects impacts to water quality due to the increase in port use resulting from the Proposed Action to be negligible to minor adverse. Other offshore wind development would use nearby ports and could also require port expansion or modification. However, Revolution Wind and all other developers would comply with all permit requirements to avoid or minimize water quality impacts. Therefore, cumulative impacts associated with the Proposed Action and past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse.

<u>Presence of structures:</u> The Proposed Action would result in long-term and minor adverse impacts to water quality through the installation of 102 structures (100 WTGs and two OSSs). This represents a 56% increase over total estimated WTG and OSS foundations under the No Action Alternative within the offshore water quality GAA. BOEM estimates a cumulative total of 283 structures for the Proposed Action plus all other future offshore wind projects within the offshore water quality GAA. These additional structures could cumulatively add to other offshore impacts to water quality from turbidity due to scour and water current alteration. However, because of the limited extent of impacts and BOEM's expectation that Revolution Wind and other developers would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** adverse and long-term impacts to water quality.

### Onshore Activities and Facilities

<u>Accidental releases and discharges:</u> The Proposed Action would result in negligible to minor adverse onshore water quality impacts on surface water due to discharges and due to dispersal of contaminants during routine spills or inadvertent releases. State and local agencies would be responsible for minimizing and avoiding water quality and other impacts during construction and installation. The Project and other reasonably foreseeable projects would be expected to comply with any applicable permit requirements to implement erosion, stormwater, and spill controls to minimize, reduce, or avoid impacts on water quality.

As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in short-term impacts and **negligible** to **minor** adverse cumulative impacts on onshore water quality.

New cable emplacement/maintenance: The Proposed Action would result in negligible to minor adverse impacts to onshore water quality impacts on surface water and groundwater due to erosion and sedimentation. State and local agencies would be responsible for minimizing and avoiding water quality and other impacts during construction and installation. The Project and other reasonably foreseeable projects would be expected to comply with any applicable permit requirements to implement erosion, stormwater, and spill controls to minimize, reduce, or avoid impacts on water quality. As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in short-term impacts and **negligible** to **minor** adverse cumulative impacts on onshore water quality.

Port utilization: The Proposed Action would result in minor adverse impacts to onshore water quality due to changes in surface water quality from increased port-related traffic. The Proposed Action would also add to the increased the risk of accidental spills or discharges. Other offshore wind development would also use nearby ports. Revolution Wind and all other developers would comply with all permit requirements to avoid or minimize water quality impacts. As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in short-term impacts and **negligible** to **minor** adverse cumulative impacts on onshore surface water quality. The Proposed Action would not contribute to impacts on groundwater quality.

Presence of structures: The Proposed Action would result in temporary and minor adverse impacts to water quality related to the presence of structures, which would also result in an increase in impervious surfaces (19 acres) through the development of 20 acres for the OnSS and ICF. Other offshore wind development would also include the construction and installation of structures and associated impacts to onshore water quality. These additional structures could cumulatively add to other onshore impacts to water quality from turbidity due to scour and water current alteration. However, because of the limited extent of impacts and BOEM's expectation that Revolution Wind and other developers would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse short-term impacts to water quality.

#### 3.21.2.3.4 Conclusions

Although Project construction and installation, O&M, and decommissioning would expose and disturb soils and sediments, onshore facilities would not cross surface waterbodies. Therefore, impacts to water quality from potential erosion, sedimentation, or inadvertent release of contamination or hazardous materials or debris into onshore surface waters are not anticipated and would be short term **negligible** to **minor** adverse. Offshore, Project construction and installation and decommissioning would contribute to increased movement, suspension, and deposition of sediments; changes to water column stratification; and mixing patterns that would affect water quality parameters. Impacts from Project O&M would be much lower than those produced during construction and installation and decommissioning but could also result in erosion, sediment resuspension, deposition, and inadvertent spills. BOEM anticipates that the impacts resulting from the Proposed Action alone would range from **negligible** to **moderate** adverse. Therefore, BOEM expects the overall impact on water quality from the Proposed Action alone to be

**minor** adverse because the effect would be small and the resource would be expected to recover completely without remedial or mitigating action. The Proposed Action would not result in any net beneficial change to water quality.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **moderate** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to water quality because the effect would be small and the resource would be expected to recover completely. The Proposed Action would not result in benefits to water quality.

### 3.21.2.4 Alternatives C, D, E, and F

Table 3.21.1 discloses IPF findings for each alternative.

#### 3.21.2.4.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated IACs offshore, which would have an associated reduction in potential changes to movement, suspension, and deposition of sediments; water column stratification; and mixing patterns, BOEM expects that the impacts resulting from each alternative alone would be similar to the Proposed Action and range from **negligible** to **moderate** adverse. Alternatives C through F would not result in any change to onshore water quality as compared to the Proposed Action (**minor** adverse) and would not result in any net beneficial change to water quality.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate** adverse). The overall impacts of each alternative when combined with past, present, and reasonably foreseeable activities would be the same level as under the Proposed Action: **minor** adverse. Alternatives C through F would not result in benefits to water quality.

### 3.21.2.5 Alternative G: Impacts of the Preferred Alternative on Water Quality

Table 3.21.1 discloses IPF findings for each alternative.

#### 3.21.2.5.1 Conclusions

Although Alternative G would reduce the number of WTGs and their associated IACs offshore as compared to the maximum-case scenario for the Proposed Action, which would have an associated reduction in potential changes to movement, suspension, and deposition of sediments; water column stratification; and mixing patterns, BOEM expects that the impacts resulting from Alternative G alone would be similar to the Proposed Action and range from **negligible** to **moderate** adverse. Alternative G would not result in any change to onshore water quality as compared to the Proposed Action (**minor** adverse) and would not result in any net beneficial change to water quality.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternative G's impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate** adverse). The overall impacts of the alternative when combined with past, present, and reasonably foreseeable activities would be the same level as under the Proposed Action: **minor** adverse. Alternative G would not result in benefits to water quality.

#### 3.21.2.6 Mitigation

No potential additional mitigation measures for water quality are identified in Table F-2 or Table F-3 in Appendix F.

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# 3.22 Wetlands and Non-tidal Waters

## 3.22.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Wetlands and Non-tidal Waters

Geographic analysis area: The GAA for wetlands and non-tidal waters is the Lower West Passage subwatershed (Hydrologic Unit Code 010900040908), which overlaps the onshore Project and is the same as the GAA for onshore water quality (see Figure 3.21-2). This area encompasses the drainage basin and network of surface waterbodies that could be affected by Project activities.

Affected environment: Freshwater and tidal wetlands, lakes and ponds, streams, and other waters are found throughout the GAA (see Figure 3.21-2). Wetlands resources and their functions and values are described in Sections 1.3.2 and 3.1.2 of COP Appendix K (VHB 2023). As mapped by the USFWS National Wetlands Inventory, approximately 1,268.1 acres of freshwater forest/shrub wetlands and 99.3 acres of freshwater emergent wetlands are found near streams, lakes, and ponds throughout the GAA. In addition, estuarine and marine wetland habitat is found in tidal areas near the shore of Narragansett Bay.

Wetlands and other waters are subject to USACE jurisdiction under Section 404 of the federal Clean Water Act (CWA). Under Section 404 of the CWA, the USACE regulates the discharge of dredged or fill material into waters of the United States. The landward limit of jurisdiction in tidal waters (33 CFR 328.4) extends to the high tide line, whereas the seaward limit is 3 nm as measured from the baseline of the territorial seas. The USACE limits of jurisdiction in non-tidal waters is as follows:

- In the absence of adjacent wetlands, the jurisdiction extends to the ordinary high-water mark.
- When adjacent wetlands are present, the jurisdiction extends beyond the ordinary high-water mark to the limit of the adjacent wetlands.
- When the water of the United States consists only of wetlands, the jurisdiction extends to the limit of the wetland.

As described in COP Appendix K, wetland resources also fall under the jurisdiction of the State of Rhode Island following pre-determined physical boundaries mapped on the RIDEM's Environmental Resource Map. Based on this map, the onshore Project components are to be located almost entirely within the jurisdiction of the RI CRMC with the exception of a potential segment of an onshore transmission cable route along Roger Williams Way between Mainsail Drive and Circuit Drive, where the jurisdictional boundary follows Roger Williams Way (VHB 2023). Under the RI CRMC Coastal Resources Management Program-Rules and Regulations Governing the Protection and Management of Freshwater Wetlands in the Vicinity of the Coast (Freshwater Wetland Rules; 650-RICR-20-00-2), wetlands receive a buffer of 50 feet from the delineated edge of the wetland. The area of land within 50 feet is regulated as a separate wetland resource (RI CRMC 2011).

Freshwater and tidal wetlands (e.g., tidal salt marsh, ruderal [i.e., disturbed] forested wetland, ruderal shrub marsh, and vernal pools) were observed in the GAA during the field surveys (VHB 2023). Wetlands and streams delineated within the footprint of onshore Project components and the adjacent areas are shown on Figures 4.3.1-3 and 4.3.1-13 in COP Appendix K. All wetlands, buffers, and ditches within the footprint are summarized in Table 3.22-1. Impacts to these resources require coordination with regulating agencies, including USACE and RI CRMC, prior to any construction activities to determine jurisdiction.

**Table 3.22-1. Delineated Wetlands by Project Component**

| Project Component | Freshwater Wetlands (acres)* | Wetland Buffer (acres)† | Regulated Ditch (feet)‡ |
|---|---|---|---|
| Landfall work area | 0 | 0 | 0 |
| OnSS footprint | < 0.01 | 0.48 | 0 |
| ICF footprint | 0.10 | 0.24 | 148.38 |
| Onshore cable corridor and envelope | 0 | 0.07 | 0 |

Source: VHB (2023).

* Freshwater wetlands subject to RI CRMC and the USACE jurisdiction. Although USACE jurisdictional wetlands are present, the proposed activity consists of hand-cutting trees and does not involve a discharge of fill; therefore, a USACE permit is not required. This was confirmed in a letter from the USACE to Revolution Wind on February 11, 2022 (USACE 2022).

† Area of land within 50 feet of the wetland boundary regulated by RI CRMC.

‡ Human-made ditch that is regulated by RI CRMC as an Area Subject to Stormwater Flowage.

The landfall work area was shifted east to avoid a delineated ruderal forested wetland (Freshwater Wetland 1) that is regulated by the RI CRMC and USACE as a freshwater wetland near the coast. Tidal salt marshes west of the landfall work area have also been avoided. There are no wetlands or waters within the onshore transmission cable corridor or easement. However, the cable corridor crosses the 50-foot wetland buffer of Freshwater Wetland 1.

Regulated wetlands within and adjacent to the OnSS and ICF parcels include four freshwater wetlands (Freshwater Wetlands 2–5), tributaries to Mill Creek, and a human-made ditch. Freshwater Wetland 2 (i.e., a small isolated forested wetland) is outside of but adjacent to the OnSS footprint. Freshwater Wetland 3 (i.e., a ruderal forested swamp) occurs along the western boundary of the OnSS parcel and continues off-site around Mill Creek. Freshwater Wetland 4 (i.e., a ruderal shrub marsh with a forested perimeter) occurs along the northern boundary of the OnSS and ICF parcel. Wetland 5 is a small, isolated scrub-shrub wetland within the ICF footprint that is hydrologically connected to Freshwater Wetland 4 by a human-made ditch that is regulated as an Area Subject to Stormwater Flowage. Tributaries to Mill Creek flow north and west through Freshwater Wetland 3, outside the OnSS footprint (see Figures 4.3.1-3 and 4.3.1-13 in COP Appendix K). Vernal pools were identified within Freshwater Wetlands 4 and 5. The OnSS and ICF footprints are designed to avoid most of the 3.92 acres of wetlands delineated within these parcels.

Warming temperatures, increasing storm severity and frequency, and ongoing rising sea levels impact wetland habitats. Large, severe storms can increase sedimentation and erosion, which can lead to habitat alteration. Offshore wind projects aim to combat climate change and associated effects by reducing GHG emissions.

## 3.22.2 Environmental Consequences

### 3.22.2.1 Relevant Design Parameters, Impact-Producing Factors, and Potential Variances in Impacts

The Project design parameters that would influence the magnitude of the impacts on wetland resources include the location of and construction of or within the OnSS, ICF, and landfall work area. The following have occurred or would occur to minimize potential impacts to wetland resources:

- Revolution Wind evaluated siting alternatives for the OnSS using the criteria that included avoidance or minimization of disturbance to wetlands and other ecologically sensitive areas.
- In accordance with Section 2.9(B)(1)(d) of the Freshwater Wetland Rules, the Onshore Facilities would be designed to avoid and minimize impacts to freshwater wetlands to the maximum extent practicable. Any wetlands that would be impacted as a result of the Project would be mitigated via the federal and state permitting process in accordance with Section 404 of the CWA and the Freshwater Wetland Rules.
- Onshore Facilities would be sited within previously disturbed and developed areas to the extent practicable.
    - The OnSS and ICF would be located on parcels that are already highly altered and include buried demolition waste.
- Accidental spill or release of oils or other hazardous materials offshore would be managed through the OSRP. Compliance with the RIPDES General Permit for Stormwater Discharges associated with construction activity which requires the implementation of a SESC Plan and spill prevention and control measures.
- Revolution Wind would follow state and federal regulations for alteration of wetlands as applicable.

Erosion control measures implemented during both construction and decommissioning, as well as a facility-specific spill plan implemented during O&M, would decrease the potential for impacts to wetland resources. These Project design parameters would be implemented across all alternatives; therefore, BOEM would not expect potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for wetland and non-tidal water resources across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E2-2 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.22-2 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action.

The Conclusion section within each alternative analysis discussion includes rationale for the overall effect call determination for that alternative. The overall impact of any alternative would be **minor** adverse because the effects on wetland resources would be small and localized, and with implementation of EPMs, wetland resources are expected to recover completely.

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**Table 3.22-2. Alternative Comparison Summary for Wetlands and Non-tidal Waters Impact-Producing Factor**

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative G (Preferred Alternative) | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| Accidental releases and discharges | **Onshore**: Spills that reach surface water would be expected to disperse rapidly (BOEM 2015). Any discharges from future offshore wind projects are not expected to affect wetland resources within the GAA. Adverse impacts from accidental releases and discharges would be **negligible** adverse, localized, and temporary to short term due to the likely limited extent and duration of a release. | **Onshore**: Revolution Wind would prepare a construction-specific plan in accordance with applicable requirements and would outline spill prevention plans and steps to contain and clean up spills that may occur. All onshore activities would be conducted in compliance with the RI Pollutant Discharge Elimination System General Permit for the Discharge of Stormwater Associated with Construction Activities and an approved soil erosion and sedimentation control plan. Therefore, with the implementation of these measures, accidental releases and discharges during onshore construction and installation are expected to result in short-term **minor** adverse impacts within adjacent wetland resources.<br>The potential for accidental releases and discharges during O&M and decommissioning would be less than during construction and installation due to reduced use of drilling fluids, fuels, oils, and lubricants. Stormwater runoff during O&M of onshore facilities could result in turbidity and sediment deposition that could cause short-term **minor** adverse impacts to wetlands or non-tidal waters Therefore, impacts to wetland resources from accidental releases and discharges would be short term **minor** adverse.<br>The contribution from the Proposed Action would be a low percentage of the overall spill risk from ongoing and future activities in the GAA. Any ballast water discharges from the Proposed Action and future offshore wind projects are not expected to affect wetland resources within the GAA. As a result, the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in short-term **negligible** to **minor** adverse impacts to wetland resources. | **Onshore**: Alternatives C through F would have the same onshore activities and facilities as the Proposed Action; therefore, impacts from accidental releases and discharges on wetland resources would be the same as the Proposed Action: **negligible** to **minor** adverse. | | | | **Onshore**: Alternative G would have the same onshore activities and facilities as the Proposed Action; therefore, impacts from accidental releases and discharges on wetland resources would be the same as the Proposed Action: **negligible** to **minor** adverse. |
| New cable emplacement/ maintenance | **Onshore**: Future offshore wind projects do not include cable emplacement and maintenance within the GAA that would affect wetland resources. | **Onshore**: No direct impacts to wetlands or other waters would occur as a result of onshore cable emplacement or maintenance activities. Temporary soil disturbance during cable installation could disturb and alter nearby wetland habitat, as well as potentially spread invasive species, which could lead to a small, | **Onshore**: Alternatives C through F would have the same onshore activities and facilities as the Proposed Action; therefore impacts on wetland resources would be the same as the Proposed Action: **negligible** to **minor** adverse. | | | | **Onshore**: Alternative G would have the same onshore activities and facilities as the Proposed Action; therefore impacts on wetland resources would be the same as the Proposed Action: **negligible** to **minor** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative G (Preferred Alternative) | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| | | localized reduction in habitat quality. With erosion control and weed management measures in place, any impacts to adjacent wetlands during construction and installation would be short term **negligible** adverse.<br>Land disturbance during O&M would be limited to regular maintenance of underground infrastructure, if needed, and EPMs would limit potential impacts from sedimentation. See Table F-1 in Appendix F for a list of EPMs for wetland resources. Adverse impacts on wetlands and non-tidal waters under the Proposed Action would be temporary **minor** adverse.<br>The contribution to cumulative impacts to wetland resources from anchoring and cable emplacement is expected to be the same as the Proposed Action because no other past, present, and reasonably foreseeable projects requiring cable placement/maintenance would occur within the GAA. As a result, the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in **minor** adverse short-term impacts to wetlands and non-tidal waters due to surface disturbance in wetland buffers. | | | | | |
| Presence of structures | **Onshore**: There are no known future offshore wind activities that have facilities planned within the GAA. Therefore, impacts to wetland resources would be **negligible** adverse. | **Onshore:** Land disturbances from the presence of structures associated with Project construction and installation would include the 19.53-acre landfall work area, 7.04-acre OnSS, 3.76-acre ICF, and 16.58-acre onshore transmission cable envelope. The OnSS and ICF structures would disturb 0.11 acre of freshwater forested wetland (less than 0.1% of wetlands within the GAA). Soil disturbance during construction and installation could also alter nearby wetland habitat due to sedimentation and spread invasive species, leading to a small, localized reduction in habitat quality. Revolution Wind would also comply with all permit and regulatory requirements related to wetland and non-tidal waters impacts, and the resources are expected to recover with mitigation. As a result, adverse impacts on wetland resources under the Proposed Action would be localized, short term **minor** adverse.<br>O&M of the ICF and OnSS would not impact wetlands or other waters. Project components | **Onshore**: Alternatives C through F would have the same onshore activities and facilities as the Proposed Action; therefore, impacts would be the same as the Proposed Action: **minor** adverse. | | | | **Onshore**: Alternative G would have the same onshore activities and facilities as the Proposed Action; therefore, impacts would be the same as the Proposed Action: **minor** adverse. |

| Impact-Producing Factor | No Action Alternative | Alternative B (Proposed Action) up to 100 WTG | Alternative C (Habitat Alternative) 64–65 WTGs | Alternative G (Preferred Alternative) | Alternative E (Viewshed Alternative) 64–81 WTGs | Alternative F (Higher Capacity Turbine Alternative) 56 WTGs | Alternative G (Preferred Alternative) |
|---|---|---|---|---|---|---|---|
| | | would be demolished or decommissioned in place, limiting the potential for soils and materials to wash into adjacent wetland resources. Temporary **minor** adverse impacts to wetlands or non-tidal waters adjacent to the structures could occur if debris from demolition washed into the adjacent wetland resources.<br>Additional structures could cumulatively add to other onshore impacts due to an increase in impervious surface from reasonably foreseeable structures within the GAA. The Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in long-term **minor** adverse impacts to wetland resources. | | | | | |

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### 3.22.2.2 Alternative A: Impacts of the No Action Alternative on Wetlands and Non-Tidal Waters

#### 3.22.2.2.1 Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for wetlands and non-tidal waters (see Section 3.22.1) would continue to follow current regional trends and respond to IPFs introduced by other ongoing activities and by permitted and constructed offshore wind COP projects within the GAA. These IPFs are described and analyzed in Appendix E1.

#### 3.22.2.2.2 Cumulative Impacts

This section discloses potential wetlands and non-tidal waters impacts associated with future offshore wind development (without the Proposed Action). In this and the following sections, these resources are collectively referred to as *wetland resources*. The cumulative impact analysis for the No Action Alternative for planned non-offshore wind activities, as well as activities associated with constructed or approved offshore wind projects (without the Proposed Action), is provided in Appendix E1.

Accidental releases and discharges: However, should offshore wind facilities be located within the GAA, there is a possibility of accidental releases of fuels, oils, and lubricants that could affect wetland resources. Any activity would require a facility-specific spill plan outlining spill prevention training, plans, and steps to contain and clean up spills if they occur. Spills that reach surface water would be expected to disperse rapidly (BOEM 2015). Adverse impacts from accidental releases and discharges would be **negligible** adverse, localized, and temporary to short term due to the likely limited extent and duration of a release.

Permitted routine operational effluent discharges to receiving waters (e.g., such as ballast water) are regulated by the NPDES. Any discharges from future offshore wind projects are not expected to affect wetland resources within the GAA.

New cable emplacement/maintenance: Future offshore wind projects do not include cable emplacement and maintenance within the GAA that would affect wetland resources.

Presence of structures: There are no known future offshore wind activities that have facilities planned within the GAA. Therefore, impacts to wetland resources would be **negligible** adverse.

#### 3.22.2.2.3 Conclusions

Under the No Action Alternative, there are no known future offshore wind activities that could impact wetland resources in the GAA. Adverse impacts from future activities on onshore wetland resources under the No Action Alternative would be temporary to short term and **negligible** adverse. Impacts associated with future offshore wind activities in the GAA for onshore wetland resources combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts because the effects would be small, and the resource would recover completely.

### 3.22.2.3 Alternative B: Impacts of the Proposed Action on Wetlands and Non-tidal Waters

#### 3.22.2.3.1 Construction and Installation

**Onshore Activities and Facilities**

Accidental releases and discharges: Onshore construction and HDD activities would require heavy equipment use, and an inadvertent release from the machinery or spill during refueling activities could occur. Onshore cables would not contain fluids and would not be susceptible to leaks that could affect water quality. The drilling rig used for HDD would be located within the landfall envelope where there are no wetlands or other waters. Drilling fluids and mud would be transported off-site for treatment, disposal, and/or reuse. Revolution Wind would prepare a construction-specific plan in accordance with applicable requirements and would outline spill prevention plans and steps to contain and clean up spills that may occur.

To protect water quality, all onshore activities would be conducted in compliance with the RI Pollutant Discharge Elimination System General Permit for the Discharge of Stormwater Associated with Construction Activities and an approved soil erosion and sedimentation control plan. The measures employed in the soil erosion and sedimentation control plan would minimize the opportunity for turbid discharges leaving a construction work area. The plan would also include specific measures for handling dewatering discharges and measures for refueling equipment to minimize the opportunities for uncontrolled spills. Therefore, with the implementation of these measures, accidental releases and discharges during onshore construction and installation are expected to result in short-term **minor** adverse impacts within adjacent wetland resources.

New cable emplacement/maintenance: No direct impacts to wetlands or other waters would occur as a result of onshore cable emplacement or maintenance activities. The landfall work area, which would be used during cable emplacement, avoids the nearby freshwater forested wetland (Freshwater Wetland 1) and wetland buffer (see Table 3.22-1). The onshore cable route would follow Circuit Drive to the OnSS, and no wetlands or other waters are within the cable route. However, approximately 94 feet (28.65 m) of the onshore cable route crosses the 50-foot buffer of Freshwater Wetland 1, resulting in 0.07 acre of temporary disturbance in the state-regulated buffer. Temporary soil disturbance during cable installation could disturb and alter nearby wetland habitat, as well as potentially spread invasive species, which could lead to a small, localized reduction in habitat quality. With erosion control and weed management measures in place, any impacts to adjacent wetlands during construction and installation would be short term **negligible** adverse. The cable corridor would be fully restored once construction and installation is complete.

Presence of structures: Land disturbances from the presence of structures associated with Project construction and installation would include the 19.53-acre landfall work area, 7.04-acre OnSS, 3.76-acre ICF, and 16.58-acre onshore transmission cable envelope. The new OnSS and ICF would be constructed adjacent to the existing Davisville Substation to support interconnection of the Project to the existing electrical grid. These structures would require cutting of 0.11 acre of freshwater forested wetland. This amounts to 2.6% of the 3.92 acres of delineated wetlands within the OnSS and ICF parcels, and less than 0.1% of mapped wetlands in the GAA (Lower West Passage subwatershed). There are no streams or other waterbodies within the footprint of the onshore facilities; however, Mill Creek is adjacent to the OnSS.

Freshwater wetlands and wetland buffers within onshore components are detailed in Table 3.22-1 and in Figures 4.3.1-3 and 4.3.1-13 in COP Appendix K. Approximately 0.11 acre of freshwater wetlands and 143.38 feet of an Area Subject to Stormwater Flowage—state-regulated ditch—would be directly impacted by construction and installation of the onshore facilities. Clearing, grading, and hardening in these areas could directly and indirectly impact wetland resources. Soil disturbance during construction and installation could also alter nearby wetland habitat due to sedimentation (see Section 3.21) and spread invasive species, leading to a small, localized reduction in habitat quality. Impacts to wetlands would be permitted and mitigated as described in Appendix F, resulting in recovery of the resource. Implementing EPMs such as erosion and sedimentation BMPs (see Table F-1 in Appendix F) would avoid or minimize impacts on water quality, wetlands, and other waters. Before Project construction, anticipated wetland impacts would require coordination with the regulating agencies, including USACE, RI CRMC, Rhode Island Department of Environmental Management (RIDEM), and Quonset Development Corporation. Revolution Wind would comply with all permit and regulatory requirements related to wetland and other water impacts, and the resources are expected to recover with mitigation. As a result, adverse impacts on wetland resources under the Proposed Action would be localized, short term **minor** adverse.

#### 3.22.2.3.2 Operations and Maintenance and Decommissioning

### Onshore Activities and Facilities

<u>Accidental releases and discharges:</u> The potential for accidental releases and discharges during O&M and decommissioning would be less than during construction and installation due to reduced use of drilling fluids, fuels, oils, and lubricants. The additional impervious surfaces at onshore Project facilities during O&M would increase the amount of runoff and stormwater pollutants delivered to nearby wetland resources. Wetlands are important habitats for supporting wildlife, and stormwater runoff filtration and stormwater runoff during O&M could have a short-term effect on turbidity and sediment deposition that could impact wetlands or other waters. Revolution Wind would prepare a construction-specific spill plan in accordance with applicable requirements and would outline spill prevention training, plans, and steps to contain and clean up spills that may occur. Therefore, impacts to wetland resources from accidental releases and discharges would be short term **minor** adverse.

<u>New cable emplacement/maintenance:</u> If O&M activities related to the onshore cable are within the segment of the ROW that crosses the 50-foot buffer of Freshwater Wetland 1, then temporary soil disturbance could alter nearby wetland habitat and spread invasive species, leading to a reduction in habitat quality. Land disturbance during O&M would be limited to regular maintenance of underground infrastructure (i.e., transmission cable discussed above under Section 3.22.2.2.1), if needed, and EPMs would limit potential impacts from sedimentation. Adverse impacts on wetlands and non-tidal waters under the Proposed Action would be temporary **minor** adverse.

<u>Presence of structures:</u> For onshore facilities, no land disturbance is anticipated during regular maintenance. O&M of the ICF and OnSS would not impact wetlands or other waters. During decommissioning of the ICF and OnSS facilities, the Project components would be demolished or decommissioned in place, limiting the potential for soils and materials to wash into adjacent wetland resources. Pre-existing habitats are not likely to be restored as part of decommissioning. Temporary **minor** adverse impacts to wetlands or other waters adjacent to the structures could occur if debris from demolition washed into the adjacent wetland resources.

### 3.22.2.3.3 Cumulative Impacts

### Onshore Activities and Facilities

Accidental releases and discharges: The Proposed Action could contribute construction-related accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris. The contribution from the Proposed Action would be a low percentage of the overall spill risk from ongoing and future activities in the GAA. These types of releases, if any, would occur infrequently at discrete locations in the watershed and at varied times. As a result, the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in short-term **negligible** adverse impacts to wetland resources.

Permitted routine operational effluent discharges to receiving waters are regulated by the NPDES. Any ballast water discharges from the Proposed Action and future offshore wind projects are not expected to affect wetland resources within the GAA. Stormwater runoff during O&M of onshore facilities could result in turbidity and sediment deposition that could cause short-term **minor** adverse impacts to wetlands or other waters. Overall, the contribution to cumulative impacts to wetland resources is expected to be localized, temporary **minor** adverse.

New cable emplacement/maintenance: The contribution to cumulative impacts to wetland resources from anchoring and cable emplacement is expected to be the same as the Proposed Action because no other past, present, and reasonably foreseeable projects requiring cable placement/maintenance would occur within the GAA. As a result, the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in **minor** adverse short-term impacts to wetlands and non-tidal waters due to surface disturbance in wetland buffers.

Presence of structures: The Proposed Action includes the OnSS and ICF structures that would require cutting 0.11 acre of freshwater forested wetland which is less than 0.1% of mapped wetlands in the GAA (Lower West Passage subwatershed) and 2.6% of wetlands delineated in those parcels. Additional structures could cumulatively add to other onshore impacts due to an increase in impervious surface from reasonably foreseeable structures within the GAA; however, only a small percentage of the 1,367.4 acres of freshwater wetlands are expected to be impacted. The Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in long-term **minor** adverse impacts to wetland resources.

### 3.22.2.3.4 Conclusions

Project construction and installation, O&M, and decommissioning would expose and disturb soils and sediments, resulting in potential erosion, sedimentation, or inadvertent release of contamination, hazardous materials or debris into onshore surface waters that could affect wetland resources in the GAA. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **minor** adverse because the effect would be small and localized. Further, the resource would be expected to recover completely with remedial or mitigating action(s). The Proposed Action would not result in any net beneficial change to wetlands or other waters.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor** adverse. Considering all IPFs together, BOEM anticipates that the overall impacts associated with the Proposed

Action when combined with past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to wetlands and non-tidal waters because the effects are expected to be small and localized. Further, with implementation of EPMs, wetland resources are expected to recover completely.

### 3.22.2.4 Alternatives C, D, E, and F

Table 3.22-2 discloses IPF findings for each alternative.

#### 3.22.2.4.1 Conclusions

Under Alternatives C through F, Project construction and installation, O&M, and decommissioning would expose and disturb soils and sediments, resulting in potential erosion, sedimentation, or inadvertent release of contamination, hazardous materials, or debris into onshore surface waters that could affect wetland resources in the GAA. BOEM anticipates that impacts resulting from each alternative alone would range from **negligible** to **minor** adverse because the effect would be small and localized. Further, the resource would be expected to recover completely with remedial or mitigating action(s). Alternatives C through F would not result in any net beneficial change to wetlands or other waters.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under Alternatives C through F resulting from individual IPFs would range from **negligible** to **minor** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with each alternative when combined with past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to wetlands and non-tidal waters because the effects are expected to be small and localized. Further, with implementation of EPMs, wetland resources are expected to recover completely.

### 3.22.2.5 Alternative G: Impacts of the Preferred Alternative on Wetlands and Non-tidal Waters

Table 3.22-2 discloses IPF findings for each alternative.

#### 3.22.2.5.1 Conclusions

Under Alternative G, Project construction and installation, O&M, and decommissioning would expose and disturb soils and sediments, resulting in potential erosion, sedimentation, or inadvertent release of contamination, hazardous materials, or debris into onshore surface waters that could affect wetland resources in the GAA. BOEM anticipates that impacts resulting from each alternative alone would range from **negligible** to **minor** adverse because the effect would be small and localized. Further, the resource would be expected to recover completely with remedial or mitigating action(s). Alternative G would not result in any net beneficial change to wetlands or other waters.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under Alternative G resulting from individual IPFs would range from **negligible** to **minor** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with each alternative when combined with past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to wetlands and non-tidal waters because the effects are expected to be small and localized. Further, with implementation of EPMs, wetland resources are expected to recover completely.

#### 3.22.2.6 Mitigation

No potential additional mitigation measures for wetland resources are identified in Table F-2 or Table F-3 in Appendix F.

# APPENDIX E3

## Maximum-Case Scenario Estimates for Offshore Wind Projects

# Contents



# Tables

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# INTRODUCTION

Table E3-1 (parts 1–10) provides maximum-case scenario estimates of potential offshore wind project impacts assuming maximum buildout, using the geographic analysis areas in the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) project environmental impact statement (EIS) and construction and operations plan–designated numbers for the RWF and RWEC. The Bureau of Ocean Energy Management (BOEM) developed these estimates based on offshore wind demand, as discussed in its 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019). Estimates disclosed in the EIS's Chapter 3, No Action analyses were developed by summing acreage or number calculations across all lease areas noted as occurring within, or overlapping, a given geographic analysis area. This likely overestimates some impacts in cases where lease areas only partially overlap analysis areas. However, this approach was used to provide the most conservative estimate of future offshore wind development.

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**Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of March 17, 2023) (part 1)**

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Resource/Projects[4] | | | | | | | | Estimated Offshore Construction Time Period[5] | Expected Turbine Size (MW)[6] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Air | Water | Benthic/ Cultural Resources | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use | Navigation/ Commercial Fisheries/Other Marine Uses | Visual/ Recreation -Tourism | Environmental Justice | Demographics/ Environmental Justice | | |
| NE | NE Aquaventis | State Project | – | – | – | – | – | – | – | – | 2024 | 11 |
| NE | Block Island | State Project, Built | – | – | – | – | – | – | – | – | Built | 6 |
| | Total State Waters Leases | | – | – | – | – | – | – | – | – | N/A | N/A |
| MA/RI | Vineyard Wind 1 part of OCS-A 0501 | COP, ROD | – | – | – | – | – | – | – | – | 2023 | Up to 14 |
| MA/RI | South Fork, OCS-A 0517 | COP, ROD | – | – | – | – | – | – | – | – | 2023 | 11 |
| MA/RI | Revolution Wind, OCS # | COP | – | – | – | – | – | – | – | – | 2024 | – |
| MA/RI | Sunrise, OCS-A 0487 | COP | – | – | – | – | – | – | – | – | 2024 | 11 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind]) | COP | – | – | – | – | – | – | – | – | 2024 | 13–16 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind]) | COP | – | – | – | – | – | – | – | – | 2025 or later | 13–19 |
| MA/RI | South Coast Wind, OCS-A 0521 | COP | – | – | – | – | – | – | – | – | 2024 | 14 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 1) | COP | – | – | – | – | – | – | – | – | 2024–2026 | 13 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 2) | COP | – | – | – | – | – | – | – | – | 2027–2029 | 13 |
| MA/RI | Vineyard Northeast Wind (OCS-A 0522) | Planning | – | – | – | – | – | – | – | – | By 2030 | 15 |
| MA/RI | Bay State Wind, part of OCS-A 0500 | Planning | – | – | – | – | – | – | – | – | By 2030 | 12 |
| MA/RI | OCS-A 0500 remainder | Planning | – | – | – | – | – | – | – | – | By 2030 | 12 |
| MA/RI | OCS-A 0487 remainder | Planning | – | – | – | – | – | – | – | – | | 12 |
| | Total MA/RI Leases | | – | – | – | – | – | – | – | – | N/A | N/A |
| NY/NJ | Ocean Wind 1, part of OCS-A 0498 | COP | – | – | – | – | – | – | – | – | 2024–2025 | 12 |
| NY/NJ | Empire Wind 1, part of OCS-A 0512 | COP | – | – | – | – | – | – | – | – | 2023–2026 | Up to 18 |
| NY/NJ | Empire Wind 2, part of OCS-A 512 | COP | – | – | – | – | – | – | – | – | 2024–2027 | Up to 18 |
| NY/NJ | Atlantic Shores South OCS-A 0499 | COP | – | – | – | – | – | – | – | – | 2025 | 15 |
| NY/NJ | Ocean Wind 2, part of OCS-A 0532 | Planning | – | – | – | – | – | – | – | – | By 2030, spread over 2026-2030 | 14 |
| NY/NJ | Atlantic Shores North, OCS-A 0549 | Planning | – | – | – | – | – | – | – | – | 2026 | 15 |
| NY/NJ | OW Ocean Winds East LLC, OCS-A 0537 | Planning | – | – | – | – | – | – | – | – | By 2030, spread over 2026–2030 | >12 |
| NY/NJ | Attentive Energy LLC, OCS-A 0538 | Planning | – | – | – | – | – | – | – | – | | >12 |
| NY/NJ | Bight Wind Holdings, LLC, OCS-A 0539 | Planning | – | – | – | – | – | – | – | – | | >12 |
| NY/NJ | Atlantic Shores Offshore Wind Bight, OCS-A 0541 | Planning | – | – | – | – | – | – | – | – | | >12 |
| NY/NJ | Invenergy Wind Offshore LLC, OCS-A 0542 | Planning | – | – | – | – | – | – | – | – | | >12 |
| NY/NJ | Vineyard Mid-Atlantic LLC, OCS-A 0544 | Planning | – | – | – | – | – | – | – | – | | >12 |
| | Total NY/NJ Leases | | – | – | – | – | – | – | – | – | N/A | N/A |
| DE/MD | Skipjack, part of OCS-A 0519 | COP | – | – | – | – | – | – | – | – | 2024 | 12 |
| DE/MD | US Wind, part of OCS-A 0490 | COP | – | – | – | – | – | – | – | – | 2024 | Up to 18 |

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Resource/Projects[4] | | | | | | | | Estimated Offshore Construction Time Period[5] | Expected Turbine Size (MW)[6] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Air | Water | Benthic/ Cultural Resources | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use | Navigation/ Commercial Fisheries/Other Marine Uses | Visual/ Recreation -Tourism | Environmental Justice | Demographics/ Environmental Justice | | |
| DE/MD | GSOE I, OCS-A 0482 | Planning | – | – | – | – | – | – | – | – | By 2030, spread over 2023–2030 | 12 |
| DE/MD | OCS-A 0519 remainder | Planning | – | – | – | – | – | – | – | – | By 2030 | 12 |
| – | Total DE/MD Leases | | – | – | – | – | – | – | – | – | N/A | N/A |
| South Atlantic | CVOW, OCS-A 0497 | Built | – | – | – | – | – | – | – | – | Built | 6 |
| South Atlantic | CVOW-C, OCS-A 0483 | COP | – | – | – | – | – | – | – | – | 2023 | 14–16 |
| South Atlantic | Kitty Hawk Wind North, OCS-A 0508 | COP | – | – | – | – | – | – | – | – | 2027 | 14–18 |
| South Atlantic | Kitty Hawk Wind South, OCS-A 0508 remainder | COP | – | – | – | – | – | – | – | – | 2027–2028 | > 20 |
| South Atlantic | TotalEnergies Renewables Wind, LLC OCS-A 0545 | Planning | – | – | – | – | – | – | – | – | By 2030 | > 12 |
| South Atlantic | Duke Energy Renewables Wind, LLC OCS-A 0546 | Planning | – | – | – | – | – | – | – | – | By 2030 | > 12 |
| – | Total South Atlantic Leases | – | – | – | – | – | – | – | – | – | N/A | N/A |
| – | OCS Total: | – | – | – | – | – | – | – | – | – | N/A | N/A |

**Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of March 17, 2023) (part 2)**

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Generating Capacity (MW)[7] | COP Total Export Cable Length (statute miles)[8] | Export Cable Corridor Length (statute miles)[9] | Number of Export Cables[10] | ESTIMATED Total Export Cable Length (statute miles)[11] | Offshore Export Cable Footprint (acres)[12] | Offshore Export Cable Installation Tool Disturbance Width (feet)[13] |
|---|---|---|---|---|---|---|---|---|---|
| | | | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses |
| NE | NE Aquaventis | State Project | 11 | – | – | – | – | N/A | – |
| NE | Block Island | State Project, Built | 30 | 28 | – | – | – | 11.61 | 5 |
| – | Total State Waters Leases | – | 41 | 28 | 0 | 0 | 0 | 11.61 | N/A |
| MA/RI | Vineyard Wind 1 part of OCS-A 0501 | COP, ROD | 800 | 98 | – | – | – | 11.88 | 6.5 |
| MA/RI | South Fork, OCS-A 0517 | COP, ROD | 132 | 139 | – | – | – | 3 | 6.5 |
| MA/RI | Revolution Wind, OCS # | COP | Up to 880 | 42 | – | – | – | 5.09 | 6.5 |
| MA/RI | Sunrise, OCS-A 0487 | COP | 934 | - | 104.6 | 2 | 209.2 | 25.36 | 13 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind]) | COP | 804 | 125 | – | – | – | 36 | 10 |

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Generating Capacity (MW)[7] | COP Total Export Cable Length (statute miles)[8] | Export Cable Corridor Length (statute miles)[9] | Number of Export Cables[10] | ESTIMATED Total Export Cable Length (statute miles)[11] | Offshore Export Cable Footprint (acres)[12] | Offshore Export Cable Installation Tool Disturbance Width (feet)[13] |
|---|---|---|---|---|---|---|---|---|---|
| | | | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind]) | COP | 1,725 | 226 | – | – | – | 113 | 10 |
| MA/RI | South Coast Wind, OCS-A 0521 | COP | 1,600–2,400 | 1,184 | – | – | – | 472 | 6.5 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 1) | COP | 1,230 | 202 | – | – | – | 24.48 | 6.5 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 2) | COP | 1,100 | 202 | – | – | – | 24.48 | 6.5 |
| MA/RI | Vineyard Northeast Wind (OCS-A 0522) | Planning | 2,400 | 532 | – | – | – | 128 | 33 |
| MA/RI | Bay State Wind, part of OCS-A 0500 | Planning | 1,128 | 139 | – | – | – | 16.85 | 6.5 |
| MA/RI | OCS-A 0500 remainder | Planning | 1,392 | – | – | – | 200 | 64 | 7 |
| MA/RI | OCS-A 0487 remainder | Planning | | – | – | – | 200 | | 7 |
| | Total MA/RI Leases | | 14,925 | 2,889 | 105 | 2 | 609 | 923 | N/A |
| NY/NJ | Ocean Wind 1, part of OCS-A 0498 | COP | 1,100 | 175 | – | – | – | 21.2 | 7 |
| NY/NJ | Empire Wind 1, part of OCS-A 0512 | COP | 816 | 46 | – | – | – | 5.6 | 5 |
| NY/NJ | Empire Wind 2, part of OCS-A 512 | COP | 1,260 | 30 | – | – | – | 3.6 | 5 |
| NY/NJ | Atlantic Shores South OCS-A 0499 | COP | 1,510+ | 342 | – | – | – | 294.1 | 3.3 |
| NY/NJ | Ocean Wind 2, part of OCS-A 0532 | Planning | 1,148 | - | – | – | 200 | 24.2 | 7 |
| NY/NJ | Atlantic Shores North, OCS-A 0549 | Planning | 2,355+ | 330.6 | – | – | - | 392.9 | 3.3 |
| NY/NJ | OW Ocean Winds East LLC, OCS-A 0537 | Planning | 7,584–11,502 | – | – | – | 200 | 24.2 | 7 |
| NY/NJ | Attentive Energy LLC, OCS-A 0538 | Planning | | – | – | – | 200 | 24.2 | 7 |
| NY/NJ | Bight Wind Holdings, LLC, OCS-A 0539 | Planning | | – | – | – | 200 | 24.2 | 7 |
| NY/NJ | Atlantic Shores Offshore Wind Bight, OCS-A 0541 | Planning | | – | – | – | 200 | 24.2 | 7 |
| NY/NJ | Invenergy Wind Offshore LLC, OCS-A 0542 | Planning | | – | – | – | 200 | 24.2 | 7 |

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Generating Capacity (MW)[7] | COP Total Export Cable Length (statute miles)[8] | Export Cable Corridor Length (statute miles)[9] | Number of Export Cables[10] | ESTIMATED Total Export Cable Length (statute miles)[11] | Offshore Export Cable Footprint (acres)[12] | Offshore Export Cable Installation Tool Disturbance Width (feet)[13] |
|---|---|---|---|---|---|---|---|---|---|
| | | | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses |
| NY/NJ | Vineyard Mid-Atlantic LLC, OCS-A 0544 | Planning | | – | – | – | 200 | 24.2 | 7 |
| – | Total NY/NJ Leases | – | 19,691 | 924 | 0 | 0 | 1,400 | 887 | N/A |
| DE/MD | Skipjack, part of OCS-A 0519 | COP | 192 | – | 40 | 1 | 40 | 4.85 | 6.5 |
| DE/MD | US Wind, part of OCS-A 0490 | COP | Up to 2,000 | 145 | – | – | – | 114 | 6.5 |
| DE/MD | GSOE I, OCS-A 0482 | Planning | 1,128 | – | – | – | 200 | 24 | 6.5 |
| DE/MD | OCS-A 0519 remainder | Planning | 1,128 | – | – | – | 200 | 24 | 6.5 |
| – | Total DE/MD Leases | | 4,448 | 145 | 40 | 1 | 440 | 168 | N/A |
| South Atlantic | CVOW, OCS-A 0497 | Built | 12 | 27 | – | – | – | 11 | 3.3 |
| South Atlantic | CVOW-C, OCS-A 0483 | COP | 2,500–3,000 | 417 | – | – | – | 272 | 5 |
| South Atlantic | Kitty Hawk Wind North, OCS-A 0508 | COP | 966–1,242 | 112 | – | – | – | 45 | 30 |
| South Atlantic | Kitty Hawk Wind South, OCS-A 0508 remainder | COP | 1,694–2,178 | 353 | – | – | – | 141 | 30 |
| South Atlantic | TotalEnergies Renewables Wind, LLC OCS-A 0545 | Planning | 785 | – | – | – | 200 | 24 | 6.5 |
| South Atlantic | Duke Energy Renewables Wind, LLC OCS-A 0546 | Planning | 788 | – | – | – | 200 | 24 | 6.5 |
| – | Total South Atlantic Leases | – | 8,005 | 909 | 0 | 0 | 400 | 517 | N/A |
| – | OCS Total: | – | 47,110 | 4,895 | 145 | 3 | 2,849 | 2,507 | N/A |

**Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of March 17, 2023) (part 3)**

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Inter-array Cable Length (statute miles)[14] | Hub Height (feet)[15] | Rotor Diameter (feet)[16] | Total Height of Turbine (feet)[17] | Turbine Number[18] |
|---|---|---|---|---|---|---|---|
| | | | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism |
| NE | NE Aquaventis | State Project | | | 450 | 520 | 2 |
| NE | Block Island | State Project, Built | 2 | 328 | 541 | 659 | 5 |
| | Total State Waters Leases | | 2 | N/A | N/A | N/A | 7 |

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Inter-array Cable Length (statute miles)[14] | Hub Height (feet)[15] | Rotor Diameter (feet)[16] | Total Height of Turbine (feet)[17] | Turbine Number[18] |
|---|---|---|---|---|---|---|---|
| | | | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism |
| MA/RI | Vineyard Wind 1 part of OCS-A 0501 | COP, ROD | 171 | 451 | 721 | 812 | 62 |
| MA/RI | South Fork, OCS-A 0517 | COP, ROD | 24 | 358 | 543 | 614 | 12 |
| MA/RI | Revolution Wind, OCS # | COP | 155 | 377–512 | 538–722 | 648–873 | 100 |
| MA/RI | Sunrise, OCS-A 0487 | COP | 180 | 459 | 656 | 787 | Up to 94 (at 102 potential locations) |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind]) | COP | 139 | 702 | 935 | 1,171 | 41–62 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind]) | COP | 201 | 702 | 935 | 1,171 | 64–88 |
| MA/RI | South Coast Wind, OCS-A 0521 | COP | 497 | 605 | 919 | 1,066 | 147 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 1) | COP | 187 | 591 | 984 | 1,083 | 70–94 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 2) | COP | 187 | 591 | 984 | 1,083 | 70–94 |
| MA/RI | Vineyard Northeast Wind (OCS-A 0522) | Planning | 221 | 787 | 1,050 | 1,312 | 160 |
| MA/RI | Bay State Wind, part of OCS-A 0500 | Planning | 148 | 492 | 722 | 853 | 94 |
| MA/RI | OCS-A 0500 remainder | Planning | 240 | 492 | 722 | 853 | 116 |
| MA/RI | OCS-A 0487 remainder | Planning | | 492 | 722 | 853 | |
| | Total MA/RI Leases | | 2,350 | N/A | N/A | N/A | 1,123 |
| NY/NJ | Ocean Wind 1, part of OCS-A 0498 | COP | 190 | 512 | 788 | 906 | 98 |
| NY/NJ | Empire Wind 1, part of OCS-A 0512 | COP | 134 | 525 | 853 | 951 | 57 |
| NY/NJ | Empire Wind 2, part of OCS-A 512 | COP | 166 | 525 | 853 | 951 | 90 |
| NY/NJ | Atlantic Shores South OCS-A 0499 | COP | 273.5 | 522 | 919 | 1,049 | 105–136 |
| NY/NJ | Ocean Wind 2, part of OCS-A 0532 | Planning | 173 | 512 | 788 | 906 | 109 |
| NY/NJ | Atlantic Shores North, OCS-A 0549 | Planning | 528.1 | 574.2 | 919 | 1,049 | 157 |
| NY/NJ | OW Ocean Winds East LLC, OCS-A 0537 | Planning | 120 | 1,009 | 1,230 | Up to 1,312 | 80 |
| NY/NJ | Attentive Energy LLC, OCS-A 0538 | Planning | 120 | 1,009 | 1,230 | Up to 1,312 | 100 |
| NY/NJ | Bight Wind Holdings, LLC, OCS-A 0539 | Planning | 120 | 1,009 | 1,230 | Up to 1,312 | 145 |
| NY/NJ | Atlantic Shores Offshore Wind Bight, OCS-A 0541 | Planning | 120 | 1,009 | 1,230 | Up to 1,312 | 93 |
| NY/NJ | Invenergy Wind Offshore LLC, OCS-A 0542 | Planning | 120 | 1,009 | 1,230 | Up to 1,312 | 97 |
| NY/NJ | Vineyard Mid-Atlantic LLC, OCS-A 0544 | Planning | 120 | 1,009 | 1,230 | Up to 1,312 | 102 |
| | Total NY/NJ Leases | | 2,184 | N/A | N/A | N/A | 1,264 |
| DE/MD | Skipjack, part of OCS-A 0519 | COP | 23.7 | 492 | 722 | 822 | 16 |
| DE/MD | US Wind, part of OCS-A 0490 | COP | 152 | 528 | 820 | 938 | 121 |
| DE/MD | GSOE I, OCS-A 0482 | Planning | 139.12 | 492 | 722 | 853 | 94 |
| DE/MD | OCS-A 0519 remainder | Planning | 139.12 | 492 | 722 | 853 | |

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Inter-array Cable Length (statute miles)[14] | Hub Height (feet)[15] | Rotor Diameter (feet)[16] | Total Height of Turbine (feet)[17] | Turbine Number[18] |
|---|---|---|---|---|---|---|---|
| | | | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism |
| | Total DE/MD Leases | | 454 | N/A | N/A | N/A | 231 |
| South Atlantic | CVOW, OCS-A 0497 | Built | 9 | 364 | 506 | 620 | 2 |
| South Atlantic | CVOW-C, OCS-A 0483 | COP | 300 | 446–489 | 725–761 | 804–869 | 205 |
| South Atlantic | Kitty Hawk Wind North, OCS-A 0508 | COP | 149 | 574 | 935 | 1,042 | 69 |
| South Atlantic | Kitty Hawk Wind South, OCS-A 0508 remainder | COP | 200 | 574 | 935 | 1,042 | 121 |
| South Atlantic | TotalEnergies Renewables Wind, LLC OCS-A 0545 | Planning | 179.08 | 492 | 722 | 853 | 64 |
| South Atlantic | Duke Energy Renewables Wind, LLC OCS-A 0546 | Planning | 94.72 | 492 | 722 | 853 | 64 |
| | Total South Atlantic Leases | | 932 | N/A | N/A | N/A | 525 |
| | OCS Total: | | 5,922 | N/A | N/A | N/A | 3,150 |

**Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of March 17, 2023) (part 4)**

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | ESP/OSS Number[19] | Foundation Number[20] | Total Footprint of Foundations (acres)[21] | Seabed Disturbance Based on Addition of Scour Protection (Foundation+Scour Protection) (acres)[22] | Offshore Export Cable Seabed Disturbance (acres)[23] |
|---|---|---|---|---|---|---|---|
| | | | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Air and Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Water and Benthic/Cultural Resources and Navigation/Commercial Fisheries/Other Marine Uses | Benthic/Cultural Resources and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses |
| NE | NE Aquaventis | State Project | 0 | 2 | N/A | N/A | N/A |
| NE | Block Island | State Project, Built | 0 | 5 | 1 | 6 | 11.61 |
| | Total State Waters Leases | | N/A | 7 | 1 | 6 | 11.61 |
| MA/RI | Vineyard Wind 1 part of OCS-A 0501 | COP, ROD | 1 | 63 | 1.3 | 32.7 | 69 |
| MA/RI | South Fork, OCS-A 0517 | COP, ROD | 1 | 13 | 1 | 11 | 555 |
| MA/RI | Revolution Wind, OCS # | COP | 2 | 102 | 3 | 74 | 1,324 |
| MA/RI | Sunrise, OCS-A 0487 | COP | 1 | Up to 95 (at 103 potential locations) | 3.27 | 97.57 | 1,185 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind]) | COP | 1–2 | 42–64 | 1.1–1.7 | 74 | 252 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind]) | COP | 1–3 | 65–91 | 2.1–3.0 | 204 | 358 |

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | ESP/OSS Number[19] | Foundation Number[20] | Total Footprint of Foundations (acres)[21] | Seabed Disturbance Based on Addition of Scour Protection (Foundation+Scour Protection) (acres)[22] | Offshore Export Cable Seabed Disturbance (acres)[23] |
|---|---|---|---|---|---|---|---|
| | | | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Air and Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Water and Benthic/Cultural Resources and Navigation/Commercial Fisheries/Other Marine Uses | Benthic/Cultural Resources and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses |
| MA/RI | South Coast Wind, OCS-A 0521 | COP | 2 | 149 | 142 | 1,697 | 2,480 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 1) | COP | 1 | Up to 95 | 24 | 399 | 159.15 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 2) | COP | 1 | Up to 95 | 24 | 399 | 159.15 |
| MA/RI | Vineyard Northeast Wind (OCS-A 0522) | Planning | 0–3 | 160 | 1.8–2.9 | 2.7–3.8 | 2,136 |
| MA/RI | Bay State Wind, part of OCS-A 0500 | Planning | 2 | 96 | 17 | 113 | 110 |
| MA/RI | OCS-A 0500 remainder | Planning | 3 | 119 | 18 | 137 | 170 |
| MA/RI | OCS-A 0487 remainder | Planning | | | | | |
| | Total MA/RI Leases | | N/A | 1,142 | 232 | 3,238 | 8,957 |
| NY/NJ | Ocean Wind 1, part of OCS-A 0498 | COP | 3 | 101 | 2.53 | 59.59 | 1,935 |
| NY/NJ | Empire Wind 1, part of OCS-A 0512 | COP | 0 | 57 | 1.14 | 52.44 | 28 |
| NY/NJ | Empire Wind 2, part of OCS-A 512 | COP | 0 | 90 | 2 | 82.80 | 18 |
| NY/NJ | Atlantic Shores South OCS-A 0499 | COP | Up to 5 | Up to 141 | 21 | 162 | 2,607 |
| NY/NJ | Ocean Wind 2, part of OCS-A 0532 | Planning | 2 | 111 | 17 | 130 | 170 |
| NY/NJ | Atlantic Shores North, OCS-A 0549 | Planning | 3–8 | 160–165 | 25 | 190 | 3,393 |
| NY/NJ | OW Ocean Winds East LLC, OCS-A 0537 | Planning | 2 | 82 | 21 | 103 | 170 |
| NY/NJ | Attentive Energy LLC, OCS-A 0538 | Planning | 2 | 102 | 27 | 129 | 170 |
| NY/NJ | Bight Wind Holdings, LLC, OCS-A 0539 | Planning | 3 | 148 | 38 | 186 | 170 |
| NY/NJ | Atlantic Shores Offshore Wind Bight, OCS-A 0541 | Planning | 2 | 95 | 25 | 120 | 170 |
| NY/NJ | Invenergy Wind Offshore LLC, OCS-A 0542 | Planning | 2 | 99 | 26 | 125 | 170 |
| NY/NJ | Vineyard Mid-Atlantic LLC, OCS-A 0544 | Planning | 2 | 104 | 27 | 131 | 170 |
| | Total NY/NJ Leases | | N/A | 1,295 | 232 | 1,470 | 9,169 |
| DE/MD | Skipjack, part of OCS-A 0519 | COP | 1 | 17 | 4.4 | 21 | 32 |
| DE/MD | US Wind, part of OCS-A 0490 | COP | 4 | 125 | 32.5 | 158 | 114 |
| DE/MD | GSOE I, OCS-A 0482 | Planning | 2 | 96 | 25.0 | 121.0 | 157.6 |
| DE/MD | OCS-A 0519 remainder | Planning | | | | | |
| | Total DE/MD Leases | | N/A | 238 | 62 | 300 | 303 |
| South Atlantic | CVOW, OCS-A 0497 | Built | 0 | 2 | 0.1 | 2 | 11 |
| South Atlantic | CVOW-C, OCS-A 0483 | COP | 3 | 208 | 4 | 198 | 13,244 |
| South Atlantic | Kitty Hawk Wind North, OCS-A 0508 | COP | 1 | 70 | 1 | 66 | 407 |
| South Atlantic | Kitty Hawk Wind South, OCS-A 0508 remainder | COP | 2 | 123 | 1 | 100 | 1,284 |

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | ESP/OSS Number[19] | Foundation Number[20] | Total Footprint of Foundations (acres)[21] | Seabed Disturbance Based on Addition of Scour Protection (Foundation+Scour Protection) (acres)[22] | Offshore Export Cable Seabed Disturbance (acres)[23] |
|---|---|---|---|---|---|---|---|
| | | | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Air and Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses and Visual/Recreation-Tourism | Water and Benthic/Cultural Resources and Navigation/Commercial Fisheries/Other Marine Uses | Benthic/Cultural Resources and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses |
| South Atlantic | TotalEnergies Renewables Wind, LLC OCS-A 0545 | Planning | 1 | 65 | 17 | 82 | 158 |
| South Atlantic | Duke Energy Renewables Wind, LLC OCS-A 0546 | Planning | 1 | 65 | 17 | 82 | 158 |
| | Total South Atlantic Leases | | N/A | 533 | 39 | 529 | 15,261 |
| | OCS Total: | | N/A | 3,215 | 566 | 5,544 | 33,701 |

**Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of March 17, 2023) (part 5)**

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Offshore Export Cable Hard Protection (acres)[24] | Anchoring Disturbance (acres)[25] | Inter-array Construction Footprint/Seabed Disruption (acres)[26] | Inter-array Operating Footprint/Seabed Disruption (acres)[27] | Inter-array Cable Hard Protection (acres)[28] |
|---|---|---|---|---|---|---|---|
| | | | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses |
| NE | NE Aquaventis | State Project | N/A | N/A | N/A | N/A | N/A |
| NE | Block Island | State Project, Built | N/A | 0.5 | 4 | 7.15 | N/A |
| | Total State Waters Leases | | N/A | 0.5 | 4 | 7 | N/A |
| MA/RI | Vineyard Wind 1 part of OCS-A 0501 | COP, ROD | 35 | 122 | 129 | 90 | 22.491 |
| MA/RI | South Fork, OCS-A 0517 | COP, ROD | 10 | 821 | 340 | 19 | 10.2 |
| MA/RI | Revolution Wind, OCS # | COP | 48 | 21 | 2,471 | 98 | 41.8 |
| MA/RI | Sunrise, OCS-A 0487 | COP | 25.2 | 259.8 | 2,150 | 95.1 | 129 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind]) | COP | 2 | 143 | 222 | 51 | 10 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind]) | COP | 5 | 199 | 321 | 73 | 14 |
| MA/RI | South Coast Wind, OCS-A 0521 | COP | 247 | 442 | 1,408 | 213 | 122 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 1) | COP | 24.00 | 9 | 962.8 | 113 | 82 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 2) | COP | 24.00 | 9 | 962.8 | 113 | 82 |
| MA/RI | Vineyard Northeast Wind (OCS-A 0522) | Planning | 130 | 896 | 1,176 | 21 | 21 |
| MA/RI | Bay State Wind, part of OCS-A 0500 | Planning | 17 | 442 | 226 | 137 | 137 |
| MA/RI | OCS-A 0500 remainder | Planning | 24 | 248.3 | 1,206 | 119 | 0 |

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Offshore Export Cable Hard Protection (acres)[24] | Anchoring Disturbance (acres)[25] | Inter-array Construction Footprint/Seabed Disruption (acres)[26] | Inter-array Operating Footprint/Seabed Disruption (acres)[27] | Inter-array Cable Hard Protection (acres)[28] |
|---|---|---|---|---|---|---|---|
| | | | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses | Water and Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land Use and Navigation/Commercial Fisheries/Other Marine Uses |
| MA/RI | OCS-A 0487 remainder | Planning | | 248.3 | | | |
| | Total MA/RI Leases | | 590 | 3,859 | 11,574 | 1,143 | 671 |
| NY/NJ | Ocean Wind 1, part of OCS-A 0498 | COP | 21 | 293.9 | 1,484 | 199 | 0 |
| NY/NJ | Empire Wind 1, part of OCS-A 0512 | COP | 5 | 77.2 | 838 | 112 | 0 |
| NY/NJ | Empire Wind 2, part of OCS-A 512 | COP | 4 | 50.4 | 1,323 | 177 | 0 |
| NY/NJ | Atlantic Shores South OCS-A 0499 | COP | 294 | 714 | 2,335 | 301 | 301 |
| NY/NJ | Ocean Wind 2, part of OCS-A 0532 | Planning | 24 | 335.8 | 1,631 | 219 | 0 |
| NY/NJ | Atlantic Shores North, OCS-A 0549 | Planning | 393 | 416 | 2,162 | 301 | 301 |
| NY/NJ | OW Ocean Winds East LLC, OCS-A 0537 | Planning | 24 | 335.8 | 1,205 | 162 | 0 |
| NY/NJ | Attentive Energy LLC, OCS-A 0538 | Planning | 24 | 335.8 | 1,499 | 201 | 0 |
| NY/NJ | Bight Wind Holdings, LLC, OCS-A 0539 | Planning | 24 | 335.8 | 2,175 | 292 | 0 |
| NY/NJ | Atlantic Shores Offshore Wind Bight, OCS-A 0541 | Planning | 24 | 335.8 | 1,396 | 187 | 0 |
| NY/NJ | Invenergy Wind Offshore LLC, OCS-A 0542 | Planning | 24 | 335.8 | 1,455 | 195 | 0 |
| NY/NJ | Vineyard Mid-Atlantic LLC, OCS-A 0544 | Planning | 24 | 335.8 | 1,529 | 205 | 0 |
| | Total NY/NJ Leases | | 883 | 3,902 | 19,033 | 2,552 | 603 |
| DE/MD | Skipjack, part of OCS-A 0519 | COP | 5 | 67.2 | 250 | 33 | 0 |
| DE/MD | US Wind, part of OCS-A 0490 | COP | 17 | 243.5 | 1,837 | 246 | 0 |
| DE/MD | GSOE I, OCS-A 0482 | Planning | 4.8 | 335.8 | 14,10.9 | 189.2 | 0 |
| DE/MD | OCS-A 0519 remainder | Planning | | | | | |
| | Total DE/MD Leases | | 27 | 647 | 3,498 | 469 | 0 |
| South Atlantic | CVOW, OCS-A 0497 | Built | 3 | 0.6 | 5 | 3 | 0 |
| South Atlantic | CVOW-C, OCS-A 0483 | COP | | 9.9 | 14,819 | 38 | 0 |
| South Atlantic | Kitty Hawk Wind North, OCS-A 0508 | COP | 32 | 2 | 5,931 | 14 | 0 |
| South Atlantic | Kitty Hawk Wind South, OCS-A 0508 remainder | COP | 49 | 9 | 7,957 | 19 | 0 |
| South Atlantic | TotalEnergies Renewables Wind, LLC OCS-A 0545 | Planning | 24 | 4.7 | 4,631 | 12 | 0 |
| South Atlantic | Duke Energy Renewables Wind, LLC OCS-A 0546 | Planning | 24 | 4.7 | 4,631 | 12 | 0 |
| | Total South Atlantic Leases | | 132 | 31 | 37,974 | 98 | 0 |
| | OCS Total: | | 1,632 | 8,439 | 72,082 | 4,269 | 1,274 |

**Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of March 17, 2023) (part 6)**

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Total of Coolant fluids in WTGs (gallons)[29] | Total Coolant fluids in ESP/OSS (gallons)[30] | Total of Oils and Lubricants in WTGs (gallons)[31] | Total Oils and Lubricants in ESP/OSS (gallons)[32] | Total Diesel Fuel in WTGs (gallons)[33] | Total Diesel Fuel in ESP/OSS (gallons)[34] |
|---|---|---|---|---|---|---|---|---|
| | | | Water | Water | Air and Water | Air and Water | Air and Water | Air and Water |
| NE | NE Aquaventis | State Project | N/A | N/A | N/A | N/A | N/A | N/A |
| NE | Block Island | State Project, Built | N/A | N/A | N/A | N/A | N/A | N/A |
| | Total State Waters Leases | | N/A | N/A | N/A | N/A | N/A | N/A |
| MA/RI | Vineyard Wind 1 part of OCS-A 0501 | COP, ROD | 42,300 | 46 | 383,000 | 123,559 | 79,300 | 5,696 |
| MA/RI | South Fork, OCS-A 0517 | COP, ROD | 41,208 | 27 | 69,732 | 80,045 | 9,516 | 52,834 |
| MA/RI | Revolution Wind, OCS # | COP | 343,400 | 0 | 330,300 | 159,138 | 79,300 | 105,668 |
| MA/RI | Sunrise, OCS-A 0487 | COP | 322,796 | 13,208 | 208,680 | 109,570 | 0 | 24,304 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind]) | COP | 314,464 | 4,228 | 498,604 | 263,650 | 98,272 | 10,936 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind]) | COP | 314,464 | 9,510 | 839,608 | 533,333 | 162,712 | 24,606 |
| MA/RI | South Coast Wind, OCS-A 0521 | COP | 530,024 | 8,033 | 433,650 | 755,000 | 132,300 | 200,000 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 1) | COP | 81,968 | 13,208 | 415,386 | 86,001 | 74,542 | 35,663 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 2) | COP | 81,968 | 13,208 | 415,386 | 86,001 | 74,542 | 35,663 |
| MA/RI | Vineyard Northeast Wind (OCS-A 0522) | Planning | 1,268,000 | 14,792 | 1,056,640 | 947,016 | 0 | 79,736 |
| MA/RI | Bay State Wind, part of OCS-A 0500 | Planning | 322,796 | 50 | 310,200 | 160,000 | 75,200 | 105,668 |
| MA/RI | OCS-A 0500 remainder | Planning | 421,999 | 12,049 | 571,497 | 521,576 | 90,506 | 107,491 |
| MA/RI | OCS-A 0487 remainder | Planning | | | | | | |
| | Total MA/RI Leases | | 4,085,387 | 88,358 | 5,532,683 | 3,824,889 | 876,190 | 788,265 |
| NY/NJ | Ocean Wind 1, part of OCS-A 0498 | COP | 39,690 | 4,488 | 187,964 | 238,707 | 77,714 | 158,502 |
| NY/NJ | Empire Wind 1, part of OCS-A 0512 | COP | 49,704 | 0 | 236,037 | 158,503 | 0 | 7,925 |
| NY/NJ | Empire Wind 2, part of OCS-A 512 | COP | 78,480 | 0 | 372,690 | 158,503 | 0 | 7,925 |
| NY/NJ | Atlantic Shores South OCS-A 0499 | COP | 820,000 | 10,300 | 606,200 | 370,050 | 80,000 | 75,000 |
| NY/NJ | Ocean Wind 2, part of OCS-A 0532 | Planning | 330,561 | 2,992 | 391,774 | 185,452 | 44,677 | 5,225 |
| NY/NJ | Atlantic Shores North, OCS-A 0549 | Planning | 643,700 | 9,150 | 530,817 | 557,850 | 62,800 | 557,850 |
| NY/NJ | OW Ocean Winds East LLC, OCS-A 0537 | Planning | 242,613 | 2,992 | 287,540 | 185,452 | 32,790 | 100,900 |
| NY/NJ | Attentive Energy LLC, OCS-A 0538 | Planning | 303,267 | 2,992 | 359,425 | 185,452 | 40,988 | 100,900 |
| NY/NJ | Bight Wind Holdings, LLC, OCS-A 0539 | Planning | 439,736 | 4,488 | 521,167 | 278,177 | 59,432 | 151,350 |
| NY/NJ | Atlantic Shores Offshore Wind Bight, OCS-A 0541 | Planning | 282,038 | 2,992 | 334,266 | 185,452 | 38,119 | 100,900 |
| NY/NJ | Invenergy Wind Offshore LLC, OCS-A 0542 | Planning | 294,169 | 2,992 | 348,643 | 185,452 | 39,758 | 100,900 |
| NY/NJ | Vineyard Mid-Atlantic LLC, OCS-A 0544 | Planning | 309,332 | 2,992 | 366,614 | 185,452 | 41,807 | 100,900 |
| | Total NY/NJ Leases | | 3,833,289 | 46,381 | 4,543,136 | 2,874,500 | 518,085 | 1,468,278 |
| DE/MD | Skipjack, part of OCS-A 0519 | COP | 48,523 | 1,496 | 57,508 | 92,726 | 6,558 | 50,450 |
| DE/MD | US Wind, part of OCS-A 0490 | COP | 366,953 | 5,985 | 434,905 | 370,903 | 49,595 | 201,801 |
| DE/MD | GSOE I, OCS-A 0482 | Planning | 285,071 | 2,992.3 | 337,859.8 | 185,451.6 | 38,528.5 | 100,900.3 |
| DE/MD | OCS-A 0519 remainder | Planning | | | | | | |

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Total of Coolant fluids in WTGs (gallons)[29] | Total Coolant fluids in ESP/OSS (gallons)[30] | Total of Oils and Lubricants in WTGs (gallons)[31] | Total Oils and Lubricants in ESP/OSS (gallons)[32] | Total Diesel Fuel in WTGs (gallons)[33] | Total Diesel Fuel in ESP/OSS (gallons)[34] |
|---|---|---|---|---|---|---|---|---|
| | | | Water | Water | Air and Water | Air and Water | Air and Water | Air and Water |
| | Total DE/MD Leases | | 700,546 | 10,473 | 830,272 | 649,081 | 94,682 | 353,151 |
| South Atlantic | CVOW, OCS-A 0497 | Built | 846 | 0 | 7,660 | 0 | 1,586 | 0 |
| South Atlantic | CVOW-C, OCS-A 0483 | COP | 855,670 | 0 | 437,060 | 258,300 | 0 | 20,409 |
| South Atlantic | Kitty Hawk Wind North, OCS-A 0508 | COP | 29,165 | 46 | 229,800 | 61,780 | 47,580 | 2,848 |
| South Atlantic | Kitty Hawk Wind South, OCS-A 0508 remainder | COP | 51,144 | 93 | 447,507 | 247,117 | 95,894 | 11,396 |
| South Atlantic | TotalEnergies Renewables Wind, LLC OCS-A 0545 | Planning | 151,025 | 23 | 180,881 | 94,533 | 23,385 | 5,776 |
| South Atlantic | Duke Energy Renewables Wind, LLC OCS-A 0546 | Planning | 151,025 | 23 | 180,601 | 94,533 | 23,385 | 5,776 |
| | Total South Atlantic Leases | | 1,238,874 | 185 | 1,483,509 | 756,262 | 191,830 | 46,204 |
| | OCS Total: | | 9,858,096 | 145,398 | 12,389,600 | 8,104,732 | 1,680,786 | 2,655,898 |

**Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of March 17, 2023) (part 7)**

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Construction Emissions NOx (tons)[35] | Construction Emissions VOC (tons)[36] | Construction Emissions CO (tons)[37] | Construction Emissions $PM_{10}$ (tons)[38] | Construction Emissions $PM_{2.5}$ (tons)[39] | Construction Emissions $SO_2$ (tons)[40] | Construction Emissions $CO_2e$ (tons)[41] | Operation Emissions NOx (tpy)[42] | Operation Emissions VOC (tpy)[43] | Operation Emissions CO (tpy)[44] | Operation Emissions PM10 (tpy)[45] | Operation Emissions PM2.5 (tpy)[46] | Operation Emissions SO2 (tpy)[47] | Operation Emissions $CO_2e$ (tpy)[48] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air |
| NE | NE Aquaventis | State Project | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| NE | Block Island | State Project, Built | 586.0 | 25.7 | 101.2 | 37.2 | N/A | 0.4 | 42,940.0 | 21.4 | 0.8 | 2.8 | 1.4 | N/A | 0.0 | 1,572.0 |
| | Total State Waters Leases | | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| MA/RI | Vineyard Wind 1 part of OCS-A 0501 | COP, ROD | 4,961 | 122 | 1,116 | 172 | 125 | 38 | 250,920 | 71.0 | 2.0 | 18.0 | 12.3 | 12.0 | 0.9 | 342,121 |
| MA/RI | South Fork, OCS-A 0517 | COP, ROD | 521.5 | 11.7 | 80.7 | 17.5 | 16.9 | 3.6 | 97,026 | 92.9 | 1.9 | 17.3 | 3 | 2.8 | 0.5 | 18,894 |
| MA/RI | Revolution Wind, OCS # | COP | 22,395.4 | 80.6 | 5,468.3 | 757.7 | 732.1 | 69.3 | 1,702,429 | 322.6 | 12.4 | 93.3 | 12.3 | 12 | 0.9 | 73,349 |
| MA/RI | Sunrise, OCS-A 0487 | COP | 2,092.80 | 49.1 | 869.4 | 38.6 | 38.6 | 2.1 | 230,504 | 183.8 | 4.3 | 76.3 | 3.4 | 3.4 | 0.2 | 20,242 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind]) | COP | 5,917 | 124 | 1,406 | 238 | 230 | 41 | 393,627.00 | 178 | 3.2 | 45 | 6 | 5.8 | 0.5 | 20,259 |
| MA/RI | New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind]) | COP | 7,732 | 164 | 1,841 | 339 | 329 | 54 | 520,958.00 | 179 | 3.2 | 45 | 6 | 5.8 | 0.5 | 27,594 |
| MA/RI | South Coast Wind, OCS-A 0521 | COP | 39,965 | 1,590 | 8,284 | 2,897 | 1,566 | 1,556 | 2,633,405 | 729 | 13 | 180 | 24 | 19 | 28 | 48,898 |

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Construction Emissions NOx (tons)[35] | Construction Emissions VOC (tons)[36] | Construction Emissions CO (tons)[37] | Construction Emissions $PM_{10}$ (tons)[38] | Construction Emissions $PM_{2.5}$ (tons)[39] | Construction Emissions $SO_2$ (tons)[40] | Construction Emissions $CO_2e$ (tons)[41] | Operation Emissions NOx (tpy)[42] | Operation Emissions VOC (tpy)[43] | Operation Emissions CO (tpy)[44] | Operation Emissions PM10 (tpy)[45] | Operation Emissions PM2.5 (tpy)[46] | Operation Emissions SO2 (tpy)[47] | Operation Emissions $CO_2e$ (tpy)[48] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 1) | COP | 8,838.6 | 364.8 | 878.8 | 145.2 | 134.9 | 253.8 | 506,326.2 | 62.2 | 2.5 | 11.8 | 1.7 | 1.6 | 2.5 | 16,034.4 |
| MA/RI | Beacon Wind, part of OCS-A 0520 (Phase 2) | COP | 8,838.6 | 364.8 | 878.8 | 145.2 | 134.9 | 253.8 | 506,326.2 | 62.2 | 2.5 | 11.8 | 1.7 | 1.6 | 2.5 | 16,034.4 |
| MA/RI | Vineyard Northeast Wind (OCS-A 0522) | Planning | 17,298 | 390 | 4,087 | 635 | 613 | 133.1 | 1,246,612 | 773 | 14 | 196 | 26 | 25 | 2.6 | 86,780 |
| MA/RI | Bay State Wind, part of OCS-A 0500 | Planning | 12,304.3 | 148.8 | 2,936.9 | 451.6 | 74.52 | 61.01 | 304,762 | 249.9 | 6.7 | 64.8 | 11.7 | 11.4 | 1.0 | 21,252 |
| MA/RI | OCS-A 0500 remainder | Planning | 15,222.7 | 396.6 | 3,239.3 | 679.0 | 464.7 | 286.8 | 976,299.7 | 337.8 | 7.6 | 88.3 | 12.6 | 11.7 | 4.7 | 80,433.5 |
| MA/RI | OCS-A 0487 remainder | Planning | | | | | | | | | | | | | | |
| | Total MA/RI Leases | | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| NY/NJ | Ocean Wind 1, part of OCS-A 0498 | COP | 11,173.00 | 293.90 | 2,156.00 | 365.60 | 349.50 | 115.30 | 665,960.00 | 159.00 | 4.10 | 40.00 | 5.60 | 5.40 | 0.90 | 11,912.00 |
| NY/NJ | Empire Wind 1, part of OCS-A 0512 | COP | 2,895.6 | 71.3 | 641.3 | 95.7 | 94.6 | 21.5 | 186,824.6 | 167.9 | 3.1 | 39.6 | 5.5 | 5.3 | 0.5 | 11,263.7 |
| NY/NJ | Empire Wind 2, part of OCS-A 512 | COP | 4,572.0 | 112.6 | 1,012.6 | 151.2 | 149.4 | 34.0 | 294,986.2 | 265.1 | 4.8 | 62.5 | 8.7 | 8.3 | 0.7 | 17,784.8 |
| NY/NJ | Atlantic Shores South OCS-A 0499 | COP | 2,089 | 40 | 503 | 70 | 86 | 7 | 139,357 | 519 | 9 | 121 | 17 | 16 | 1 | 33,566 |
| NY/NJ | Ocean Wind 2, part of OCS-A 0532 | Planning | 5,638.8 | 138.8 | 1,248.9 | 186.4 | 184.3 | 41.9 | 363,816.3 | 327.0 | 6.0 | 77.1 | 10.7 | 10.3 | 0.9 | 21,934.6 |
| NY/NJ | Atlantic Shores North, OCS-A 0549 | Planning | 7,413.6 | 175.2 | 1,920.4 | 248.0 | 240.2 | 31.3 | 528,676.1 | 521.1 | 8.7 | 121.7 | 16.7 | 16.2 | 1.4 | 34,948.7 |
| NY/NJ | OW Ocean Winds East LLC, OCS-A 0537 | Planning | 4,165.6 | 102.6 | 922.6 | 137.7 | 136.1 | 30.9 | 268,765.2 | 241.6 | 4.4 | 57.0 | 7.9 | 7.6 | 0.7 | 16,203.9 |
| NY/NJ | Attentive Energy LLC, OCS-A 0538 | Planning | 5,181.6 | 127.6 | 1,147.7 | 171.3 | 169.3 | 38.5 | 334,317.7 | 300.5 | 5.5 | 70.8 | 9.8 | 9.4 | 0.8 | 20,156.1 |
| NY/NJ | Bight Wind Holdings, LLC, OCS-A 0539 | Planning | 7,518.4 | 185.1 | 1,665.2 | 248.6 | 245.7 | 55.9 | 485,088.4 | 436.0 | 7.9 | 102.8 | 14.3 | 13.7 | 1.2 | 29,246.1 |
| NY/NJ | Atlantic Shores Offshore Wind Bight, OCS-A 0541 | Planning | 4,826.0 | 118.8 | 1,068.9 | 159.6 | 157.7 | 35.9 | 311,374.3 | 279.9 | 5.1 | 66.0 | 9.2 | 8.8 | 0.8 | 18,772.8 |
| NY/NJ | Invenergy Wind Offshore LLC, OCS-A 0542 | Planning | 5,029.2 | 123.8 | 1,113.9 | 166.3 | 164.4 | 37.4 | 324,484.8 | 291.7 | 5.3 | 68.8 | 9.6 | 9.1 | 0.8 | 19,563.3 |
| NY/NJ | Vineyard Mid-Atlantic LLC, OCS-A 0544 | Planning | 5,283.2 | 130.1 | 1,170.2 | 174.7 | 172.7 | 39.2 | 340,872.9 | 306.4 | 5.6 | 72.2 | 10.0 | 9.6 | 0.8 | 20,551.3 |
| | Total NY/NJ Leases | | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| DE/MD | Skipjack, part of OCS-A 0519 | COP | 863.6 | 21.3 | 191.3 | 28.6 | 28.2 | 6.4 | 55,719.6 | 50.1 | 0.9 | 11.8 | 1.6 | 1.6 | 0.1 | 3,359.3 |

| Region[1] | Lease/Project/ Lease Remainder[2] | Status[3] | Construction Emissions NOx (tons)[35] | Construction Emissions VOC (tons)[36] | Construction Emissions CO (tons)[37] | Construction Emissions $PM_{10}$ (tons)[38] | Construction Emissions $PM_{2.5}$ (tons)[39] | Construction Emissions $SO_2$ (tons)[40] | Construction Emissions $CO_2e$ (tons)[41] | Operation Emissions NOx (tpy)[42] | Operation Emissions VOC (tpy)[43] | Operation Emissions CO (tpy)[44] | Operation Emissions PM10 (tpy)[45] | Operation Emissions PM2.5 (tpy)[46] | Operation Emissions SO2 (tpy)[47] | Operation Emissions $CO_2e$ (tpy)[48] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air | Air |
| DE/MD | US Wind, part of OCS-A 0490 | COP | 6,350.0 | 156.4 | 1,406.4 | 210.0 | 207.5 | 47.2 | 409,703.0 | 368.3 | 6.7 | 86.8 | 12.1 | 11.5 | 1.0 | 24,701.1 |
| DE/MD | GSOE I, OCS-A 0482 | Planning | 4,876.8 | 120.1 | 1,080.2 | 161.2 | 159.4 | 36.2 | 314,651.9 | 282.8 | 5.1 | 66.7 | 9.3 | 8.9 | 0.8 | 18,970.4 |
| DE/MD | OCS-A 0519 remainder | Planning | | | | | | | | | | | | | | |
| | Total DE/MD Leases | | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| South Atlantic | CVOW, OCS-A 0497 | Built | 193.2 | 8.5 | 48.2 | 6.2 | 6.0 | 3.9 | 12,069.1 | 7.4 | 0.4 | 3.4 | 0.3 | 0.3 | 0.1 | 681.0 |
| South Atlantic | CVOW-C, OCS-A 0483 | COP | 20,093.0 | 883.8 | 5,008.3 | 641.3 | 622.1 | 409.1 | 1,255,186.2 | 773.6 | 43.1 | 352.6 | 35.4 | 34.4 | 12.5 | 70,819.2 |
| South Atlantic | Kitty Hawk Wind North, OCS-A 0508 | COP | 7,950.5 | 359.7 | 1,681.9 | 222.9 | 216.2 | 200.8 | 499,886.0 | 287.2 | 16.9 | 148.5 | 14.6 | 14.2 | 4.2 | 28,209.0 |
| South Atlantic | Kitty Hawk Wind South, OCS-A 0508 remainder | COP | 10,693.5 | 460.4 | 2,965.2 | 372.2 | 361.0 | 178.8 | 664,782.0 | 430.6 | 23.1 | 178.6 | 18.3 | 17.7 | 7.3 | 37,503.0 |
| South Atlantic | TotalEnergies Renewables Wind, LLC OCS-A 0545 | Planning | 6,279.0 | 276.2 | 1,565.1 | 200.4 | 194.4 | 127.8 | 392,245.7 | 241.8 | 13.5 | 110.2 | 11.1 | 10.7 | 3.9 | 22,131.0 |
| South Atlantic | Duke Energy Renewables Wind, LLC OCS-A 0546 | Planning | 6,279.0 | 276.2 | 1,565.1 | 200.4 | 194.4 | 127.8 | 392,245.7 | 241.8 | 13.5 | 110.2 | 11.1 | 10.7 | 3.9 | 22,131.0 |
| | Total South Atlantic Leases | | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | OCS Total: | | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

BOEM recognizes that the estimates presented within this cumulative analysis are likely high, conservative estimates; however, BOEM believes that this analysis is appropriately capturing the potential cumulative impacts and errs on the side of maximum impacts. Totals by lease area and by OCS may not fully sum due to rounding errors.

Unless otherwise noted, assumptions below are based on what has been most commonly submitted via previous and current COPs. These may require updates.

[1] Categorizes each project by its geographic area and separates United States offshore wind projects into the following regions to allow for a holistic look at projects in close proximity to others:

i. NE: Northeast State Waters leases that do not align to state projects (include a single strand of WTGs and no OSSs)
ii. MA/RI: Leases from Massachusetts and Rhode Island (a 1x1–nm grid spacing is assumed if not included in COP)
iii. NY/NJ: Leases from New York and New Jersey (a 1x1–nm grid spacing is assumed if not included in COP)
iv. DE/MD: Leases from Delaware and Maryland (a 1x1–nm grid spacing is assumed if not included in COP)
v. South Atlantic: Leases from Virginia and North Carolina (a 1x1–nm grid spacing is assumed if not included in COP)

[2] Provides the name and, if applicable, part of a project, including the project's OCS number.

[3] Provides the status of the project, and should be classified as a State Project, COP, Record of Decision (ROD), and/or Built; otherwise the project should be labeled as Planning.

[4] These 8 columns are used as a template for the EIS. Project NEPA Coordinators pull these headers for their project to fill in a project-specific table of resources with checkmarks in the EIS they are drafting. These columns identify lease areas that are applicable to each resource based on the geographic analysis areas shown in the EIS.

[5] This column estimates the construction time period as a range for each project as provided in the COP. This estimate is for offshore components only.
If there is no COP, the estimated dates are based on information as of February 1, 2022, and are subject to change when an applicant submits a COP or as project COPs progress through the approval process. Furthermore, BOEM assumes that construction of all the foundations would be installed during year 1 of a given project's construction schedule with the remaining work completed in year 2. If there is no other information, assume the estimated offshore construction time period is "By 2030".

[6] Compare the dimensions of the turbine provided in the COP (if available) with known turbine capacities to determine the estimated capacity of the turbine to be installed. If the information is provided in the COP, use that.
Otherwise, use the best available public facing information in order to estimate the expected turbine size. For those projects without announced WTG sizes, use the known dimensions of turbines of the same capacity as the prototype capacity, rounded to the nearest even number, for the current year in DOE's most recent Offshore Wind Market Report (for 2022, https://www.energy.gov/eere/wind/articles/offshore-wind-market-report-2022-edition). NOTE: A different set of assumptions may be necessary for floating offshore wind, and this should be considered once floating COPs are being received.

[7] This column showcases the top of the envelope estimate based on the COP. This information will be updated to whatever is the most up to date publicly available data at the time. Often, the final generating capacity in the EIS is much more conservative.
If not included in the COP, use the formula below:
Generating Capacity = Turbine Number (Column Z) * Expected Turbine Size (Column N MW)
*Note: If you are including a range in this cell for your project, be sure to update the subregion and overall OCS total numbers by adding in the larger value of your range.

[8] Often times, COPs provide the total export cable length. If not, ask for this data from the developer. However, the COP typically reports in nautical miles, so this must be converted into statute miles. If the COP provides the export cable length rather than the export cable corridor length, you may skip Columns Q, R, and S.
Statute miles = nautical miles * (1.1508 SM/NM)
If the value is provided to you as a range, use the higher value.

[9] Often times, COPs provide the corridor length, rather than the total export cable length. However, the COP typically reports in nautical miles, so this must be converted into statute miles.
Statute miles = nautical miles * 1.15 (1.15 Statute Mile = 1 Nautical Mile)

[10] This number should come from the COP if the corridor length is provided but may have to be interpreted as COPs typically provide a description such as "up to x number of cables". In these cases, use the max case for the number of export cables.
If this information is not available, proceed to Column S to estimate the total export cable length.

[11] When the export cable length is not provided in the COP, estimate this value by using the following formula:
ESTIMATED Total Export Cable Length = [export cable corridor length (Column Q miles)] * [number of export cables (Column R)]

If neither the export cable length nor the export cable corridor length are included in the COP, assume that each offshore wind development has its own cable (both onshore and offshore) and that future projects would not utilize a regional transmission line. The length of offshore export cable for those lease areas without a known project size has been assumed to total 200 statute miles for fixed foundation development. When using the assumed 200 mile value, Column Q and Column R will be left blank (this is denoted in the main tab by a -).

[12] This number should come from the COP. If it does, ensure the value is converted to acres. If not, use the formula below to estimate:
Cable Footprint = [[COP Export Cable Length (Column P miles) OR ESTIMATED Export Cable Length (Column S miles)] * (5,280 ft/mile) * 1 ft]/(43,560 sqft/acre)
Note: If the COP provides the export cable length (Column P), use that in the equation above, otherwise use the estimated export cable length value from Column S.
The 1 ft value is the typical cable diameter provided from previously submitted COPs. Use this value unless the COP reports a different value.

[13] This number should come from the COP. If not, ask for this data from the developer.
If not available, assume the disturbance width is 6.5 feet based on COPs submitted to date. This column represents an important number for calculating the area of benthic disturbance from construction.

[14] This number should come from the COP. If not, ask for this data from the developer. If not available, use the following estimated formula:
inter-array cable length = turbine # (Column Z) * 1.48 miles
The 1.48 miles factor is based on COPs submitted to date (2.4 kilometers).

[15] This number should come from the COP. If not, ask for this data from the developer.
Otherwise, use the best available public facing information. For those projects without announced WTG dimensions, use the known dimensions of turbines of the same capacity as the prototype capacity, rounded to the nearest even number, for the current year in DOE's most recent Offshore Wind Market Report (for 2022, https://www.energy.gov/eere/wind/articles/offshore-wind-market-report-2022-edition). The report lists values in meters, ensure these values are converted to feet. NOTE: A different set of assumptions may be necessary for floating offshore wind, and this should be considered once floating COPs are being received.

[16] This number should come from the COP.
Otherwise, use the best available public facing information. For those projects without announced WTG dimensions, use the known dimensions of turbines of the same capacity as the prototype capacity, rounded to the nearest even number, for the current year in DOE's most recent Offshore Wind Market Report (for 2022, https://www.energy.gov/eere/wind/articles/offshore-wind-market-report-2022-edition). The report lists values in meters, ensure these values are converted to feet. NOTE: A different set of assumptions may be necessary for floating offshore wind, and this should be considered once floating COPs are being received.

[17] This number should come from the COP. If not, use the following assumption:
total heigh of turbine = rotor diameter (Column X feet) + 100 feet OR 853 feet, whichever is higher
The 100 ft value is the assumption for an air gap. 853 ft comes from a turbine model already available that has been used in visual simulations but has a larger air gap (Haliade X-12).

[18] This number should come from the COP. If not, ask for this data from the developer. If not available, BOEM staff will assume this data based on best available information.
*Note: If you are including a range in this cell for your project, be sure to update the subregion and overall OCS total numbers by adding in the larger value of your range.

[19] This number should come from the COP. If not, assume that for every 50 turbines there would be one ESP/OSS installed.

[20] This number should come from the COP. If not, ask for this data from the developer. If not available, use the following estimated formula:
foundation # = turbine # (Column Z) + ESP/OSS # (Column AA)
*Note: If you are including a range in this cell for your project, be sure to update the subregion and overall OCS total numbers by adding in the larger value of your range.

[21] This number should come from the COP and is typically included as the diameter of a monopile. However, there are variances to how the developer presents this information in a COP. Additionally, COPs sometimes include a formula to derive this information. If so, use said formula. If this information is not included in a COP, use the following formula to estimate:
foundation footprint = 0.26 acres * foundation # (Column AB)
Assumption of 0.26 acres is based on monopile size used in Ocean Wind and other projects with 12-14 MW turbines, subtracting scour footprint from total location footprint.
*Note: If you are including a range in this cell for your project, be sure to update the subregion and overall OCS total numbers by adding in the larger value of your range.

[22] This number should come from the COP. If the COP provides a range, include only the highest value. If not, use the following formula to estimate:
Seabed Disturbance + Scour = [1 acre * foundation # (Column AB)] + foundation footprint (Column AC acres)
The "1" is based off of a previously submitted COPs with a scour protection of 1 acre
*Note: If you are including a range in this cell for your project, be sure to update the subregion and overall OCS total numbers by adding in the larger value of your range.

[23] This number should come from the COP. If so, ensure it is converted to acres. If not, use the following formula to estimate:
Seabed Disturbance = [[COP Export Cable Length (Column P miles) OR ESTIMATED Export Cable Length (Column S miles)] * 5,280 ft/mile * installation tool disturbance width (Column U ft)]/(43,560 sqft/acre)
Note: If the COP provides the export cable length (Column P), use that in the equation above. Otherwise, use the estimated export cable length value from Column S.
Offshore export cable seabed bottom disturbance is assumed to be due to installation of the export cable, the use of jack-up vessels, the need to perform dredging, and boulder removal.

[24] This number should come from the COP. If so, ensure it is converted to acres. If not, use the following formula to estimate:
Offshore Export Cable Hard Protection = [[COP Export Cable Length (Column P miles) OR ESTIMATED Export Cable Length (Column S miles)] * 5,280 ft/mile * 0.10 * 9.8 ft]/(43,560 sqft/acre)
Note: If the COP provides the export cable length (Column P), use that in the equation above. Otherwise, use the estimated export cable length value from Column S.
This equation uses the 9.8 ft as the width of a concrete mattress used in previously submitted COPs and multiplies by 10% based on the assumption built in to previously submitted COPs on how much of the cable route will require hard protection/mattressing/armoring.

[25] This number should come from the COP. If so, ensure it is converted to acres. If not, use the following formula to estimate:
Anchoring Disturbance = [COP Export Cable Length (Column P miles) OR ESTIMATED Export Cable Length (Column S miles)] * (the corresponding subregion total COP anchoring disturbance per export cable length total)
Note: If the COP provides the export cable length (Column P), use that in the equation above. Otherwise, use the estimated export cable length value from Column S.
To provide an assumption for non-COPs, please calculate the total anchoring disturbance values for COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total export cable length associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the anchoring disturbance value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AG white color coded cells)/(SUM Corresponding Column P white color coded cells)] * (new project Column S or P)

[26] The length of expected inter-array cables should come from the COP. If so, ensure it is converted to acres. If not, use the following formula to estimate:
Inter-array construction seabed disruption = foundation # (Column AB) * (the corresponding subregion total COP inter-array construction seabed disruption per foundation total)
To provide an assumption for non-COPs, please calculate the total inter-array construction seabed disruption values for COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the construction seabed disruption value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AH white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[27] This number should come from the COP. If so, ensure it is converted to acres. If not, use the following formula to estimate:
inter-array operating seabed disruption = foundation # (Column AB) * (the corresponding subregion total COP inter-array operating seabed disruption per foundation total)
To provide an assumption for non-COPs, please calculate the total inter-array operating seabed disruption values for COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the operating seabed disruption value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AI white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[28] This number should be come from the COP. If not, this number is assumed to be zero.

[29] This column is not applicable to State Waters projects.
From the COP: Total of Coolant Fluids in WTGs = [sum of all coolants provided in the COP (any material used as a coolant, not including water)] * [turbine # (Column Z)]
To provide an assumption for non-COPs, please calculate the total coolant fluids in WTGs for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total coolant fluids in WTGs value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AK white color coded cells)/(SUM Corresponding Column Z white color coded cells)] * (new project Column Z)

[30] This column is not applicable to State Waters projects.
From the COP: Total of Coolant Fluids in ESP/OSS = [sum of all coolants provided in the COP (any material used as a coolant, not including water)] * [ESP/OSS # (Column AA)]
To provide an assumption for non-COPs, please calculate the total coolant fluids in ESP/OSSs for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total coolant fluids in ESP/OSSs value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AL white color coded cells)/(SUM Corresponding Column AA white color coded cells)] * (new project Column AA)

[31] This column is not applicable to State Waters projects.
From the COP: Total of Oils and Lubricants in WTGs = [sum of all oils and lubricants provided in the COP] * [turbine # (Column Z)]
To provide an assumption for non-COPs, please calculate the total oils and lubricants in WTGs for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total oils and lubricants in WTGs value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AM white color coded cells)/(SUM Corresponding Column Z white color coded cells)] * (new project Column Z)

[32] This column is not applicable to State Waters projects.
From the COP: Total of Oils and Lubricants in ESPs/OSSs = [sum of all oils and lubricants provided in the COP] * [ESP/OSS # (Column AA)]
To provide an assumption for non-COPs, please calculate the total oils and lubricants in ESP/OSSs for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total oils and lubricants in ESP/OSSs value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AN white color coded cells)/(SUM Corresponding Column AA white color coded cells)] * (new project Column AA)

[33] This column is not applicable to State Waters projects.
From the COP: Total of Diesel Fuel in WTGs = [sum of all diesel fuel provided in the COP] * [turbine # (Column Z)]
To provide an assumption for non-COPs, please calculate the total diesel fuel in WTGs for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total diesel fuel in WTGs value, calculate the following formula from the values currently within the MA/RI region.
[(SUM Column AO white color coded cells)/(SUM Corresponding Column Z white color coded cells)] * (new project Column Z)

[34] This column is not applicable to State Waters projects.
From the COP: Total of Diesel Fuel in ESPs/OSSs = [sum of all diesel fuel provided in the COP] * [ESP/OSS # (Column AA)]
To provide an assumption for non-COPs, please calculate the total diesel fuels in ESP/OSSs for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total diesel fuels in ESP/OSSs value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AP white color coded cells)/(SUM Corresponding Column AA white color coded cells)] * (new project Column AA)

[35] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Construction emissions are totals for all construction activities, which take place over multiple years.
To provide an assumption for non-COPs, please calculate the total construction emissions of Nox for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total construction emissions of Nox value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AQ white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[36] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Construction emissions are totals for all construction activities, which take place over multiple years.
To provide an assumption for non-COPs, please calculate the total construction emissions of VOC for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total construction emissions of VOC value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AR white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[37] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Construction emissions are totals for all construction activities, which take place over multiple years.
To provide an assumption for non-COPs, please calculate the total construction emissions of CO for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total construction emissions of CO value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AS white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[38] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Construction emissions are totals for all construction activities, which take place over multiple years.
To provide an assumption for non-COPs, please calculate the total construction emissions of PM10 for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total construction emissions of PM10 value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AT white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[39] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Construction emissions are totals for all construction activities, which take place over multiple years.
To provide an assumption for non-COPs, please calculate the total construction emissions of PM2.5 for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total construction emissions of PM2.5 value, calculate the following formula from the values currently within the MA/RI region.
[(SUM Column AU white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[40] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Construction emissions are totals for all construction activities, which take place over multiple years.
To provide an assumption for non-COPs, please calculate the total construction emissions of SO2 for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total construction emissions of SO2 value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AV white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[41] This number should come from the COP. If not, request from the developer. For COPs that report CO2 equivalent per pollutant, total all pollutant values.
To provide an assumption for non-COPs, please calculate the total construction emissions of CO2e for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total construction emissions of CO2e value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AW white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[42] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Operations emissions are the highest annual level if all years not expected to be equal.
To provide an assumption for non-COPs, please calculate the total operation emissions of Nox for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total operation emissions of Nox value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AX white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[43] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Operations emissions are the highest annual level if all years not expected to be equal.
To provide an assumption for non-COPs, please calculate the total operation emissions of VOC for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total operation emissions of VOC value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AY white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[44] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Operations emissions are the highest annual level if all years not expected to be equal.
To provide an assumption for non-COPs, please calculate the total operation emissions of CO for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total operation emissions of CO value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column AZ white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[45] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Operations emissions are the highest annual level if all years not expected to be equal.
To provide an assumption for non-COPs, please calculate the total operation emissions of PM10 for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total operation emissions of PM10 value, calculate the following formula from the values currently within the MA/RI region.
[(SUM Column BA white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[46] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Operations emissions are the highest annual level if all years not expected to be equal.
To provide an assumption for non-COPs, please calculate the total operation emissions of PM2.5 for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total operation emissions of PM2.5 value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column BB white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[47] This number should come from the COP, but may require a summation of numbers provided per chemical compound. If not in the COP, ask for this data from the developer. If not available, use the following assumption:
Operations emissions are the highest annual level if all years not expected to be equal.

To provide an assumption for non-COPs, please calculate the total operation emissions of $SO_2$ for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total operation emissions of $SO_2$ value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column BC white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

[48] This number should come from the COP. If not, request from the developer. For COPs that report $CO_2$ equivalent per pollutant, total all pollutant values.
To provide an assumption for non-COPs, please calculate the total operation emissions of $CO_2e$ for all COPs listed in the Scenario tab for a specific subregion and divide by the corresponding COP provided total foundations associated with that specific subregion. (Note: White color coded cells are values taken directly from a COP). For example, if your new project is within the MA/RI region but does not have a COP yet, or does not provide the total operation emissions of $CO_2e$ value, calculate using the following formula from the values currently within the MA/RI region.
[(SUM Column BD white color coded cells)/(SUM Corresponding Column AB white color coded cells)] * (new project Column AB)

# LITERATURE CITED

Bureau of Ocean Energy Management (BOEM). 2019. *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf*. Available at: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/IPFs-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-N-OCS.pdf. Accessed December 2020.

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# APPENDIX E4

## Maximum-Case Scenario Estimates for Select Offshore Wind Project Components

# Contents



# Tables

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# Introduction

The following table provides maximum-case scenario estimates of potential No Action, Proposed Action, and other action alternative impacts for specific offshore wind project components, assuming maximum buildout, using the geographic analysis areas in the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) project environmental impact statement (EIS) and cumulative estimates developed by Bureau of Ocean Energy Management BOEM (see Table E3-1 in Appendix E3). All numbers are estimates and subject to change.

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**Table E4-1. Maximum-Case Scenario Estimates of Potential Impacts for Specific Offshore Wind Project Components**

| Project Component | Geographic Analysis Area | OCS Total (without Proposed Action)* | Proposed Action | Alt C | Alt D | Alt E | Alt F | Alt G | Proposed Action + OCS Total (cumulative) | Alt C + OCS Total (cumulative) | Alt D + OCS Total (cumulative) | Alt E + OCS Total (cumulative) | Alt F + OCS Total (cumulative) | Alt G + OCS Total (cumulative) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Offshore export cable length (statute miles) | All | 7,702 | 84 | 84[Ŧ] | 84[Ŧ] | 84[Ŧ] | 84[Ŧ] | 84[Ŧ] | 7,786 | 7,786[Ŧ] | 7,786[Ŧ] | 7,786[Ŧ] | 7,786[Ŧ] | 7,786[Ŧ] |
| Inter-array cable and OSS-link cable length (statute miles)[†] | All | 5,767 | 164 | 164[Ŧ] | 164[Ŧ] | 164[Ŧ] | 164[Ŧ] | 126 | 5,931 | 5,931[Ŧ] | 5,931[Ŧ] | 5,931[Ŧ] | 5,931[Ŧ] | 5,893 |
| WTG number | Air | 299 | 100 | 64–65 | 78–93 | 64 or 81 | 56 | 65 | 399 | 363–364 | 377–392 | 363 or 380 | 355 | 364 |
| | Water | 178 | 100 | 64–65 | 78–93 | 64 or 81 | 56 | 65 | 278 | 242–243 | 256–271 | 242 or 259 | 234 | 243 |
| | Benthic/cultural resources (marine) | 12 | 100 | 64–65 | 78–93 | 64 or 81 | 56 | 65 | 112 | 76–77 | 90–105 | 76 or 93 | 68 | 77 |
| | Birds/bats/commercial fisheries/finfish-invertebrates-EFH/marine mammals/other marine uses (surveys)/sea turtles/land-use | 3,025 | 100 | 64–65 | 78–93 | 64 or 81 | 56 | 65 | 3,125 | 3,089–3,090 | 3,103–3,118 | 3,089 or 3,106 | 3,081 | 3,090 |
| | Navigation//other marine uses (excluding surveys) | 998 | 100 | 64–65 | 78–93 | 64 or 81 | 56 | 65 | 1,098 | 1,062–1,063 | 1,076–1,091 | 1,062 or 1079 | 1,054 | 1,063 |
| | Visual/recreation-tourism/cultural resources (viewshed) | 876 | 100 | 64–65 | 78–93 | 64 or 81 | 56 | 65 | 980 | 940–941 | 954–969 | 940 or 957 | 932 | 941 |
| | Demographics/environmental justice | 3,025 | 100 | 64–65 | 78–93 | 64 or 81 | 56 | 65 | 3,125 | 3,089–3,090 | 3103–3,118 | 3,089 or 3,106 | 3,081 | 3,090 |
| Foundation number (WTG and OSS)[‡] | Air | 306 | 102 | 66–67 | 80–95 | 66 or 83 | 58 | 67 | 408 | 372–373 | 386–401 | 372 or 389 | 364 | 373 |
| | Water | 181 | 102 | 66–67 | 80–95 | 66 or 83 | 58 | 67 | 283 | 247–248 | 261–276 | 247 or 264 | 239 | 248 |
| | Benthic/cultural resources (marine) | 13 | 102 | 66–67 | 80–95 | 66 or 83 | 58 | 67 | 115 | 79–80 | 93–108 | 79 or 96 | 71 | 80 |
| | Birds/bats/commercial fisheries/finfish-invertebrates-EFH/marine mammals/other marine uses (surveys)/sea turtles/land-use | 3,088 | 102 | 66–67 | 80–95 | 66 or 83 | 58 | 67 | 3,190 | 3,154–3,155 | 3,168–3,183 | 3,154 or 3,171 | 3,146 | 3,155 |
| | Navigation/other marine uses (excluding surveys) | 1,015 | 102 | 66–67 | 80–95 | 66 or 83 | 58 | 67 | 1,117 | 1081–1082 | 1095–1110 | 1081 or 1098 | 1,073 | 1,082 |
| | Visual/recreation-tourism/cultural resources (viewshed) | 893 | 102 | 66–67 | 80–95 | 66 or 83 | 58 | 67 | 995 | 959–960 | 973–988 | 959 or 976 | 951 | 960 |
| | Demographics/environmental justice | 3,088 | 102 | 66–67 | 80–95 | 66 or 83 | 58 | 67 | 3,190 | 3,154–3,155 | 3,168–3,183 | 3,154 or 3,171 | 3,146 | 3,155 |

| Project Component | Geographic Analysis Area | OCS Total (without Proposed Action)* | Proposed Action | Alt C | Alt D | Alt E | Alt F | Alt G | Proposed Action + OCS Total (cumulative) | Alt C + OCS Total (cumulative) | Alt D + OCS Total (cumulative) | Alt E + OCS Total (cumulative) | Alt F + OCS Total (cumulative) | Alt G + OCS Total (cumulative) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operation footprint of foundations (WTG and OSS)(acres)[§ ¶] | Air | 80 | 3 | 2 | 2–3 | 2 | 2 | 2 | 83 | 82 | 82–83 | 82 | 82 | 82 |
| | Water | 47 | 3 | 2 | 2–3 | 2 | 2 | 2 | 50 | 49 | 49–50 | 49 | 49 | 49 |
| | Benthic/cultural resources (marine) | 1 | 3 | 2 | 2–3 | 2 | 2 | 2 | 4 | 3 | 3–4 | 3 | 3 | 3 |
| | Birds/bats/commercial fisheries/finfish-invertebrates-EFH/marine mammals/other marine uses (surveys)/sea turtles/land-use | 564 | 3 | 2 | 2–3 | 2 | 2 | 2 | 567 | 566 | 566–567 | 566 | 566 | 566 |
| | Navigation/other marine uses (excluding surveys) | 264 | 3 | 2 | 2–3 | 2 | 2 | 2 | 267 | 266 | 266–267 | 266 | 266 | 266 |
| | Visual/recreation-tourism/cultural resources (viewshed) | 232 | 3 | 2 | 2–3 | 2 | 2 | 2 | 235 | 234 | 234–235 | 234 | 234 | 234 |
| | Demographics/environmental justice | 564 | 3 | 2 | 2–3 | 2 | 2 | 2 | 567 | 566 | 566–567 | 566 | 566 | 566 |
| Construction footprint of foundations (WTG and OSS) (acres) | Air | Not available | 3,172.2 | 2,065.8–2,097.1 | 2,504–2,973.5 | 2,065.8 or 2,597.9 | 1,815.4 | 2,097.1 | Not available | Not available | Not available | Not available | Not available | Not available |
| | Water | Not available | 3,172.2 | 2,065.8–2,097.1 | 2,504–2,973.5 | 2,065.8 or 2,597.9 | 1,815.4 | 2,097.1 | Not available | Not available | Not available | Not available | Not available | Not available |
| | Benthic/cultural resources (marine) | Not available | 3,172.2 | 2,065.8–2,097.1 | 2,504–2,973.5 | 2,065.8 or 2,597.9 | 1,815.4 | 2,097.1 | Not available | Not available | Not available | Not available | Not available | Not available |
| | Birds/bats/commercial fisheries/finfish-invertebrates-EFH/marine mammals/other marine uses (surveys)/sea turtles/land-use | Not available | 3,172.2 | 2,065.8–2,097.1 | 2,504–2,973.5 | 2,065.8 or 2,597.9 | 1,815.4 | 2,097.1 | Not available | Not available | Not available | Not available | Not available | Not available |
| | Navigation/other marine uses (excluding surveys) | Not available | 3,172.2 | 2,065.8–2,097.1 | 2,504–2,973.5 | 2,065.8 or 2,597.9 | 1,815.4 | 2,097.1 | Not available | Not available | Not available | Not available | Not available | Not available |
| | Visual/recreation-tourism/cultural resources (viewshed) | Not available | 3,172.2 | 2,065.8–2,097.1 | 2,504–2,973.5 | 2,065.8 or 2,597.9 | 1,815.4 | 2,097.1 | Not available | Not available | Not available | Not available | Not available | Not available |
| | Demographics/environmental justice | Not available | 3,172.2 | 2,065.8–2,097.1 | 2,504–2,973.5 | 2,065.8 or 2,597.9 | 1,815.4 | 2,097.1 | Not available | Not available | Not available | Not available | Not available | Not available |

| Project Component | Geographic Analysis Area | OCS Total (without Proposed Action)* | Proposed Action | Alt C | Alt D | Alt E | Alt F | Alt G | Proposed Action + OCS Total (cumulative) | Alt C + OCS Total (cumulative) | Alt D + OCS Total (cumulative) | Alt E + OCS Total (cumulative) | Alt F + OCS Total (cumulative) | Alt G + OCS Total (cumulative) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Seabed disturbance based on addition of scour protection (foundation + scour protection) (acres)[#] | Air | 386 | 71.4 | 46–47 | 56–67 | 46 or 58 | 41 | 47 | 457 | 432–433 | 442–453 | 432 or 444 | 427 | 433 |
| | Water | 228 | 71.4 | 46–47 | 56–67 | 46 or 58 | 41 | 47 | 299 | 274–275 | 284–295 | 274 or 286 | 269 | 275 |
| | Benthic/cultural resources (marine) | 11 | 71.4 | 46–47 | 56–67 | 46 or 58 | 41 | 47 | 82 | 57–58 | 67–78 | 57 or 69 | 52 | 58 |
| | Birds/bats/commercial fisheries/finfish-invertebrates-EFH/marine mammals/other marine uses (surveys)/sea turtles/land-use | 5,469 | 71.4 | 46–47 | 56–67 | 46 or 58 | 41 | 47 | 5,540.4 | 5,515–5,516 | 5,525–5,536 | 5,515 or 5,527 | 5,510 | 5,516 |
| | Navigation/other marine uses (excluding surveys) | 1,279 | 71.4 | 46–47 | 56–67 | 46 or 58 | 41 | 47 | 1,350 | 1,325–1,326 | 1,335–1,346 | 1,325 or 1,337 | 1,320 | 1,326 |
| | Visual/recreation-tourism/cultural resources (viewshed) | 1,125 | 71.4 | 46–47 | 56–67 | 46 or 58 | 41 | 47 | 1,197 | 1,171–1,172 | 1,181–1,192 | 1,171 or 1,183 | 1,166 | 1,172 |
| | Demographics/environmental justice | 5,469 | 71.4 | 46–47 | 56–67 | 46 or 58 | 41 | 47 | 5,540.4 | 5,515–5,516 | 5,525–5,536 | 5,515 or 5,527 | 5,510 | 5,516 |
| Offshore export cable construction seabed disturbance (acres)** | Water | 2,018 | 1,390 | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 3,408 | 3,408[Ŧ] | 3,408[Ŧ] | 3,408[Ŧ] | 3,408[Ŧ] | 3,408[Ŧ] |
| | Benthic/cultural resources (marine) | 555 | 1,390 | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,945 | 1,945[Ŧ] | 1,945[Ŧ] | 1,945[Ŧ] | 1,945[Ŧ] | 1,945[Ŧ] |
| | Birds/bats/commercial fisheries/finfish-invertebrates-EFH/marine mammals/other marine uses (surveys)/sea turtles/land-use | 32,377 | 1,390 | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 33,767 | 33,767[Ŧ] | 33,767[Ŧ] | 33,767[Ŧ] | 33,767[Ŧ] | 33,767[Ŧ] |
| | Navigation/other marine uses (excluding surveys) | 7,633 | 1,390 | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 9,023[Ŧ] | 9,023[Ŧ] | 9,023[Ŧ] | 9,023[Ŧ] | 9,023[Ŧ] | 9,023[Ŧ] |
| | Visual/recreation-tourism/cultural resources (viewshed) | 7,463 | 1,390 | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 8,853 | 8,853[Ŧ] | 8,853[Ŧ] | 8,853[Ŧ] | 8,853[Ŧ] | 8,853[Ŧ] |
| | Demographics/environmental justice | 32,377 | 1,390 | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 1,390[Ŧ] | 33,767 | 33,767[Ŧ] | 33,767[Ŧ] | 33,767[Ŧ] | 33,767[Ŧ] | 33,767[Ŧ] |

| Project Component | Geographic Analysis Area | OCS Total (without Proposed Action)* | Proposed Action | Alt C | Alt D | Alt E | Alt F | Alt G | Proposed Action + OCS Total (cumulative) | Alt C + OCS Total (cumulative) | Alt D + OCS Total (cumulative) | Alt E + OCS Total (cumulative) | Alt F + OCS Total (cumulative) | Alt G + OCS Total (cumulative) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Offshore export cable hard protection (acres)[††] | Water | 60 | 39.2 | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 99.2 | 99.2[Ŧ] [Ŧ] | 99.2[Ŧ] | 99.2[Ŧ] | 99.2[Ŧ] | 99.2[Ŧ] |
| | Benthic/cultural resources (marine) | 10 | 39.2 | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 49.2 | 49.2[Ŧ] | 49.2[Ŧ] | 49.2[Ŧ] | 49.2[Ŧ] | 49.2[Ŧ] |
| | Birds/bats/commercial fisheries/finfish-invertebrates-EFH/marine mammals/other marine uses (surveys)/sea turtles/land-use | 1,584 | 39.2 | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 1,623.2 | 1,623.2[Ŧ] | 1,623.2[Ŧ] | 1,623.2[Ŧ] | 1,623.2[Ŧ] | 1,623.2[Ŧ] |
| | Navigation/other marine uses (excluding surveys) | 543 | 39.2 | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 582.2 | 582.2[Ŧ] | 582.2[Ŧ] | 582.2[Ŧ] | 582.2[Ŧ] | 582.2[Ŧ] |
| | Visual/recreation-tourism/cultural resources (viewshed) | 519 | 39.2 | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 558.2 | 558.2[Ŧ] | 558.2[Ŧ] | 558.2[Ŧ] | 558.2[Ŧ] | 558.2[Ŧ] |
| | Demographics/environmental justice | 1,584 | 39.2 | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 39.2[Ŧ] | 1,623.2 | 1,623.2[Ŧ] | 1,623.2[Ŧ] | 1,623.2[Ŧ] | 1,623.2[Ŧ] | 1,623.2[Ŧ] |
| Anchoring disturbance (acres) | Water | 1,862 | 3,204 | 2,066–2,098 | 2,510–2,985 | 2,066 or 2,605 | 1,812 | 2,098 | 5,066 | 3,928–3,960 | 4,372–4,847 | 3,928 or 4,467 | 3,674 | 3,960 |
| | Benthic/cultural resources (marine) | 821 | 3,204 | 2,066–2,098 | 2,510–2,985 | 2,066 or 2,605 | 1,812 | 2,098 | 4,025 | 2,887–2,919 | 3,331–3,806 | 2,887 or 3,426 | 2,633 | 2,919 |
| | Birds/bats/commercial fisheries/finfish-invertebrates-EFH/marine mammals/other marine uses (surveys)/sea turtles/land-use | 8,427 | 3,204 | 2,066–2,098 | 2,510–2,985 | 2,066 or 2,605 | 1,812 | 2,098 | 11,631 | 10,493–10,525 | 10,937–11,412 | 10,493 or 11,032 | 10,239 | 10,525 |
| | Navigation/other marine uses (excluding surveys) | 3,848 | 3,204 | 2,066–2,098 | 2,510–2,985 | 2,066 or 2,605 | 1,812 | 2,098 | 7,052 | 5,914–5,946 | 6,358–6,833 | 5,914 or 6,453 | 5,660 | 5,946 |
| | Visual/recreation-tourism/cultural resources (viewshed) | 3,346 | 3,204 | 2,066–2,098 | 2,510–2,985 | 2,066 or 2,605 | 1,812 | 2,098 | 6,550 | 5,412–5,444 | 5,856–6,331 | 5,412 or 5,951 | 5,158 | 5,444 |
| | Demographics/environmental justice | 8,427 | 3,204 | 2,066–2,098 | 2,510–2,985 | 2,066 or 2,605 | 1,812 | 2,098 | 11,631 | 10,493–10,525 | 109,37–11,412 | 104,93 or 11,032 | 10,239 | 10,525 |
| Inter-array cable and OSS-link cable construction seabed disturbance (acres)[‡‡] | Water | 4,131 | 2,619 | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,010 | 6,750 | 6,750[Ŧ] | 6,750[Ŧ] | 6,750[Ŧ] | 6,750[Ŧ] | 6,141 |
| | Benthic/cultural resources (marine) | 340 | 2,619 | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,010 | 2,959 | 2,959[Ŧ] | 2,959[Ŧ] | 2,959[Ŧ] | 2,959[Ŧ] | 2,350 |

| Project Component | Geographic Analysis Area | OCS Total (without Proposed Action)* | Proposed Action | Alt C | Alt D | Alt E | Alt F | Alt G | Proposed Action + OCS Total (cumulative) | Alt C + OCS Total (cumulative) | Alt D + OCS Total (cumulative) | Alt E + OCS Total (cumulative) | Alt F + OCS Total (cumulative) | Alt G + OCS Total (cumulative) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Birds/bats/commercial fisheries/finfish-invertebrates-EFH/marine mammals/other marine uses (surveys)/sea turtles/land-use | 69,004 | 2,619 | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,010 | 71,623 | 71,623[Ŧ] | 71,623[Ŧ] | 71,623[Ŧ] | 71,623[Ŧ] | 71,014 |
| | Navigation/other marine uses (excluding surveys) | 8,495 | 2,619 | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,010 | 8,944 | 8,944[Ŧ] | 8,944[Ŧ] | 8,944[Ŧ] | 8,944[Ŧ] | 8,335 |
| | Visual/recreation-tourism/cultural resources (viewshed) | 7,523 | 2,619 | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,010 | 10,142 | 10,142[Ŧ] | 10,142[Ŧ] | 10,142[Ŧ] | 10,142[Ŧ] | 9,533 |
| | Demographics/environmental justice | 69,004 | 2,619 | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,619[Ŧ] | 2,010 | 71,623 | 71,623[Ŧ] | 71,623[Ŧ] | 71,623[Ŧ] | 71,623[Ŧ] | 71,014 |
| Inter-array cable and OSS-link cable hard protection (acres)[§§] | Water | 444 | 78.5 | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 60.3 | 522.5 | 522.5[Ŧ] | 522.5[Ŧ] | 522.5[Ŧ] | 522.5[Ŧ] | 504 |
| | Benthic/cultural resources (marine) | 10 | 78.5 | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 60.3 | 88.5 | 88.5[Ŧ] | 88.5[Ŧ] | 88.5[Ŧ] | 88.5[Ŧ] | 70.3 |
| | Birds/bats/commercial fisheries/finfish-invertebrates-EFH/marine mammals/other marine uses (surveys)/sea turtles/land-use | 1,232 | 78.5 | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 60.3 | 1,435.5 | 1,310.5[Ŧ] | 1,310.5[Ŧ] | 1,310.5[Ŧ] | 1,310.5[Ŧ] | 1292.3 |
| | Navigation/other marine uses (excluding surveys) | 629 | 78.5 | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 60.3 | 707.5 | 707.5[Ŧ] | 707.5[Ŧ] | 707.5[Ŧ] | 707.5[Ŧ] | 689.3 |
| | Visual/recreation-tourism/cultural resources (viewshed) | 629 | 78.5 | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 60.3 | 707.5 | 707.5[Ŧ] | 707.5[Ŧ] | 707.5[Ŧ] | 707.5[Ŧ] | 689.3 |
| | Demographics/environmental justice | 1,232 | 78.5 | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 78.5[Ŧ] | 60.3 | 1,435.5 | 1,310.5[Ŧ] | 1,310.5[Ŧ] | 1,310.5[Ŧ] | 1,310.5[Ŧ] | 1292.3 |
| Total hazardous fluids (WTG and OSS) (gallons)*** | Air | 4,990,313 | 585,200 | 468,856–473,060 | 514,712–562,772 | 468,856 or 524,324 | 444,224 | 473,060 | 5,575,513 | 5,459,169–5,463,373 | 5,505,025–5,553,085 | 5,459,169 or 5,514,637 | 5,434,537 | 5,463,373 |
| | Water | 2,866,729 | 585,200 | 468,856–473,060 | 514,712–562,772 | 468,856 or 524,324 | 444,224 | 473,060 | 3,451,929 | 3,335,585–3,339,789 | 3,381,441–3,429,501 | 3,335,585 or 3,391,053 | 3,310,953 | 3,339,789 |
| | Benthic/cultural resources (marine) | 253,362 | 585,200 | 468,856–473,060 | 514,712–562,772 | 468,856 or 524,324 | 444,224 | 473,060 | 838,562 | 72,2218–726,422 | 768,074–816,134 | 722,218 or 777,686 | 697,586 | 726,422 |
| | Birds/bats/commercial fisheries/finfish-invertebrates-EFH/marine mammals/other marine uses | 33,869,870 | 585,200 | 468,856–473,060 | 514,712–562,772 | 468,856 or 524,324 | 444,224 | 473,060 | 34,455,070 | 34,338,726–34,342,930 | 34,384,582–34,432,642 | 34,338,726 or 34,394,194 | 34,314,094 | 34,342,930 |

| Project Component | Geographic Analysis Area | OCS Total (without Proposed Action)* | Proposed Action | Alt C | Alt D | Alt E | Alt F | Alt G | Proposed Action + OCS Total (cumulative) | Alt C + OCS Total (cumulative) | Alt D + OCS Total (cumulative) | Alt E + OCS Total (cumulative) | Alt F + OCS Total (cumulative) | Alt G + OCS Total (cumulative) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (surveys)/sea turtles/land-use | | | | | | | | | | | | | |
| | Navigation/other marine uses (excluding surveys) | 14,231,132 | 585,200 | 468,856–473,060 | 514,712–562,772 | 468,856 or 524,324 | 444,224 | 473,060 | 14,816,332 | 14,699,988–14,704,192 | 14,745,844–14,793,904 | 14,699,988 or 14,755,456 | 14,675,356 | 14,704,192 |
| | Visual/recreation-tourism/cultural resources (viewshed) | 12,453,920 | 585,200 | 468,856–473,060 | 514,712–562,772 | 468,856 or 524,324 | 444,224 | 473,060 | 13,039,120 | 12,922,776–12,926,980 | 12,968,632–13,016,692 | 12,922,776 or 12,978,244 | 12,898,144 | 12,926,980 |
| | Demographics/environmental justice | 33,869,870 | 585,200 | 468,856–473,060 | 514,712–562,772 | 468,856 or 524,324 | 444,224 | 473,060 | 34,455,070 | 34,338,726–34,342,930 | 34,384,582–34,432,642 | 34,338,726 or 34,394,194 | 34,314,094 | 34,342,930 |

* Totals provided in Appendix E3 and summarized here.

† Sums total IAC and OSS-Link cable length by alternative, as disclosed in Section 2.1.

‡ Sums total WTGs and OSSs by alternative, as disclosed in Section 2.1.

§ Sums OSS monopile foundation (0.043 acre/foundation) and WTG monopile foundation (0.027 acre/foundation) by alternative, as disclosed in Section 2.1.

¶ Sums OSS monopile foundation (7.2 acres/foundation) and WTG monopile foundation (7.2 acres/foundation) by alternative, as disclosed in Section 2.1.

# Sums WTG monopile scour protection (0.67 acre/foundation) and OSS monopile scour protection (0.66 acres/foundation) by alternative, as disclosed in Section 2.1.

** Sums RWEC-OCS and RWEC-RI construction and installation footprint by alternative, as disclosed in Section 2.1.

†† Sums RWEC-OCS and RWEC-RI operation footprint by alternative, as disclosed in Section 2.1.

‡‡ Sums IAC and OSS-link construction and installation footprint by alternative, as disclosed in Section 2.1.

§§ Sums IAC and OSS-link operation footprint by alternative, as disclosed in Section 2.1.

*** Totals provided in Appendix E3 and summarized here.

ŧ Project design has not occurred for Alternatives C through F; therefore, GIS calculations for the IAC, OSS-link cable, and RWEC are not available. This table uses the Proposed Action as the most conservative proxy estimate. However, best professional judgment suggests that the footprint of the IAC, OSS-link cable, and RWEC would change and be slightly reduced to match the reduced number of WTGs under Alternatives C through F.

# Literature Cited

Bureau of Ocean Energy Management (BOEM). 2019. *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf*. Available at: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/IPFs-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-N-OCS.pdf. Accessed December 2020.

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# APPENDIX F

## Environmental Protection Measures, Mitigation, and Monitoring

# Contents



# Tables

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# Introduction

The Revolution Wind Farm (RWF) and the Revolution Wind Export Cable (RWEC) Project environmental impact statement (EIS) assesses the potential environmental, social, economic, historical, and cultural impacts that could result from the construction, operations and maintenance (O&M), and decommissioning of a wind energy project (the Project) located in the Bureau of Ocean Energy Management's (BOEM's) Renewable Energy Lease Area OCS-A 0486, approximately 15.0 miles east of Block Island, Rhode Island; approximately 12.5 miles south of the Rhode Island mainland coast; and between approximately 12.0 and 13.5 miles southeast of various points along the Massachusetts coastline in the Atlantic Ocean. The Project comprises the siting and development of the RWF and the RWEC. Revolution Wind, LLC (Revolution Wind) is proposing the Project, which is designed to contribute to Connecticut's renewable energy mandate of 2,000 megawatts (MW) of offshore wind energy by 2030 and Rhode Island's 100% renewable energy goal by 2030.

As part of the Project, Revolution Wind has committed to self-implement measures to avoid, reduce, mitigate, and/or monitor impacts on the resources discussed in Chapter 3 of the EIS. Those environmental protection measures (EPMs) are summarized in Table F-1 of this appendix. BOEM considers as part of the Proposed Action and Preferred Alternative only those measures that Revolution Wind has committed to in the construction and operations plan (COP) (VHB 2023).

Table F-1 includes EPMs derived from the COP in the following volumes, sections, and appendices:

- Volume 1 Section 3.3.3.2, Section 4.6.1.3, and Table 4.7-2
- Volume III
- Appendix Z2 - *Protected Species Mitigation and Monitoring Plan (PSMMP): Sea Turtles, and ESA-Listed Fish Species* (LGL Ecological Research Associates, Inc. 2022a)
- Appendix Z3 - *Protected Species Mitigation and Monitoring Plan (PSMMP): Marine Mammals* (Revolution Wind 2022)
- Appendix AA - *Assessment of the Potential Effects of the Revolution Offshore Wind Farm on Birds and Bats* (Biodiversity Research Institute 2023)

In addition to EPMs identified in the COP, Table F-1 also includes mitigation measures that Revolution Wind has proposed in its unanticipated discovery plan (Revolution Wind 2023:Attachments B and C). Note: the EMP descriptions in Table F-1 were taken verbatim from the COP and were not edited.

Table F-2 includes mitigation measures resulting from consultations and reviews under several environmental statutes (Clean Air Act, Endangered Species Act [ESA], Magnuson-Stevens Fisheries Conservation and Management Act, Marine Mammal Protection Act [MMPA], and National Historic Preservation Act), as discussed in Appendix A of the Final EIS. Examples include the following:

- *Petition for Incidental Take Regulations for the Construction and Operation of the Revolution Wind Offshore Wind Farm* (LGL Ecological Research Associates, Inc. 2022b)

- Federal consistency consultations under the Coastal Zone Management Act, which concluded on May 10, 2023, with the Massachusetts Office of Coastal Zone Management and on May 12, 2023, with the Rhode Island Coastal Resources Management Council

BOEM may select alternatives and/or require additional mitigation or monitoring measures to further protect and monitor these resources. Additional mitigation measures identified by BOEM are shown in Table F-3.

Please note that not all of the mitigation measures in Table F-2 and Table F-3 are within BOEM's statutory and regulatory authority but could be adopted and imposed by other governmental entities.

If BOEM decides to approve the COP, the record of decision (ROD) would state which of the mitigation and monitoring measures identified in Table F-2 and Table F-3 have been adopted, and if not, why they were not. The ROD will describe the specific terms and conditions of these measures for which compliance is required (40 Code of Federal Regulations [CFR] 1505.3). Revolution Wind would be required to certify compliance with certain terms and conditions under 30 CFR 285.633(a). Furthermore, BOEM would periodically review the activities conducted under the approved COP, with the frequency and extent of the review based on the significance of any changes in available information and on onshore or offshore conditions affecting, or affected by, the activities conducted under the COP.

Monitoring measures may be required to evaluate the effectiveness of a mitigation measure or to identify if resources are responding as predicted to impacts from the Project. This monitoring would typically be developed in coordination between BOEM and agencies with jurisdiction over the resource to be monitored. The information generated by monitoring may be used to 1) modify how a mitigation measure identified in the COP or ROD is being implemented, 2) revise or develop new mitigation or monitoring measures for which compliance would be required under the RWF COP in accordance with 30 CFR 585.634(b), 3) develop measures for future projects, or 4) contribute to regional efforts for better understanding the impacts and benefits resulting from offshore wind energy projects in the Atlantic (e.g., a potential cumulative impact assessment tool). Unless specified as an EPM, the proposed mitigation measures described below would not change the impact ratings on the affected resource, as described in Chapter 3 of the Final EIS, but would further reduce expected impacts or inform the development of additional mitigation measures if required.

In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (miles used specifically for marine navigation). Statute miles are more commonly used and are referred to simply as *miles*, whereas nautical miles are referred to by name or by their abbreviation *nm*.

**Table F-1. Environmental Protection Measures (EPMs) Committed to by Revolution Wind, LLC (Applicant Proposed Measures)**

| EPM Number | Proposed Project Phase | EPM | Description of Environmental Protection Measures Committed to by Revolution Wind, LLC (VHB 2023)* | Resource Area Affected | Anticipated Enforcing Agency/Lessee† |
|---|---|---|---|---|---|
| **Provided in COP Table 4.7-2** | | | | | |
| AQ-1 | Construction and installation, O&M, and decommissioning | Mitigation of air emissions | Vessels providing construction or maintenance services for the RWF will use low-sulfur fuel, where possible. | Air quality | Revolution Wind |
| AQ-2 | Construction and installation, O&M, and decommissioning | Mitigation of air emissions | Vessel engines will meet the appropriate Environmental Protection Agency (EPA) air emission standards for nitrogen oxide ($NO_X$) emissions when operating within Emission Controls Areas. | Air quality | Revolution Wind |
| AQ-3 | Construction and installation, O&M, and decommissioning | Mitigation of air emissions | Onshore Facilities equipment and fuel suppliers will provide equipment and fuels that comply with the applicable EPA or equivalent emission standards. | Air quality | Revolution Wind |
| AQ-4 | Construction and installation, O&M, and decommissioning | Mitigation of air emissions | Marine engines with a model year of 2007 or later and non-road engines complying with the Tier 3 standards (in 40 CFR 89 or 1039) or better will be used to satisfy best available control technology (BACT) or lowest achievable emission rate (LAER). | Air quality | Revolution Wind |
| WQ-1 | Construction and installation | Cable burial risk assessment | To the extent feasible, installation of the Inter-array cables (IACs), OSS-Link Cable, and RWEC will occur using equipment such as mechanical cutter, mechanical plow, or jet plow. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment. | Water quality | Revolution Wind |
| WQ-2 | Construction and installation, O&M, and decommissioning | Spill prevention and control measures | Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges. | Water quality | Revolution Wind |
| WQ-3 | Construction and installation, O&M, and decommissioning | Oil spill response plan (OSRP) | Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP (COP Appendix D [Orsted 2023]). | Water quality | Revolution Wind |
| WQ-4 | Construction and installation, O&M, and decommissioning | Marine debris awareness training | All vessels will comply with United States Coast Guard (USCG) and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to Notice to Lessee (NTL) 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process. | Water quality | Revolution Wind |
| WQ-5 | Construction and installation | HDD contingency plan | At the landfall location, drilling fluids will be managed within a contained system to be collected for reuse, as necessary. An HDD Contingency Plan will be prepared and implemented to minimize the potential risks associated with release of drilling fluids. | Water quality | Revolution Wind |
| WQ-6 | Construction and installation, O&M, and decommissioning | Soil erosion and sediment control (SESC) plan | A SESC plan, including erosion and sedimentation control measures, will be implemented to minimize potential water quality impacts during construction and operation of the Onshore Facilities. | Water quality | Revolution Wind |
| Coast-1 | Construction and installation | Siting of onshore facilities | Onshore Facilities will be sited within previously disturbed and developed areas to the extent practicable. | Coastal and terrestrial habitats | Revolution Wind |
| Coast-2 | Construction and installation, O&M, and decommissioning | OSRP | Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP. | Coastal and terrestrial habitats | Revolution Wind |

| EPM Number | Proposed Project Phase | EPM | Description of Environmental Protection Measures Committed to by Revolution Wind, LLC (VHB 2023)* | Resource Area Affected | Anticipated Enforcing Agency/Lessee† |
|---|---|---|---|---|---|
| Coast-3 | Construction and installation | HDD contingency plan | At the landfall location, drilling fluids will be managed within a contained system to be collected for reuse, as necessary. An HDD Contingency Plan will be prepared and implemented to minimize the potential risks associated with release of drilling fluids. | Coastal and terrestrial habitats | Revolution Wind |
| Coast-4 | Construction and installation, O&M, and decommissioning | Spill prevention and control measures and SESC plan | Compliance with the RIPDES General Permit for Stormwater Discharges associated with construction activity which requires the implementation of a SESC Plan and spill prevention and control measures. | Coastal and terrestrial habitats | Revolution Wind |
| Coast-5 | Construction and installation | SESC plan | The operator must implement the site-specific SESC Plan and maintain it during the entire construction process until the entire worksite is permanently stabilized by vegetation or other means. The measures employed in the SESC Plan use best management practices (BMPs) to minimize the opportunity for turbid discharges leaving a construction work area. | Coastal and terrestrial habitats | Revolution Wind |
| Coast-6 | Construction and installation, O&M, and decommissioning | Spill prevention and control measures | The spill prevention and control measures mandate that the operator identifies all areas where spills can occur and their accompanying drainage points. The operator must also establish spill prevention and control measures to reduce the chance of spills, stop the source of spills, contain and clean up spills, and dispose of materials contaminated by spills. Spill prevention and control training will be provided for relevant personnel. | Coastal and terrestrial habitats | Revolution Wind |
| Coast-7 | Construction and installation and O&M | Vegetation management | The perimeter surrounding Onshore Facilities will be managed to encourage the growth of native grasses, ferns, and low-growing shrubs. The management strategy will include the removal of invasive plants in compliance with state and federal regulations (e.g., herbicide use will not be permitted within regulated wetlands). | Coastal and terrestrial habitats | Revolution Wind |
| Coast-8 | Construction and installation | Avoidance/mitigation of wetland impacts | In accordance with Section 2.9(B)(1)(d) of the Freshwater Wetland Rules, the Onshore Facilities will be designed to avoid and minimize impacts to freshwater wetlands to the maximum extent practicable. Any wetlands that will be impacted as a result of the Project will be mitigated via the federal and state permitting process in accordance with Section 404 of the CWA and the Freshwater Wetland Rules. | Coastal and terrestrial habitats | Revolution Wind |
| Coast-9 | Construction and installation, O&M, and decommissioning | SESC plan | An SESC Plan, including erosion and sedimentation control measures, will be implemented to minimize potential water quality impacts during construction and operation of the Onshore Facilities. | Coastal and terrestrial habitats | Revolution Wind |
| Coast-10 | Construction and installation | Vegetation management | The documented sickle-leaved golden aster population on the OnSS parcel will be protected during construction. | Coastal and terrestrial habitats | Revolution Wind |
| Ben-1 | Preconstruction | Siting of RWF and RWEC | The RWF and RWEC will be sited to avoid and minimize impacts to sensitive habitats (e.g., hard-bottom habitats) to the extent practicable. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-2 | Construction and installation | Cable burial risk assessment | The IAC, OSS-Link Cable, and RWEC will avoid identified shallow hazards to the extent practicable. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-3 | Construction and installation | Cable burial risk assessment | To the extent feasible, installation of the IAC, OSS-Link Cable, and RWEC will occur using equipment such as mechanical cutter, mechanical plow, or jet plow. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-4 | Construction and installation | Cable burial risk assessment | To the extent feasible, the RWEC, IAC, and OSS-Link Cable will typically target a burial depth of 4 to 6 ft (1.2 to 1.8 m) below seabed. The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-5 | Construction and installation | Cable burial risk assessment | DP vessels will be used for installation of the IACs, OSS-Link Cable, and RWEC to the extent practicable. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-6 | Preconstruction | Anchoring plan | A plan for vessels will be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-7 | Preconstruction, construction and installation, and postconstruction | Fisheries and benthic monitoring studies | Revolution Wind is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and post-construction. Fisheries and benthic monitoring studies are being planned to assess the impacts associated with the Project on economically and ecologically important fisheries resources. These studies will be conducted in | Benthic habitat and invertebrates | Revolution Wind |

| EPM Number | Proposed Project Phase | EPM | Description of Environmental Protection Measures Committed to by Revolution Wind, LLC (VHB 2023)* | Resource Area Affected | Anticipated Enforcing Agency/Lessee† |
|---|---|---|---|---|---|
| | | | collaboration with the local fishing industry and will build upon monitoring efforts being conducted by affiliates of Revolution Wind at other wind farms in the region. | | |
| Ben-8 | Preconstruction | Submerged aquatic vegetation (SAV) study | A preconstruction SAV survey will be completed to identify any new or expanded SAV beds. The Project design will be refined to avoid impacts to SAV to the greatest extent practicable. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-9 | Construction and installation, O&M, and decommissioning | Spill prevention and control measures | Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-10 | Construction and installation, O&M, and decommissioning | OSRP | Accidental spill or release of oils or other hazardous materials will be managed through the OSRP. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-11 | Construction and installation, O&M, and decommissioning | Marine debris awareness training | All vessels will comply with United States Coast Guard (USCG) and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to Notice to Lessee (NTL) 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-12 | Construction and installation | Soft start before pile driving | A ramp-up or soft start will be used at the beginning of each pile segment during impact pile driving and/or vibratory pile driving to provide additional protection to mobile species in the vicinity by allowing them to vacate the area prior to the commencement of pile-driving activities. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-13 | Construction and installation and O&M | Lighting minimization | Construction and operational lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-14 | Construction and installation | Time of year (TOY) restrictions | Revolution Wind will continue to coordinate with Rhode Island Department of Environmental Management (RIDEM) and National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies. | Benthic habitat and invertebrates | Revolution Wind |
| Ben-15 | Preconstruction and construction and installation | Siting of RWF and RWEC | The RWF and RWEC would use HRG surveys and other site characterization methods to identify, avoid, and minimize impacts to complex bottom habitats to the extent practicable | Benthic habitat and invertebrates | Revolution Wind |
| Ben-16 | Construction and installation, O&M, and decommissioning | Fisheries and benthic monitoring plan | Revolution Wind has developed a fisheries and benthic habitat monitoring plan (dated May 2023) that has been prepared in accordance with recommendations set forth in Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 (BOEM 2019). | Benthic habitat and invertebrates | Revolution Wind |
| Ben-17 | Construction and installation | Boulder relocation | It is anticipated that a boulder grab and specialized working class, remotely operated vehicle boulder skid will be used for the majority of boulder relocations to reduce the magnitude and spatial extent of impacts to benthic habitats and invertebrates, such as complex and large-grained complex habitats. The boulder plow will only be used in limited segments of the RWEC. | Benthic habitat and EFH | BOEM and Bureau of Safety and Environmental Enforcement (BSEE) |
| Ben-18 | Construction and installation | HDD landfall | At the landfall location, drilling fluids will be managed within a contained system to be collected for reuse, as necessary. An HDD Contingency Plan will be prepared and implemented to minimize the potential risks associated with the release of drilling fluids. This EPM would minimize adverse effects to benthic habitats and invertebrates from impacts to water quality. | Benthic habitat and EFH | Revolution Wind, BOEM |
| Ben-19 | O&M | Bathymetry surveys | Revolution Wind intends to conduct an as-built survey/bathymetry survey along the entirety of the cable routes following installation. Bathymetry surveys will be performed post-installation one year after commissioning, two years after commissioning, and every five years thereafter or in accordance with permits and authorizations received for the Project. | Benthic habitat and EFH | Revolution Wind, BOEM |
| Fin-1 | Construction and installation | Cable burial risk assessment | To the extent feasible, installation of the IAC, OSS-Link Cable, and RWEC will occur using equipment such as mechanical cutter, mechanical plow, or jet plow. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment. | Finfish and essential fish habitat | Revolution Wind |

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| Fin-2 | Construction and installation | TOY restrictions | Based on the coordination with RIDEM and NOAA NMFS to date, in general, offshore site preparation for and installation of the RWEC-RI north of the Convention on the International Regulations for Preventing Collisions at Sea ("COLREGS") line of demarcation will occur between the day after Labor Day and February 1 to avoid and minimize impacts to winter flounder (Pseudopleuronectes americanus) and shellfish. Revolution Wind will continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies. | Finfish and essential fish habitat | Revolution Wind |
| Fin-3 | Construction and installation | Cable burial risk assessment | To the extent feasible, the RWEC, IAC, and OSS-Link Cable will typically target a burial depth of 4 to 6 ft (1.2 to 1.8 m) below seabed. The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. | Finfish and essential fish habitat | Revolution Wind |
| Fin-4 | Construction and installation | Cable burial risk assessment | DP vessels will be used for installation of the IACs, OSS-Link Cable, and RWEC to the extent practicable. | Finfish and essential fish habitat | Revolution Wind |
| Fin-5 | Preconstruction | Anchoring plan | A plan for vessels will be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources. | Finfish and essential fish habitat | Revolution Wind |
| Fin-6 | Preconstruction, construction and installation, and postconstruction | Fisheries and benthic monitoring studies | Revolution Wind is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and post-construction. Fisheries and benthic monitoring studies are being planned to assess the impacts associated with the Project on economically and ecologically important fisheries resources. These studies will be conducted in collaboration with the local fishing industry and will build upon monitoring efforts being conducted by affiliates of Revolution Wind at other wind farms in the region. | Finfish and essential fish habitat | Revolution Wind |
| Fin-7 | Construction and installation, O&M, and decommissioning | Spill prevention and control measures | Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges. | Finfish and essential fish habitat | Revolution Wind |
| Fin-8 | Construction and installation, O&M, and decommissioning | OSRP | Accidental spill or release of oils or other hazardous materials will be managed through the OSRP. | Finfish and essential fish habitat | Revolution Wind |
| Fin-9 | Construction and installation | Soft start before pile driving | A ramp-up or soft start will be used at the beginning of each pile segment during impact pile driving and/or vibratory pile driving to provide additional protection to mobile species in the vicinity by allowing them to vacate the area prior to the commencement of pile-driving activities. | Finfish and essential fish habitat | Revolution Wind |
| Fin-10 | Construction and installation and O&M | Lighting minimization | Construction and operational lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations. | Finfish and essential fish habitat | Revolution Wind |
| Fin-11 | Construction and installation, O&M, and decommissioning | Marine debris awareness training | All vessels will comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to NTL 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process. | Finfish and essential fish habitat | Revolution Wind |
| Fin-12 | Construction and installation | TOY restrictions | Revolution Wind will continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies. | Finfish and essential fish habitat | Revolution Wind |
| Fin-13 | Construction and installation, postconstruction and installation monitoring | Gear identification | To facilitate identification of gear on any entangled animals, all trap/pot gear used in the surveys must be uniquely marked to distinguish it from other commercial or recreational gear. | Finfish and essential fish habitat | Revolution Wind, BOEM, BSEE, and NMFS |
| Fin-14 | Construction and installation | Boulder relocation | It is anticipated that a boulder grab and specialized working class, remotely operated vehicle boulder skid will be used for the majority of boulder relocations to reduce the magnitude and spatial extent of impacts to benthic habitats and | Benthic habitat and EFH | BOEM and BSEE |

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| | | | invertebrates, such as complex and large-grained complex habitats. The boulder plow will only be used in limited segments of the RWEC. | | |
| Fin-15 | Construction and installation | TOY restrictions | Timing restrictions to avoid noise impacts to North Atlantic right whale would also be protective of a portion of the Atlantic cod spawning season. This includes the restriction of pile-driving to the months of May to December; no pile driving will occur from January 1st to April 30th. | Finfish and essential fish habitat | Revolution Wind, BOEM, BSEE, and NMFS |
| Fin-16 | Construction and installation | HDD landfall | At the landfall location, drilling fluids will be managed within a contained system to be collected for reuse, as necessary. An HDD Contingency Plan will be prepared and implemented to minimize the potential risks associated with the release of drilling fluids. This EPM would minimize adverse effects to benthic and pelagic EFH, including EFH species, from impacts to water quality. | Finfish and essential fish habitat | Revolution Wind, BOEM |
| Fin-17 | O&M | Bathymetry surveys | Revolution Wind intends to conduct an as-built survey/bathymetry survey along the entirety of the cable routes following installation. Bathymetry surveys will be performed post-installation one year after commissioning, two years after commissioning, and every five years thereafter or in accordance with permits and authorizations received for the Project. | Benthic habitat and essential fish habitat | Revolution Wind, BOEM |
| MM-1 | Construction and installation | Establishment of pre-clearance and shutdown zones for impact pile driving | Exclusion and monitoring zones for marine mammals and sea turtles will be established for impact and vibratory pile-driving activities. | Marine mammals | Revolution Wind |
| MM-2 | Construction and installation | Impact and vibratory pile-driving mitigation measures | The following measures will be implemented for impact and vibratory pile-driving activities. These measures will include seasonal restrictions, soft-start measures, shutdown procedures, marine mammal and sea turtle monitoring protocols, the use of qualified and NOAA-approved Protected Species Observers (PSO), and noise attenuation systems such as bubble curtains, as appropriate. | Marine mammals | Revolution Wind |
| MM-3 | Construction and installation, O&M, and decommissioning | Vessel speed restrictions | Vessels will follow NOAA guidelines for marine mammal and sea turtle strike avoidance measures, including vessel speed restrictions. | Marine mammals | Revolution Wind |
| MM-4 | Construction and installation, O&M, and decommissioning | Marine mammal, sea turtle, and marine debris awareness training | All personnel working offshore will receive training on marine mammal and sea turtle awareness and marine debris awareness. | Marine mammals | Revolution Wind |
| MM-5 | Construction and installation, O&M, and decommissioning | Spill prevention and control measures | Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges. | Marine mammals | Revolution Wind |
| MM-6 | Construction and installation, O&M, and decommissioning | OSRP | Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP. | Marine mammals | Revolution Wind |
| MM-7 | Construction and installation, O&M, and decommissioning | Marine debris awareness training | All vessels will comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process. | Marine mammals | Revolution Wind |
| MM-8 | Construction and installation | Cable burial risk assessment | To the extent feasible, the RWEC, IAC, and OSS-Link Cable will typically target a burial depth of 4 to 6 ft (1.2 to 1.8 m) below seabed. The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. | Marine mammals | Revolution Wind |
| MM-9 | Construction and installation, | Gear identification | All trap/pot gear used in the surveys would be uniquely marked to distinguish it from other commercial or recreational gear. Per the May 2023 Fisheries Research and Benthic Monitoring Plan, Revolution Wind will use | Marine mammals | Revolution Wind, BOEM, BSEE, and NMFS |

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| | postconstruction and installation monitoring | | ropeless trap/pot gear equipped with acoustic retrieval systems (see MM-12). This EPM will effectively avoid risk of marine mammal entanglement. | | |
| MM-10 | Construction and installation and postconstruction and installation | MMPA application measures | Revolution Wind is committed to minimizing impacts to marine mammal species through a comprehensive monitoring and mitigation program. The mitigation measures identified in the MMPA Incidental Take Regulations (ITR) application to be implemented include, but are not limited to, the following:<br>1. Noise attenuation through use of a noise mitigation system;<br>2. Seasonal restrictions;<br>3. Standard PSO training and equipment requirements;<br>4. Visual monitoring; including low visibility monitoring tools;<br>5. Passive acoustic monitoring;<br>6. Establishment and monitoring of shutdown zones<br>7. Pre-start clearance;<br>8. Ramp-up (soft-start) procedures;<br>9. Operational and long-term monitoring of marine mammals and sea turtles;<br>10. Operational shutdowns and delay;<br>11. Sound source verification measurements of at least one foundation installation<br>12. Survey sighting coordination;<br>13. Entanglement reduction measures during fishery and benthic monitoring surveys;<br>14. Vessel strike avoidance procedures; and<br>15. Data recording and reporting procedures. | Marine mammals | Revolution Wind, NMFS, and BSEE |
| MM-11 | Construction and installation, postconstruction and installation monitoring | Fisheries and benthic habitat monitoring | Fisheries monitoring was designed in accordance with recommendations set forth in "Guidelines for Providing Information on Fisheries for Application for Renewable Energy Development on the Atlantic Outer Continental Shelf" (BOEM 2019) and consideration to the Responsible Offshore Science Alliance (ROSA) Offshore Wind Project Monitoring Framework and Guidelines. All survey activities will be subject to rules and regulations outlined under the MMPA and ESA. Efforts will be taken to reduce marine mammal, sea turtle, and seabird injuries and mortalities caused by incidental interactions with sampling gear. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Take Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury. | Marine mammals | Revolution Wind |
| MM-12 | Construction and installation, postconstruction and installation monitoring | Fisheries and benthic habitat monitoring | Changes to Appendix Y, Fisheries Research and Benthic Monitoring Plan, include measures to reduce potential impacts to protected species, specifically, use of ropeless technology or grappling techniques which will require no downlines in the lease area. To mitigate unmarked gear, applicant would post the gear positions in an online gear tracking application until such a point, if any, where downlines and markers are permitted. As an additional mitigation measure, the researchers for the Revolution Wind ventless lobster trap survey would remove gear from the lease area between sampling periods as to reduce the risk of it being lost or accidentally towed up by fishing or survey vessels. | Marine Mammals | Revolution Wind |
| ST-1 | Construction and installation | Establishment of clearance and/or shutdown zones for impact pile driving | Exclusion and monitoring zones for marine mammals and sea turtles will be established for impact and vibratory pile-driving activities. | Sea turtles | Revolution Wind |
| ST-2 | Construction and installation | Impact and vibratory pile-driving mitigation measures | The following measures will be implemented for impact and vibratory pile-driving activities. These measures will include seasonal restrictions, soft-start measures, shut-down procedures, marine mammal and sea turtle monitoring protocols, the use of qualified and NOAA-approved Protected Species Observers (PSOs), and noise attenuation systems such as bubble curtains, as appropriate. | Sea turtles | Revolution Wind |
| ST-3 | Construction and installation, O&M, and decommissioning | Vessel speed restriction | Vessels will follow NOAA guidelines for marine mammal and sea turtle strike avoidance measures, including vessel speed restrictions. | Sea turtles | Revolution Wind |
| ST-4 | Construction and installation, O&M, and decommissioning | Marine mammal, sea turtle, and marine debris awareness training | All personnel working offshore will receive training on marine mammal and sea turtle awareness and marine debris awareness. | Sea turtles | Revolution Wind |

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| ST-5 | Construction and installation, O&M, and decommissioning | Spill prevention and control measures | Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges. | Sea turtles | Revolution Wind |
| ST-6 | Construction and installation, O&M, and decommissioning | OSRP | Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP. | Sea turtles | Revolution Wind |
| ST-7 | Construction and installation, O&M, and decommissioning | Marine debris awareness training | All vessels will comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to NTL 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process. | Sea turtles | Revolution Wind |
| ST-8 | Construction and installation | Cable burial risk assessment | To the extent feasible, the RWEC, IAC, and OSS-Link Cable will typically target a burial depth of 4 to 6 ft (1.2 to 1.8 m) below seabed. The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. | Sea turtles | Revolution Wind |
| ST-9 | Construction and installation | Develop and implement Protected Species Monitoring and Mitigation Plan | A Protected Species Monitoring and Mitigation Plan has been developed that defines the mitigation and monitoring that will be carried out to reduce the potential impacts on federally protected species including sea turtles. | Sea turtles | Revolution Wind |
| ST-10 | Construction and installation | Develop and implement Protected Species Monitoring and Mitigation Plan | All PSOs will have completed a NMFS-approved PSO training course. | Sea turtles | Revolution Wind |
| ST-11 | Construction and installation | Develop and implement Protected Species Monitoring and Mitigation Plan | Sound field verification measurements of the installation of at least three monopile foundations will be made and results used to modify shutdown zones, as appropriate. | Sea turtles | Revolution Wind |
| ST-12 | Construction and installation | Develop and implement Protected Species Monitoring and Mitigation Plan | Prior to the initiation of pile-driving and HRG survey equipment ramp-up, PSOs will conduct a 30-minute watch of the shutdown zones to monitor for sea turtles. Prior to munitions and explosives of concern/unexploded ordnance detonation, a 60-minute watch of the shutdown zone will be conducted. | Sea turtles | Revolution Wind |
| ST-13 | Construction and installation | Develop and implement Protected Species Monitoring and Mitigation Plan | If the HRG survey acoustic source is shut down for reasons other than mitigation (e.g., mechanical difficulty) for less than 30 minutes, it will be reactivated without ramp-up if PSOs have maintained constant observation and no detections of any sea turtles have occurred within the respective shutdown zones. | Sea turtles | Revolution Wind |
| ST-14 | Construction and installation, postconstruction and installation monitoring | Fisheries and benthic habitat monitoring | Revisions to the March 2023 COP version of Appendix Y, Fisheries Research and Benthic Monitoring Plan, include additional measures to reduce potential impacts to protected species. The ventless trap and pot gear will employ ropeless technology or grappling techniques that will eliminate the need for buoy lines and surface floats. To mitigate unmarked gear, the applicant would post the gear positions in an online gear tracking application until such a point, if any, where downlines and markers are permitted. As an additional mitigation measure, the researchers for the Revolution Wind ventless lobster trap survey would remove gear from the lease area between sampling periods as to reduce risk of loss. | Sea turtles | Revolution Wind |
| Bird-1 | Construction and installation | TOY restrictions for tree and shrub removal | To the extent feasible, tree and shrub removal for Onshore Facilities will occur outside the avian nesting and bat roosting period, May 1 through August 15. If tree and shrub removal cannot be avoided during this season, Revolution Wind will coordinate with appropriate agencies to determine appropriate course of action. | Birds | Revolution Wind |

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| Bird-2 | Construction and installation and O&M | WTG spacing and layout | Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mi (1-nm) by 1.15-mi (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This wide spacing of WTGs will allow avian species to avoid individual WTGs and minimize risk of potential collision. | Birds | Revolution Wind |
| Bird-3 | Construction and installation and O&M | Lighting minimization | Construction and operational lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations. | Birds | Revolution Wind |
| Bird-4 | Construction and installation and O&M | Lighting minimization with lighting technology | Revolution Wind will comply with Federal Aviation Administration (FAA) and USCG requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimizes impacts on avian species. | Birds | Revolution Wind |
| Bird-5 | Construction and installation, O&M, and decommissioning | OSRP | Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP. | Birds | Revolution Wind |
| Bird-6 | Construction and installation, O&M, and decommissioning | Marine debris awareness training | All vessels will comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to NTL 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process. | Birds | Revolution Wind |
| Bird-7 | Construction and installation, O&M, and decommissioning | SESC plan | An SESC Plan, including erosion and sedimentation control measures, will be implemented to minimize potential water quality impacts during construction and operation of the Onshore Facilities. | Birds | Revolution Wind |
| Bird-8 | Construction and installation | Siting of onshore facilities | Onshore Facilities will be sited within previously disturbed and developed areas to the extent practicable. | Birds | Revolution Wind |
| Bird-9 | Construction and installation | Burial of onshore transmission cables | The Onshore Transmission Cables will be buried; therefore, avoiding the risk to avian and bat species associated with overhead lines. | Birds | Revolution Wind |
| Bird-10 | O&M | Adaptive mitigation for birds and bats | Revolution Wind has developed an Avian and Bat Post-Construction Monitoring Framework (see Appendix G and COP Appendix AA [Biodiversity Research Institute 2023]) for the Project that summarizes the approach to monitoring; describes overarching monitoring goals and objectives; identifies the key avian species, priority questions, and data gaps unique to the region and Project Area that will be addressed through monitoring; and describes methods and time frames for data collection, analysis, and reporting. Post-construction monitoring will assess impacts of the Project with the purpose of filling select information gaps and supporting validation of the Project's Avian Risk Assessment. Focus may be placed on improving knowledge of ESA-listed species occurrence and movements offshore, avian collision risk, species/species-group displacement, or similar topics. Where possible, monitoring conducted by Revolution Wind will build on and align with post-construction monitoring conducted by the other Orsted/Eversource offshore wind projects in the Northeast region. Revolution Wind will engage with federal and state agencies and environmental groups (eNGOs) to identify appropriate monitoring options and technologies and to facilitate acceptance of the final plan. | Birds | Revolution Wind, BOEM, BSEE, USFWS |
| Bird-11 | Construction and installation, O&M, and decommissioning | Adaptive mitigation for birds and bats | Revolution Wind will document any dead (or injured) birds/bats found incidentally on vessels and structures during construction, O&M, and decommissioning and provide an annual report to BOEM and United States Fish and Wildlife Service (USFWS). | Birds | Revolution Wind and BSEE |
| Bird-12 | Construction and installation | TOY restrictions | Revolution Wind will continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies. | Birds | Revolution Wind |
| Bird-13 | Construction and installation and O&M | Aircraft detection lighting system (ADLS) (or a similar system) | Revolution Wind will use an aircraft detection lighting system (ADLS) (or a similar system), pursuant to approval by the FAA and commercial and technical feasibility at the time of Facility Design Report (FDR)/ Fabrication and Installation Report (FIR) approval. | Birds | Revolution Wind |
| Bat-1 | Construction and installation and O&M | Lighting minimization | Construction and operational lighting will be limited to the minimum necessary to ensure safety and to comply with applicable regulations. | Bats | Revolution Wind |

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| Bat-2 | Construction and installation | TOY restrictions for tree and shrub removal | To the extent feasible, tree and shrub removal for Onshore Facilities will occur outside the avian nesting and bat roosting period; May 1 through August 15. If tree and shrub removal cannot be avoided during this season, Revolution Wind will coordinate with appropriate agencies to determine appropriate course of action. | Bats | Revolution Wind |
| Bat-3 | Construction and installation and O&M | WTG spacing and layout | Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mi (1-nm) by 1.15-mi (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This wide spacing of WTGs will allow avian and bat species to avoid individual WTGs and minimize risk of potential collision. | Bats | Revolution Wind |
| Bat-4 | Construction and installation and O&M | Lighting minimization with lighting technology | Revolution Wind will comply with FAA and USCG requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimize impacts on avian and bat species. | Bats | Revolution Wind |
| Bat-5 | Construction and installation, O&M, and decommissioning | OSRP | Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP. | Bats | Revolution Wind |
| Bat-6 | Construction and installation, O&M, and decommissioning | SESC plan | An SESC Plan, including erosion and sedimentation control measures, will be implemented to minimize potential water quality impacts during construction and operation of the Onshore Facilities. | Bats | Revolution Wind |
| Bat-7 | Construction and installation | Siting of onshore facilities | Onshore Facilities will be sited within previously disturbed and developed areas to the extent practicable. | Bats | Revolution Wind |
| Bat-8 | Construction and installation | Burial of onshore transmission cables | The Onshore Transmission Cables will be buried; therefore, avoiding the risk to avian and bat species associated with overhead lines. | Bats | Revolution Wind |
| Bat-9 | Construction and installation, O&M, and decommissioning | Adaptive mitigation for birds and bats | Revolution Wind will document any dead (or injured) birds/bats found incidentally on vessels and structures during construction, O&M, and decommissioning and provide an annual report to BOEM and USFWS. | Bats | Revolution Wind and BSEE |
| Bat-10 | Construction and installation | TOY restrictions | Revolution Wind will continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies. | Bats | Revolution Wind |
| Bat-11 | Construction | Minimization of long=term impacts | Comply with the Northern Long-Eared Bat 4(d) rule (81 FR 1900-1922) to avoid and minimize long-term impacts on the species and sensitive upland habitats. | Bats | BOEM and USFWS |
| CR-1 | Construction and installation and O&M | Aircraft detection lighting system (ADLS) (or a similar system) | Revolution Wind will use Aircraft Detection Lighting System (ADLS) (or a similar system), pursuant to approval by the FAA and commercial and technical feasibility at the time of FDR/FIR approval. | Cultural resources | Revolution Wind |
| CR-2 | Construction and installation and O&M | WTG design | RWF WTGs will have uniform design, speed, height, and rotor diameter, thereby mitigating visual clutter. | Cultural resources | Revolution Wind |
| CR-3 | Construction and installation and O&M | WTG design | The WTGs will be painted Pure White (RAL 9010) to Light Grey (RAL 7035), as recommended by BOEM and the FAA. This color white of the turbines generally blends well with the sky at the horizon and eliminates the need for daytime warning lights or red paint marking of the blade tips. | Cultural resources | Revolution Wind |
| CR-4 | Construction and installation | Burial of onshore transmission cables and ICF interconnection | The Onshore Transmission Cable and ICF Interconnection ROW will be buried, minimizing potential impacts to adjacent properties. | Cultural resources | Revolution Wind |
| CR-5 | Construction and installation and O&M | Onshore facilities location | The Onshore Facilities will be located adjacent to an existing substation on a parcel zoned for commercial and industrial/utility use. | Cultural resources | Revolution Wind |
| CR-6 | Construction and installation and O&M | Onshore facilities screening | Screening will be implemented at the aboveground Onshore Facilities to the extent feasible, to reduce potential visibility and noise. | Cultural resources | Revolution Wind |
| CR-7 | Preconstruction | Siting of RWF and RWEC | The RWF and RWEC will be sited to avoid or minimize impacts to potential submerged cultural sites and paleolandforms, or will mitigate these impacts as specified in the memorandum of agreement (MOA) (Appendix J). | Cultural resources | Revolution Wind |
| CR-8 | Construction and installation and O&M | Marine survey design, execution, and interpretation | Native American Tribal representatives were involved, and will continue to be involved, in marine survey protocol design, execution of the surveys, and interpretation of the results. | Cultural resources | Revolution Wind |

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| CR-9 | Preconstruction | Anchoring plan | A plan for vessels will be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources. | Cultural resources | Revolution Wind |
| CR-10 | Construction and installation | Unanticipated discovery plan (UDP) | An Unanticipated Discovery Plan (UDP) will be implemented that will include stop-work and notification procedures to be followed if a potentially significant archaeological resource is encountered during construction. | Cultural resources | Revolution Wind |
| CR-11 | Construction and installation | Siting of onshore facilities | Onshore Facilities will be sited within previously disturbed and developed areas to the extent practicable. | Cultural resources | Revolution Wind |
| CR-12 | Preconstruction | Siting of onshore facilities | Onshore Facilities will be sited to avoid or minimize impacts to potential terrestrial archeological resources, or will mitigate these impacts as specified in the MOA (Appendix J). | Cultural resources | Revolution Wind |
| VR-1 | Construction and installation | ADLS (or a similar system) | Revolution Wind will use ADLS (or a similar system), pursuant to approval by the FAA and commercial and technical feasibility at the time of FDR/FIR approval. | Visual resources | Revolution Wind |
| VR-2 | Construction and installation and O&M | WTG design | RWF WTGs will have uniform design, speed, height, and rotor diameter, thereby mitigating visual clutter. | Visual resources | Revolution Wind |
| VR-3 | Construction and installation and O&M | WTG design | The WTGs will be painted Pure White (RAL 9010) to Light Grey (RAL 7035), as recommended by BOEM and the FAA for aviation safety. | Visual resources | Revolution Wind |
| VR-4 | Construction and installation | Burial of onshore transmission cables and ICF interconnection | The Onshore Transmission Cable and ICF Interconnection ROW will be buried, minimizing potential impacts to adjacent properties. | Visual resources | Revolution Wind |
| VR-5 | Construction and installation and O&M | Onshore facilities screening | Screening will be implemented with vegetation and other site adaptive materials at the aboveground Onshore Facilities to the extent feasible, to reduce potential visibility and noise. | Visual resources | Revolution Wind |
| VR-6 | Construction and installation and O&M | Onshore facilities design | Adaptive color treatments (i.e. the use of colors that repeat in the surrounding environment, especially those of the natural elements) and non-reflective surface treatments and finishes will be used on Onshore Facilities to minimize contrast and reflected glare to the surrounding setting, as it aligns with local stakeholder preference and approval by local authorities. | Visual resources | Revolution Wind |
| VR-7 | Construction and installation and O&M | Lighting minimization at the ONSS and ICF | Lighting at the OnSS and ICF will be designed and installed using sustainable outdoor lighting specifications to minimize impact to natural night skies or to contribute to increased impacts https://www.nps.gov/subjects/nightskies/sustainable-outdoor-lighting.htm, (e.g., kept to a minimum and turned on only as needed by manual switch, all recessed or fully shielded light fixtures, no upward lighting, etc.). | Visual resources | Revolution Wind |
| Demo-1 | Construction and installation, O&M, and decommissioning | Employment of local workers | Where possible, local workers will be hired to meet labor needs for Project construction, O&M, and decommissioning. | Demographics, employment, and economics | Revolution Wind |
| Demo-2 | Construction and installation | TOY restrictions of onshore facility construction | The Onshore Facilities construction schedule will be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day. | Demographics, employment, and economics | Revolution Wind |
| Demo-3 | Construction and installation and O&M | Onshore facilities screening | Screening will be implemented at the aboveground Onshore Facilities to the extent feasible, to reduce potential visibility and noise. | Demographics, employment, and economics | Revolution Wind |
| Demo-4 | Construction and installation | Coordination with local authorities to address environmental and community concerns | Revolution Wind will coordinate with local authorities during construction of Onshore Facilities to minimize local traffic impacts; further, these Project components will be constructed in compliance with applicable regulations related to environmental and community concerns (e.g., traffic and erosion). In addition, traffic will be temporary and will not impact long-term property values. | Demographics, employment, and economics | Revolution Wind |
| Demo-5 | Preconstruction | Community-based career development programming | Revolution Wind is committing $1,000,000 to community-based programming, including $500,000 to the Community College of Rhode Island to help build their Global Wind Organization (GWO) training center and $500,000 to Building Futures Rhode Island to enable both new entrants to union construction careers (through pre-apprenticeship). An | Demographics, employment, and economics | Revolution Wind |

| EPM Number | Proposed Project Phase | EPM | Description of Environmental Protection Measures Committed to by Revolution Wind, LLC (VHB 2023)* | Resource Area Affected | Anticipated Enforcing Agency/Lessee† |
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| | | | additional $700,000 will be dedicated to other local programming that creates access to these careers for disadvantaged communities. | | |
| Demo-6 | Construction and Installation | Labor standards | Construction of the Revolution Wind project will be governed by the National Offshore Wind Agreement, which is a project labor agreement that will apply to domestic construction activities associated with the project. | Demographics, employment, and economics | Revolution Wind |
| Rec-1 | Construction and installation | Fisheries communication plan | A comprehensive communication plan will be implemented during offshore construction to inform all mariners, including commercial and recreational fishermen, and recreational boaters of construction activities and vessel movements. Communication will be facilitated through a Project website, public notices to mariners and vessel float plans, and a fisheries liaison. Revolution Wind will submit information to the USCG to issue Local Notice to Mariners during offshore installation activities. | Recreation and tourism | Revolution Wind |
| Rec-2 | Construction and installation | TOY restrictions on onshore facilities construction | The Onshore Facilities construction schedule will be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day. | Recreation and tourism | Revolution Wind |
| Rec-3 | Construction and installation | Coordination with local authorities to address environmental and community concerns | Revolution Wind will coordinate with local authorities during construction of Onshore Facilities to minimize local traffic impacts; further, these Project components will be constructed in compliance with applicable regulations related to environmental and community concerns (e.g., traffic and erosion). In addition, traffic will be temporary and will not impact long-term property values. | Recreation and tourism | Revolution Wind |
| ComFish-1 | Construction and installation and O&M | WTG spacing and layout | Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mi (1-nm) by 1.15-mi (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This layout has been confirmed through expert analysis to allow for safe navigation without the need for additional designated transit lanes. This layout will also provide a uniform, wide spacing among structures to facilitate search and rescue operations. | Commercial and recreational fishing | Revolution Wind |
| ComFish-2 | Construction and installation | Cable burial risk assessment | To the extent feasible, installation of the Inter-Array Cable, OSS Interconnector Cable, and RWEC will occur using equipment such as mechanical cutter, mechanical plow, or jet plow. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment. | Commercial and recreational fishing | Revolution Wind |
| ComFish-3 | Construction and installation | Cable burial risk assessment | To the extent feasible, the RWEC, IAC, and OSS-Link Cable will typically target a burial depth of 4 to 6 ft (1.2 to 1.8 m) below seabed. The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. | Commercial and recreational fishing | Revolution Wind |
| ComFish-4 | Construction and installation and O&M | Implementation of BMPS | As appropriate and feasible, BMPs will be implemented to minimize impacts on fisheries, as described in the Guidelines for Providing Information on Fisheries Social and Economic Conditions for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 (BOEM 2020). | Commercial and recreational fishing | Revolution Wind |
| ComFish-5 | Preconstruction, construction and installation, and postconstruction | Fisheries and benthic monitoring studies | Revolution Wind is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and postconstruction. Fisheries and benthic monitoring studies are being planned to assess the impacts associated with the Project on economically and ecologically important fisheries resources. These studies will be conducted in collaboration with the local fishing industry and will build upon monitoring efforts being conducted by affiliates of Revolution Wind at other wind farms in the region. | Commercial and recreational fishing | Revolution Wind |
| ComFish-6 | Construction and installation and O&M | WTG lighting and ais installation | Each WTG will be marked and lit with both USCG navigation lighting and FAA aviation lighting. Automatic Identification Systems (AISs) will be installed at the RWF marking the corners of the wind farm to assist in safe navigation. | Commercial and recreational fishing | Revolution Wind |
| ComFish-7 | Construction and installation, O&M, and decommissioning | Spill prevention and control measures | Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges. | Commercial and recreational fishing | Revolution Wind |
| ComFish-8 | Construction and installation, O&M, and decommissioning | OSRP | Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP. | Commercial and recreational fishing | Revolution Wind |

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| ComFish-9 | Construction and installation, O&M, and decommissioning | Marine debris awareness training | All vessels will comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to NTL 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process. | Commercial and recreational fishing | Revolution Wind |
| ComFish-10 | Construction and installation and O&M | Fisheries communication plan | Communications and outreach with the commercial and recreational fishing industries will be guided by the Project-specific Fisheries Communication Plan. Revolution Wind has agreed to share fisheries monitoring data with regulatory agencies and interested stakeholders upon request. Data sharing will occur on an annual cycle, which may be unique to each survey, and all data will be subject to rigorous quality assurance and quality control criterion prior to dissemination. | Commercial and recreational fishing | Revolution Wind |
| ComFish-11 | Construction and installation, O&M, and decommissioning | Coordination with appropriate federal, state, and local contacts | Project construction, O&M, and decommissioning activities will be coordinated with appropriate contacts at USCG, Naval Undersea Warfare Center (NUWC)-Newport RI, the Northeast Marine Pilots Association, and Department of Defense (DoD) command headquarters. | Commercial and recreational fishing | Revolution Wind |
| ComFish-12 | Preconstruction | Siting of RWEC | RWEC was sited to avoid conflicts with DoD use areas and navigational areas identified by the USCG, as applicable. | Commercial and recreational fishing | Revolution Wind |
| ComFish-13 | Construction and installation | Fisheries communication plan | A comprehensive communication plan will be implemented during offshore construction to inform all mariners, including commercial and recreational fishermen, and recreational boaters of construction activities and vessel movements. Communication will be facilitated through a Fisheries Liaison, Project website, and public notices to mariners and vessel float plans (in coordination with USCG). | Commercial and recreational fishing | Revolution Wind |
| ComFish-14 | Construction and installation | TOY restrictions | Revolution Wind will continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies. | Commercial and recreational fishing | Revolution Wind |
| ComFish-15 | Construction and installation, O&M, and decommissioning | Coastal Zone Management Act (CZMA) consistency reviews | **Direct Compensation Program** (will be in place 30 days after the receipt of all final federal, state and local permits, authorizations, concurrences, and approvals necessary to construct and operate Revolution Wind as described in the approved COP and will exist for the life of the project) – Revolution Wind will create a Direct Compensation Program for impacted fishermen. Similar to South Fork Wind, Revolution Wind will base the direct compensation program on findings from two separate Coastal Zone Management Act (CZMA) consistency reviews conducted by the states of Rhode Island and Massachusetts and resulting mitigation agreements. The direct compensation programs which are part of the mitigation agreements for the states of Rhode Island and Massachusetts will address impacts to commercial fishing operations and for-hire recreational fishing operations. Revolution Wind expects that the structure of the direct compensation programs agreed to via the CZMA process will substantially reflect South Fork Wind's direct compensation program. Understanding there may be impacts outside of Rhode Island and Massachusetts, Revolution Wind is committed to advancing and adhering to principles set forth by the nine-state initiative as well as ideals laid out in the BOEM guidance. Together, the nine-state initiative and BOEM guidance will ensure a fair and efficient compensatory mitigation process regardless of homeport. It is Revolution Wind's intent to contribute, to the extent necessary, an amount commensurate to impacted landings from states exclusive of Rhode Island and Massachusetts. It is Revolution Wind's understanding that the nine-state initiative will create a process that will be managed by a third party, determine eligibility, and approve claims. | Commercial and recreational fishing | Revolution Wind, Massachusetts Office of Coastal Zone Management, and Rhode Island Coastal Resources Management Council |
| ComFish-16 | Construction and installation, O&M, and decommissioning | CZMA consistency reviews | **Coastal Community Funds** – In addition to the direct compensation programs created during the CZMA process, Revolution Wind will create or contribute to Coastal Community Funds in Rhode Island and Massachusetts. The contribution amounts will be determined during the CZMA process. The Coastal Community Funds will be grant-making entities, unrelated to Revolution Wind, and open to all fishing interests, including private recreational angling and on-shore support businesses. | Commercial and recreational fishing | Revolution Wind, Massachusetts Office of Coastal Zone Management, and Rhode Island Coastal Resources Management Council |
| ComFish-17 | Construction and installation, O&M, and decommissioning | CZMA consistency reviews | **Navigational Safety Fund** (will be in place 30 days after the receipt of all final federal, state and local permits, authorizations, concurrences, and approvals necessary to construct and operate Revolution Wind as described in the approved COP and will exist until funds run out) – The Navigational Safety Fund will enable eligible commercial fishermen and for-hire vessels to acquire navigation equipment through a voucher system. The Navigational Safety Fund will be similar to and carry out the same intent as the program established for South Fork Wind[2]. It will also provide training and | Commercial and recreational fishing | Revolution Wind, Massachusetts Office of Coastal Zone Management, and Rhode Island Coastal Resources Management Council |

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| | | | experiential learning opportunities to those navigating within Orsted's lease area off the coast of Rhode Island and Massachusetts. Fishermen eligible for the Direct Compensation Program and who do not already possess AIS transceivers and/or pulse compression radar systems may receive one-time grants for up to $10,000 in order to upgrade or purchase pulse compression radar or AIS. Commercial fishing vessels and inspected for-hire/party vessels will be eligible for $10,000 in upgrades and uninspected for- hire vessels will be eligible for $5,000 in upgrades. Eligible fishermen will be issued vouchers to spend at approved vendors for approved products. The process of issuing vouchers, approving vendors, and approving equipment will be managed by a third party which could be the same third party managing the Direct Compensation Program. In addition to vessel upgrades, there will be an educational component to the Navigational Safety Fund. Those eligible for direct compensation may attend a professional training of their choice with support up to $1,000 per person. Eligible trainings include but are not limited to a captain's course, license upgrade, radar course, or rules of the road refresher. Like vessel upgrades, a third party manager will issue vouchers for training and be responsible for approving trainings, trainers, educators, and/or institutions. | | |
| ComFish-18 | Construction and installation, O&M, and decommissioning | CZMA consistency reviews | **Gear Claim Procedure** (currently in use and will exist for the life of the project) – Orsted administers a portfolio-wide gear claim procedure which makes fishermen whole if Orsted activities damage or destroy commercial fishing gear. The gear claim process has been in place since 2018 and has had significant updates since then. The most significant update in January 2021 included changes to model the gear claim procedure after NOAA's Fishermen's Contingency Fund to the greatest extent possible. Currently, the gear claim process requires a fisherman to file a claim within 30 days upon discovery of lost or damaged gear. They may request reimbursement for lost/damaged gear, economic loss (lost catch and business interruption), and reasonable claim preparation costs. After they submit a complete claim, the claim is reviewed and either accepted or rejected in whole or in part. If rejected in whole or in part, the fishermen may appeal the decision to an independent third party. The independent third party's review is final. The full details of the gear claim process can be found at https://us.orsted.com/renewable-energy-solutions/offshore-wind/mariners. | Commercial and recreational fishing | Revolution Wind, Massachusetts Office of Coastal Zone Management, and Rhode Island Coastal Resources Management Council |
| Nav-1 | Construction and installation and O&M | WTG spacing and layout | Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mi (1-nm) by 1.15-mi (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI-MA WEA. This layout has been confirmed through expert analysis to allow for safe navigation without the need for additional designated transit lanes. This layout will also provide a uniform, wide spacing among structures to facilitate search and rescue operations. | Navigation and vessel traffic | Revolution Wind |
| Nav-2 | Construction and installation and O&M | WTG lighting and ais installation | Each WTG will be marked and lit with both USCG navigation lighting and FAA aviation lighting. AIS will be installed at the RWF marking the corners of the wind farm to assist in safe navigation. | Navigation and vessel traffic | Revolution Wind |
| Nav-3 | Construction and installation, O&M, and decommissioning | Spill prevention and control measures | Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges. | Navigation and vessel traffic | Revolution Wind |
| Nav-4 | Construction and installation, O&M, and decommissioning | OSRP | Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP. | Navigation and vessel traffic | Revolution Wind |
| Nav-5 | Construction and installation, O&M, and decommissioning | Coordination with appropriate federal, state, and local contacts | Project construction, O&M, and decommissioning activities will be coordinated with appropriate contacts at USCG, NUWC-Newport RI, the Northeast Marine Pilots Association, and DoD command headquarters. | Navigation and vessel traffic | Revolution Wind |
| Nav-6 | Preconstruction | Siting of RWEC | RWEC was sited to avoid conflicts with DoD use areas and navigational areas identified by the USCG, as applicable. | Navigation and vessel traffic | Revolution Wind |
| Nav-7 | Construction and installation | Fisheries communication plan | A comprehensive communication plan will be implemented during offshore construction to inform all mariners, including commercial and recreational fishermen, and recreational boaters of construction activities and vessel movements. Communication will be facilitated through a Fisheries Liaison, Project website, and public notices to mariners and vessel float plans (in coordination with USCG). | Navigation and vessel traffic | Revolution Wind |

| EPM Number | Proposed Project Phase | EPM | Description of Environmental Protection Measures Committed to by Revolution Wind, LLC (VHB 2023)* | Resource Area Affected | Anticipated Enforcing Agency/Lessee† |
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| Nav-8 | Construction and installation, O&M, and decommissioning | Consultation with appropriate federal, state, and local agencies | Revolution Wind will consult with USCG, NUWC-Newport RI, the Northeast Marine Pilots Association, and regional ferry service operators to avoid or reduce use conflicts. | Navigation and vessel traffic | Revolution Wind |
| Land-1 | Construction and installation | Siting of onshore facilities | Onshore Facilities will be sited within previously disturbed and developed areas to the extent practicable. | Land use and coastal infrastructure | Revolution Wind |
| Land-2 | Construction and installation | Coordination with local authorities to address environmental and community concerns | Revolution Wind will coordinate with local authorities during construction of Onshore Facilities to minimize local traffic impacts; further, these Project components will be constructed in compliance with applicable regulations related to environmental and community concerns (e.g., traffic and erosion). In addition, traffic will be temporary and will not impact long-term property values. | Land use and coastal infrastructure | Revolution Wind |
| Land-3 | Construction and installation, O&M, and decommissioning | SESC plan | An SESC Plan, including erosion and sedimentation control measures, will be implemented to minimize potential water quality impacts during construction and operation of the Onshore Facilities. | Land use and coastal infrastructure | Revolution Wind |
| Other-1 | Construction and installation and O&M | WTG spacing and layout | Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mi (1-nm) by 1.15-mi (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This layout has been confirmed through expert analysis to allow for safe navigation without the need for additional designated transit lanes. This layout will also provide a uniform, wide spacing among structures to facilitate search and rescue operations. | Other uses | Revolution Wind |
| Other-2 | Construction and installation, O&M, and decommissioning | Consultation with appropriate federal, state, and local agencies | Revolution Wind will consult with USCG, NUWC-Newport RI, the Northeast Marine Pilots Association, and regional ferry service operators to avoid or reduce use conflicts. | Other uses | Revolution Wind |
| Other-3 | Construction and installation and O&M | WTG lighting and ais installation | Each WTG will be marked and lit with both USCG navigation lighting and FAA aviation lighting. AIS will be installed at the RWF marking the corners of the wind farm to assist in safe navigation. | Other uses | Revolution Wind |
| EJ-1 | Construction and installation, O&M, and decommissioning | Labor standards | Construction of the Revolution Wind project will be governed by the National Offshore Wind Agreement, which is a project labor agreement that will apply to domestic construction activities associated with the project. | Environmental justice | Revolution Wind |
| EJ-2 | Construction and installation | TOY restrictions on onshore facilities construction | The Onshore Facilities construction schedule will be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day. | Environmental justice | Revolution Wind |
| EJ-3 | Construction and installation | Coordination with local authorities to address environmental and community concerns | Revolution Wind will coordinate with local authorities during construction of Onshore Facilities to minimize local traffic impacts; further, these Project components will be constructed in compliance with applicable regulations related to environmental and community concerns (e.g., traffic and erosion). In addition, traffic will be temporary and will not impact long-term property values. | Environmental justice | Revolution Wind |
| EJ-4 | Construction and installation, O&M, and decommissioning | Studies of contaminated soil and groundwater in environmental justice focus areas | Investigation and remediation of contaminated soil and groundwater must be carried out in accordance with RIDEM regulations and policies regarding Environmental Justice Focus Areas including enhanced stakeholder outreach. | Environmental justice | Revolution Wind |
| EJ-5 | Construction and installation | ADLS (or a similar system) | Revolution Wind will use ADLS (or a similar system), pursuant to approval by the FAA and commercial and technical feasibility at the time of FDR/FIR approval. | Environmental justice | Revolution Wind |
| EJ-6 | Construction and installation | Burial of onshore transmission cables and ICF interconnection | The Onshore Transmission Cable and ICF Interconnection ROW will be buried, minimizing potential impacts to adjacent properties. | Environmental justice | Revolution Wind |
| EJ-7 | Construction and installation and O&M | Onshore facilities screening | Screening will be implemented at the aboveground Onshore Facilities to the extent feasible, to reduce potential visibility and noise. | Environmental justice | Revolution Wind |
| EJ-8 | Construction and installation, O&M, and decommissioning | Mitigation of air emissions | Onshore facilities equipment and fuel suppliers will provide equipment and fuels that comply with the applicable EPA or equivalent emission standards. | Environmental justice | Revolution Wind |

| EPM Number | Proposed Project Phase | EPM | Description of Environmental Protection Measures Committed to by Revolution Wind, LLC (VHB 2023)* | Resource Area Affected | Anticipated Enforcing Agency/Lessee† |
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| EJ-9 | Preconstruction | Community-based career development programming | Revolution Wind is committing $1,000,000 to community-based programming, including $500,000 to the Community College of Rhode Island to help build their Global Wind Organization (GWO) training center and $500,000 to Building Futures Rhode Island to enable both new entrants to union construction careers (through pre-apprenticeship). An additional $700,000 will be dedicated to other local programming that creates access to these careers for disadvantaged communities . | Environmental Justice | Revolution Wind |

* The COP EMP descriptions were taken verbatim from the COP and were not edited.

† At the time of preparation of this document, BOEM and BSEE are in the process of transferring enforcement authorities from BOEM to BSEE.

**Table F-2. Mitigation and Monitoring Measures Resulting from Consultations**

| Mitigation Number | Proposed Project Phase | Mitigation or Monitoring Measure | Description of Mitigation and Monitoring Measures Resulting from Consultations | Resource Area Mitigated | BOEM's Identification of the Anticipated Enforcing Agency* |
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| **Radar Systems Mitigations Resulting from Department of Defense (DOD), Federal Aviation Administration (FAA), National Oceanic and Atmospheric Administration (NOAA) Integrated Ocean Observing System (IOOS) Reviews** | | | | | |
| 1 | O&M | Mitigation for oceanographic high-frequency radars | Operational mitigations identified for impacts on airport surveillance radar (ASR)-8/9:<br>• Passive aircraft tracking using Automatic Dependent Surveillance–Broadcast (ADS-B) or signal/transponder<br>• Increasing aircraft altitude near radar<br>• Sensitivity time control (range-dependent attenuation)<br>• Range azimuth gating (ability to isolate/ignore signals from specific range-angle gates)<br>• Track initiation inhibit, velocity editing, plot amplitude thresholding (limiting the amplitude of certain signals)<br>• Modification mitigations for Air Route Surveillance Radar (ARSR)-4 and for ASR-8/9 systems:<br>• Using the dual beams of the radar simultaneously<br>• In-fill radars | Other marine uses – land-based radar | BOEM and Bureau of Safety and Environmental Enforcement (BSEE) |
| 2 | O&M | Mitigation for oceanographic high-frequency radars | BOEM would require that Revolution Wind coordinate with the radar operators and the Surface Currents Program of NOAA IOOS Office to assess if the Project causes radar interference to the degree that radar performance is no longer within the specified radar system's operation parameters or fails to meet mission objectives. If either is the case, the lessee must notify BOEM and engage radar operators and NOAA IOOS on mitigation efforts. The following options to mitigate operational impacts on oceanographic high-frequency radars have been identified:<br>• Data sharing from turbine operators to include the following:<br>○ Sharing real-time telemetry of surface current velocity, wave height, wave period, wave direction, and other oceanographic data measured at locations in the Project with radar operators into the public domain<br>○ Sharing time-series of blade rotation rates, nacelle bearing angles, and other information about the operational state of each of the Project's turbines with radar operators to aid interference mitigation<br>• Wind farm curtailment/curtailment agreement | Other marine uses – land-based radar | BOEM and BSEE |

| Mitigation Number | Proposed Project Phase | Mitigation or Monitoring Measure | Description of Mitigation and Monitoring Measures Resulting from Consultations | Resource Area Mitigated | BOEM's Identification of the Anticipated Enforcing Agency* |
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| | | | Additional modifications identified for oceanographic high-frequency radar systems to mitigate impacts:<br>• Signal processing enhancements<br>• Antenna modifications | | |
| 3 | O&M | Mitigation for Next Generation Weather Radar (NEXRAD) weather radar systems | Operational mitigations to NEXRAD weather radar systems include the following:<br>• Wind farm curtailment/curtailment agreement<br>Research is being conducted to determine whether impacts on weather radar can be mitigated by using phased array radars to achieve a null in the antenna radiation pattern in the direction of the wind turbine. | Other marine uses – land-based radar | BOEM and BSEE |
| 4 | Construction, O&M, decommissioning | Add conditions of COP approval | Require the following conditions of COP approval to mitigate potential impacts on ASR-8/9:<br>• Notify North American Aerospace Defense Command (NORAD) 30 to 60 days ahead of Project completion and when the Project is complete and operational for radar adverse-impact management (RAM) scheduling<br>• Contribute funds toward execution of the RAM<br>• Curtail operations for national security or defense purposes as described in the leasing agreement | Other marine uses – land-based radar | BOEM and BSEE |
| **USFWS Biological Opinion Reasonable and Prudent Measures from the USFWS Issued May 30, 2023†** | | | | | |
| 1 | Construction and O&M | Measures to minimize take of piping plovers and rufa red knots. | Periodically review current technologies and methods for minimizing collision risk of migratory birds with WTGs, including but not limited to: WTG coloration/marking, lighting, avian deterrents, remote sensing such as radar and thermal cameras, and limited WTG operational changes.[1] | Birds | BOEM and USFWS |
| 2 | Construction and O&M | Measures to minimize take of piping plovers and rufa red knots. | Implement those technologies and methods deemed reasonable and prudent to minimize collision risk.[2] | Birds | BOEM and USFWS |
| **USFWS Biological Opinion Terms and Conditions from the USFWS Issued May 30, 2023†** | | | | | |
| 1 | O&M | Collision risk minimization and monitoring | Periodically review current technologies and methods for minimizing collision risk of listed birds.<br>• Prior to the start of WTG operations at Revolution Wind, BOEM must compile, from existing project documentation (e.g., the BA, other consultation documents, the final EIS, the COP), a stand-alone summary of technologies and methods that BOEM evaluated to reduce or minimize bird collisions at the Revolution Wind WTGs.<br>• Within 5 years of the start of WTG operation, and then every 5 years for the life of the project, BOEM must prepare a Collision Minimization Report (CMR), reviewing best available scientific and commercial data on technologies and methods that have been implemented, or are being studied, to reduce or minimize bird collisions at offshore and onshore WTGs. The review must be global in scope. | Birds | BOEM and USFWS |

[1] Operational changes may include, but are not limited to, feathering, which involves adjusting the angle of the blades to slow or stop them from turning under certain conditions.

[2] Reasonable and prudent minimization measures will include only actions that occur within the action area, involve only minor changes to the project, and reduce the projected level of take. Measures are reasonable and prudent when they (and their implementing terms and conditions) are consistent with the project's basic design, location, scope, duration, and timing (50 CFR 402.14(i)(i)(2)). The reasonableness determination will consider both technical and economic factors; the test for reasonableness is whether the proposed measure would cause more than a minor change to the project. The prudency determination will consider the likelihood, based on best available information, of successfully and appreciably reducing bird collisions relative to the cost and technical difficulty of the measure. The BOEM and the Service will ensure that any reasonable and prudent measures and terms and conditions are within the legal authority and jurisdiction of the BOEM and Revolution Wind to carry out.

| Mitigation Number | Proposed Project Phase | Mitigation or Monitoring Measure | Description of Mitigation and Monitoring Measures Resulting from Consultations | Resource Area Mitigated | BOEM's Identification of the Anticipated Enforcing Agency* |
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| | | | • BOEM must distribute a draft CMR to the USFWS, Revolution Wind, and appropriate state agencies for a 60-day review period. BOEM must address all comments received during the review period and issue the final report within 60 days of the close of the review period.<br>• Within 60 days of issuing the final CMR, BOEM must convene a meeting with the USFWS, Revolution Wind, and appropriate state agencies to discuss the report and seek consensus on whether implementation of any technologies/methods are reasonable and prudent. If consensus cannot be reached, the USFWS will consider input from the meeting participants and make the final determination of whether any measures are reasonable and prudent and should be implemented under RPM 2. | | |
| 2 | Construction and O&M | Implementation of measures to minimize take of piping plovers and rufa red knots. | Implement those technologies and methods deemed reasonable and prudent to minimize collision risk.<br>BOEM will require Revolution Wind to adopt and deploy reasonable and prudent technologies and methods to avoid or minimize take of the piping plover and rufa red knot. Additional technology and methods would be required only if they are likely to appreciably reduce take of the piping plover and rufa red knot, in accordance with 50 CFR 402.14(i)(2). BOEM will specify the USFWS-approved timeframe in which any required minimization measure(s) must be implemented, as well as any requirements to monitor, maintain, or adapt the measure(s) over time.<br>BOEM will require Revolution Wind to provide periodic reporting on the implementation of any minimization measure(s) according to a schedule developed by BOEM and approved by the USFWS. | Birds | BOEM and USFWS |
| **USFWS Biological Opinion Monitoring and Reporting Requirements from the USFWS Issued May 30, 2023†** | | | | | |
| 1 | Construction and O&M | Monitoring and reporting for piping plovers and rufa red knots | BOEM or Revolution Wind shall monitor the action area for piping plovers and rufa red knots. As effective technology and methods become available, BOEM should include monitoring for piping plovers and rufa red knots that may have collided with a WTG during migration. The monitoring method(s) should be informed by the best available information and technology and could include boat-based monitoring, Motus stations, remote sensing, cameras, microphones, Doppler and NEXRAD radar, eDNA, etc. The monitoring should occur during the time(s) of year when collisions are most likely. Initially, monitoring will proceed according to Revolution Wind's Avian and Bat Post-Construction Monitoring Framework and be operational for the first piping plover and rufa red knot migratory seasons after the WTGs are operational. Subsequently, consideration of new methods and timing will occur on the same timeline as the CMR described in the Terms and Conditions above unless BOEM and the USFWS agree to a different schedule. | Birds | BOEM and USFWS |
| 2 | Construction and O&M | Monitoring and reporting for piping plovers and rufa red knots | BOEM shall notify the USFWS within two business days if an injured or dead piping plover or rufa red knot is identified in or within 1 mile of the Revolution Wind lease area | Birds | BOEM and USFWS |
| 3 | Construction and O&M | Monitoring and reporting for listed species | BOEM or Revolution Wind shall provide a report to the USFWS annually summarizing monitoring efforts, methods, and results; observations of injured or dead piping plovers and rufa red knots; observations of any listed species perching on Revolution Wind infrastructure (including offshore substations); implementation and effectiveness of avoidance and minimization measures; and any other relevant activity and information related to the proposed action and potential impacts to listed species. BOEM will submit the report to the USFWS by the end of each calendar year or at another time agreed to by the two agencies. This report can be part of a larger, more comprehensive offshore wind report submitted to the USFWS annually. | Birds | BOEM and USFWS |
| 4 | Construction and O&M | Reporting for listed species | Reports and notifications will be submitted to:<br>Field Supervisor<br>New England Field Office<br>U.S. Fish and Wildlife Service | Birds | BOEM and USFWS |

| Mitigation Number | Proposed Project Phase | Mitigation or Monitoring Measure | Description of Mitigation and Monitoring Measures Resulting from Consultations | Resource Area Mitigated | BOEM's Identification of the Anticipated Enforcing Agency* |
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| | | | 70 Commercial Street, Suite 300<br>Concord, NH 03301<br>newengland@fws.gov<br>603-223-2541 | | |
| **BOEM-proposed Bird and Bat Mitigation Measures** | | | | | |
| 1 | Construction, O&M | Bird-perching deterrent devices | To minimize attracting birds to operating turbines, the Lessee must install anti-perching devices on turbines and the offshore substation (OSS). The location of anti-perching devices must be proposed by Revolution Wind based on best management practices (BMPs) applicable to the appropriate operation and safe installation of the devices. Revolution Wind must confirm the locations of anti-perching devices with a monitoring plan to track the efficacy of the anti-perching devices as part of the documentation it must submit with the facility design report (FDR). | Birds | BOEM, BSEE and USFWS |
| 2 | Construction and installation, O&M, and decommissioning | Annual bird and bat mortality reporting | Revolution Wind must submit an annual report covering each calendar year, due by January 31 of the following year, documenting any dead (or injured) birds or bats found on vessels and structures during construction, operations, and decommissioning. The report must be submitted to BOEM (at renewable_reporting@boem.gov) and BSEE (at OSWSubmittals@bsee.gov) and the U.S. Fish and Wildlife Service (USFWS). The report must contain the following information: name of species, date found, location, a picture to confirm species identity (if possible), and any other relevant information. Carcasses with federal or research bands must be reported to the U.S. Geological Survey (USGS) Bird Banding Laboratory at https://www.usgs.gov/labs/bird-banding-laboratory. | Birds and bats | BOEM, BSEE, and USFWS |
| 3 | Construction and installation, O&M, and decommissioning | Annual Bird and Bat Mortality Reporting | Any occurrence of dead ESA-listed birds or bats must be reported to BOEM, BSEE, and USFWS as soon as practicable (taking into account crew and vessel safety), but no later than 24 hours after the sighting, and if practicable, the dead specimen should be carefully collected and preserved in the best possible state. | Birds and bats | BOEM, BSEE and USFWS |
| 4 | O&M | Avian and Bat Monitoring Program | At least 45 calendar days before beginning surveys, Revolution Wind must complete, obtain concurrence from the U.S. Department of the Interior (DOI), and adopt an avian and bat monitoring plan (ABMP), as described in Revolution Wind's *Avian and Bat Post- Construction Monitoring Framework* in COP Appendix AA (Biodiversity Research Institute [BRI] 2023), including coordination with interested stakeholders. The DOI will review the ABMP and provide any comments on the plan within 30 calendar days of its submittal. Revolution Wind must resolve all comments on the ABMP to the DOI's satisfaction before implementing the plan. Revolution Wind may conclude that DOI has concurred in the ABMP if the DOI provides no comments on the plan within 30 calendar days of its submittal date.<br>a. Monitoring. Revolution Wind must 1) install acoustic monitoring devices for bats for 2 years; 2) install Motus receivers within the wind farm; 3) refurbish up to two onshore Motus receiver stations; 4) provide funding for up to 150 Motus tags per year for up to 3 consecutive years; and 5) conduct a 1- to 2-year cross-project radar study to measure migrant flux rates, flight heights, and marine bird avoidance.<br>b. Annual monitoring reports. Revolution Wind must submit to BOEM (at renewable_reporting@boem.gov), USFWS, and BSEE (at OSWSubmittals@bsee.gov) a comprehensive report after each full year of monitoring (preconstruction and postconstruction) within 6 months of completion of the last avian survey. The report must include all data, analyses, and summaries regarding ESA-listed and non-ESA-listed birds and bats. The DOI will use the annual monitoring reports to assess the need for reasonable revisions (based on subject matter expert analysis) to the ABMP. The DOI reserves the right to require reasonable revisions to the ABMP and may require new technologies as they become available for use in offshore environments.<br>c. Postconstruction quarterly progress reports. Revolution Wind must submit quarterly progress reports during the implementation of the ABMP to BOEM (at renewable_reporting@boem.gov) and the USFWS by the fifteenth day of the month following the end of each quarter during the first full year that the Project is | Birds and bats | BOEM, BSEE, and USFWS |

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| | | | operational. The progress reports must include a summary of all work performed, an explanation of overall progress, and any technical problems encountered.<br>d. Monitoring plan revisions. Within 15 calendar days of submitting the annual monitoring report, the Lessee must meet with BOEM and the USFWS to discuss the following: the monitoring results; the potential need for revisions to the ABMP, including technical refinements or additional monitoring; and the potential need for any additional efforts to reduce impacts. If the DOI determines after this discussion that revisions to the ABMP are necessary, the DOI may require the Lessee to modify the ABMP. If the reported monitoring results deviate substantially from the impact analysis included in the Final EIS, the Lessee must transmit to the DOI recommendations for new mitigation measures and/or monitoring methods.<br>e. Operational reporting (operations). Revolution Wind must submit to BOEM (at renewable_reporting@boem.gov) and BSEE (at OSWSubmittals@bsee.gov) an annual report summarizing the following monthly operational data calculated from 10-minute supervisory control and data acquisition (SCADA) for all turbines together in tabular format: the proportion of time the turbines were operational (spinning at > x rpm) each month, the average rotor speed (monthly rpms) of spinning turbines plus 1 standard deviation, and the average pitch angle of blades (degrees relative to rotor plane) plus 1 standard deviation. The DOI will use this information as inputs for avian collision risk models to assess whether the results deviate substantially from the impact analysis included in the Final EIS.<br>f. Raw data. Revolution Wind must store the raw data from all avian and bat surveys and monitoring activities according to accepted archiving practices. Such data must remain accessible to the DOI and the USFWS, upon request for the duration of the lease. Revolution Wind must work with BOEM to ensure the data are publicly available. The USFWS may specify third-party data repositories that must be used, such as the Motus Wildlife Tracking System or MoveBank, and such parties and associated data standards may change over the duration of the monitoring plan. | | |
| 5 | O&M | Adaptive mitigation for birds and bats | If the reported postconstruction bird and bat monitoring results (generated as part of the *Avian and Bat Post-Construction Monitoring Framework* in COP Appendix AA [BRI 2023] indicate bird and bat impacts deviate substantially from the impact analysis included in this EIS, then Revolution Wind must make recommendations for new mitigation measures or monitoring methods. | Birds and bats | BOEM and USFWS |
| **BOEM-proposed Navigation and Vessel Traffic Mitigation Measures Developed in Conjunction with the U.S. Coast Guard (USCG)** | | | | | |
| 1 | Construction, O&M, decommissioning | Submarine cable system burial plan | A copy of the submarine cable system burial plan shall be submitted by Revolution Wind as part of its FDR and fabrication and installation report (FIR) that depicts precise planned locations and burial depths of the entire cable system. This plan shall be reviewed by the USCG and BOEM. | Navigation and vessel traffic | BOEM, BSEE, and USCG |
| 2 | Construction | Boulder relocation reporting | The locations of any boulder (which would protrude > 2 meters [m] or more on the seafloor) relocated during cable installation activities must be reported to BOEM, the USCG, NOAA, and the local harbormaster within 30 days of relocation. These locations must be reported in latitude and longitude degrees to the nearest 10 thousandth of a decimal degree (roughly the nearest meter), or as precise as practicable. | Navigation and vessel traffic | BOEM, BSEE, USCG, and NOAA |
| 3 | Construction, O&M, decommissioning | Vessel safety practices | All Project vessels involved in construction, O&M, and decommissioning activities would comply with U.S. or International Convention for the Safety of Life at Sea (SOLAS) standards, as applicable, with regard to vessel construction, vessel safety equipment, and crewing practices. | Navigation and vessel traffic | BOEM, BSEE, and USCG |

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| 4 | Construction, O&M, decommissioning | WTG and OSS marking | Each WTG and OSS would be marked with private aids to navigation (PATONs), subject to the approval of the Commander (dpw-1) of the First Coast Guard District. Revolution Wind would do the following:<br>Provide BOEM and the USCG with a proposed lighting, marking, and signaling plan, which must be approved by BOEM after consultation with the USCG. The plan should conform to the International Association of Marine Aids to Navigation and Lighthouse Authorities Recommendation G1162, *The Marking of Man-Made Offshore Structures* (IALA 2021). Should any part of the recommendation conflict with federal law or regulation, or if Revolution Wind seeks an alternative to the recommendation, Revolution Wind must consult with the USCG.<br>Mark each individual WTG and OSS with clearly visible, unique, alphanumeric identification characters.<br>Light each WTG and OSS in a manner that is visible by mariners in a 360-degree arc around the WTG and OSS.<br>Apply to the First Coast Guard District to establish PATONs for the facility. Approval for all PATONs must be obtained before installation of RWF structures begins.<br>Ensure each WTG is lighted with red obstruction lighting consistent with the FAA Advisory Circular 70/7460-1L Change 2 (FAA 2018), so long as this requirement does not preclude the use of an aircraft detection lighting system (ADLS).<br>Provide signage that covers 360 degrees of the wind turbine structures warning vessels of the air draft of the turbine blades as determined at highest astronomical tide.<br>Cooperate with the USCG and NOAA to ensure that cable routes and wind turbines are depicted on appropriate government produced and commercially available nautical charts.<br>Provide mariner information sheets on Revolution Wind's website with details on the location of the turbines and specifics such as blade clearance above sea level. | Navigation and vessel traffic | BOEM, BSEE, USCG, and NOAA |
| 5 | Construction, O&M, decommissioning | WTG shutdown mechanism | Equip all WTG rotors (blade assemblies) with control mechanisms operable from the RWF control centers available 24 hours a day, 7 days a week. The control mechanisms shall enable control room operators to shut down the requested WTGs within an agreed-upon time of notification between the USCG and Revolution Wind. A formal shutdown procedure would be part of the standard operating procedures and periodically tested. Normally, USCG-ordered shutdowns would be limited to those WTGs in the immediate vicinity of an emergency and for as short a period as is safely practicable under the circumstances, as determined by the USCG. | Navigation and vessel traffic: other marine uses | BSEE and USCG |
| 6 | Construction, O&M, decommissioning | USCG training and exercises | Revolution Wind would participate in periodic USCG-coordinated training and exercises to test and refine notification and shutdown procedures and to provide SAR training opportunities for USCG vessels and aircraft. | Navigation and vessel traffic; other marine uses | BSEE and USCG |
| 7 | Construction, O&M, decommissioning | Operations and maintenance plan | Prior to operation of the Project, Revolution Wind shall submit a written plan for O&M, which includes control center(s), for review by BOEM and the USCG. The plan must demonstrate that the control center(s) would be adequately staffed to perform standard operating procedures, communications capabilities, and monitoring capabilities. The plan shall include, but not be limited to, the following topics, which may be modified through ongoing discussions with the USCG:<br>Standard operating procedures: Methods for establishing and testing WTG rotor shutdown; methods of lighting control; method(s) for notifying the USCG of mariners in distress or potential/actual SAR incidents; method(s) for notifying the USCG of any events or incidents that may impact maritime safety or security; and methods for providing the USCG with environmental data, imagery, communications, and other information pertinent to SAR or marine pollution response.<br>Staffing: Number of personnel intended to staff the control center(s) to ensure continuous monitoring of WTG operations, communications, and surveillance systems. | Navigation and vessel traffic; other marine uses | BOEM, BSEE, and USCG |

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| | | | Communications: Capabilities to be maintained by the control center(s) to communicate with the USCG and mariners within and near the Lease Area. Communications capability shall at a minimum include very high frequency (VHF) marine radio and landline and wireless for voice and data.<br>Monitoring: The control center(s) should maintain the capability to monitor RWF installation and operations in real time (including night and periods of poor visibility) for determining the status of all PATONs and detection of a survivor who has climbed to the survivor's platform, if installed, on any WTG or OSS. | | |
| 8 | Construction, O&M, decommissioning | WTG/OSS installation | No WTG/OSS installation work shall commence at the Project site (i.e., on or under the water) without prior review by BSEE and the USCG of a plan to be submitted by Revolution Wind that describes the schedule and process for erecting each WTG, including all planned mitigations to be implemented to minimize any adverse impacts on navigation while installation is ongoing. Appropriate Notice to Mariners submissions would accompany the plan. | Navigation and vessel traffic | BSEE and USCG |
| 9 | Construction, O&M, decommissioning | USCG reporting | Complaints: On a monthly basis during installation, Revolution Wind shall provide the USCG with a description of any complaints received (either written or oral) by boaters, fishermen, commercial vessel operators, or other mariners regarding impacts on navigation safety allegedly caused by construction vessels, crew transfer vessels, barges, or other equipment. Revolution Wind shall describe any remedial action taken in response to complaints received.<br>Correspondence: Revolution Wind shall provide the USCG copies of any correspondence received by Revolution Wind from other federal, state, or local agencies that mention or address navigation safety issues.<br>Maintenance schedule: Revolution Wind would provide the USCG with its planned WTG maintenance schedule, forecasted out to at least one quarter. Appropriate Notice to Mariners submissions would accompany each maintenance schedule. | Navigation and vessel traffic | BSEE and USCG |
| 10 | Construction, O&M, decommissioning | Public participation | To ensure sufficient opportunity for the public to receive information directly from the owners/operators of the wind energy facility, Revolution Wind would attend periodic meetings of the Southeastern Massachusetts and Rhode Island Port Safety and Security Forums to provide briefs on the status of construction and operations and on any problems or issues encountered with respect to navigation safety. | Navigation and vessel traffic | BOEM and BSEE |
| 11 | Construction, O&M, decommissioning | Helicopter landing platforms | If Revolution Wind's OSSs include helicopter landing platforms, those platforms would be designed and built to accommodate up to and including USCG H-60-sized rescue helicopters. | Navigation and vessel traffic; other marine uses | BOEM, BSEE, and USCG |
| **DOD Measures Resulting from Military Aviation and Installation Assurance Siting Clearinghouse Review** | | | | | |
| 1 | O&M | Fiber-optic sensing technology | Distributed fiber-optic sensing technology proposed for the Project or associated transmission cables would be reviewed by the DOD to ensure that distributed fiber-optic sensing is not used to detect sensitive data from DOD activities, to conduct any other type of surveillance of U.S. Government operations, or to otherwise pose a threat to national security. | Other marine uses – military and national security | BOEM, BSEE, and DOD |

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| **National Historic Preservation Act (NHPA) Section 106 Mitigation Measures from the Memorandum of Agreement** | | | | | |
| 1 | Construction and installation | Avoid or minimize and mitigate impacts on identified National Register of Historic Places (NRHP)–eligible cultural resources | Mitigation measures for cultural resources are drafted in the memorandum of agreement (MOA) and its historic property treatment plans attached in EIS Appendix J. Revolution Wind–committed measures identified in COP Appendix BB, *Cultural resources Avoidance, Minimization, and Mitigation Measures* (Revolution Wind 2023), would also be incorporated by BOEM into COP approval. This MOA and its requirements would be set by BOEM under NHPA Section 106 as a condition of BOEM's signing the ROD. Under the MOA, adverse effects from the Project to NRHP-eligible cultural resources, including national historic landmarks (NHLs) and traditional cultural places (TCPs), would be avoided, minimized, or mitigated in accordance with the NHPA Section 106 regulations (36 CFR 800) and in compliance with Section 110(f). | Cultural resources | BOEM and BSEE |
| **Draft NMFS Biological Opinion Reasonable and Prudent Measures from NMFS issued June 16, 2023†** | | | Draft NMFS Biological Opinion Reasonable and Prudent Measures were issued to BOEM for consideration on June 16, 2023.<br>Final NMFS Biological Opinion Reasonable and Prudent Measures to be issued to BOEM for consideration on July 21, 2023. | | |
| 1 | Construction and installation | Pile-driving | Effects to ESA-listed whales and sea turtles must be minimized during pile driving. This includes adherence to the mitigation measures specified in the final MMPA ITA. | ESA-listed marine mammals, sea turtles | BOEM, BSEE, and NMFS |
| 2 | Construction and installation | UXO detonation | Effects to ESA-listed whales and sea turtles must be minimized during UXO detonation. This includes adherence to the mitigation measures specified in the final MMPA ITA. | ESA-listed marine mammals, sea turtles | BOEM, BSEE, and NMFS |
| 3 | Construction and installation, O&M, decommissioning | Vessel operations | Vessels operated by Revolution Wind or under contract to Revolution Wind or its contractors must comply with the RPMs and Terms and Conditions relevant to vessel operations within the Delaware River and Delaware Bay included in the Incidental Take Statements provided with NMFS GARFO's July 19, 2022, Paulsboro Marine Terminal Biological Opinion or any subsequently issued Opinion that replace that Opinion as a result of reinitiation. | ESA-listed finfish | BOEM, BSEE, and NMFS |
| 4 | Construction and installation, O&M, decommissioning | Reporting requirements | Effects to, or interactions with, ESA-listed Atlantic sturgeon, whales, and sea turtles must be documented during all phases of the proposed action, and all incidental take must be reported to NMFS GARFO. | ESA-listed finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |
| 5 | Construction and installation | Review of plans | All required plans must be submitted to NMFS GARFO with sufficient time for review, comment, and approval. | ESA-listed finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |
| 6 | Construction and installation, O&M, decommissioning | On-site observation and inspection | On-site observation and inspection must be conducted to gather information on the effectiveness and implementation of measures to minimize and monitor incidental take during activities described in this Opinion, including its Incidental Take Statement. | ESA-listed finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |

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| **Draft NMFS Biological Opinion Terms and Conditions from NMFS issued June 16, 2023†** | | | Draft NMFS Biological Opinion Terms and Conditions were issued to BOEM for consideration on June 16, 2023.<br>Final NMFS Biological Opinion Terms and Conditions to be issued to BOEM for consideration on July 21, 2023. | | |
| 1 | Construction and installation | Pile-driving and UXO detonation | To implement the requirements of RPM 1 and 2, the measures required by the final MMPA ITA must be incorporated into any project authorizations/approvals, and the relevant Federal agency must monitor Revolution Wind's compliance with these measures:<br>a. BOEM must require, through an enforceable condition of their approval of Revolution Wind's Construction and Operations Plan, that Revolution Wind comply with any measures in the final MMPA ITA that are revised from, or in addition to, measures included in the proposed ITA, which already have been incorporated into the proposed action.<br>b. NMFS OPR must ensure that all mitigation measures as prescribed in the final ITA are implemented by Revolution Wind.<br>c. The USACE must require, through an enforceable condition of any permit issued to Revolution Wind, compliance with any measures in the final MMPA ITA that are revised from, or in addition to, measures included in the proposed ITA, which have been incorporated into the proposed action. | ESA-listed finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |
| 2 | Construction and installation | Pile-driving | To implement the requirements of RPM 1, the following measures must be implemented by Revolution Wind:<br>a. If any of the sound field verification (SFV; see T&C 11e below) measurements from any pile indicate that the distance to any isopleth of concern is larger than those modeled assuming 10 dB attenuation (see Tables X (whales), Y (sea turtles), Z (Atlantic sturgeon)), before any additional piles are installed Revolution Wind must:<br>i. Identify additional noise attenuation measures (e.g., add noise attenuation device, adjust hammer operations) that are expected to reduce sound levels to the modeled distances; provide an explanation to NMFS GARFO and NMFS OPR supporting that determination; and, deploy those additional measures on any subsequent piles that are installed (e.g., if threshold distances are exceeded on pile 1 then additional measures must be deployed before installing pile 2).<br>ii. If any of the SFV measurements indicate that the distances to evel A thresholds for ESA listed whales or PTS peak or cumulative thresholds for sea turtles are larger than the modeled distances (assuming 10 dB attenuation), the clearance and shutdown zones for subsequent piles must be increased so that they are at least the size of the distances to those thresholds as indicated by SFV. For every 1,500 m that a zone is expanded, additional PSOs must be deployed to ensure adequate and complete monitoring of the expanded shutdown and/or clearance zone.<br>iii. If any SFV measurements to thresholds of concern for the pile installed following implementation of additional noise attenuation measures are still larger than those modeled assuming 10 dB attenuation, Revolution Wind must either install an additional noise attenuation device (e.g., additional bubble curtain) or modify the pile driving operations (i.e., reduced hammer energy) in a way that is expected to reduce noise and reduce the distance to thresholds of concern to no greater than the modeled distances (assuming 10 dB attenuation). Additionally, Revolution Wind must provide an explanation to NMFS GARFO and NMFS OPR supporting that determination and deploy those additional measures on any subsequent piles that are installed (e.g., if threshold distances are still exceeded on pile 2 the additional measures must be deployed for pile 3).<br>iv. Following installation of the the pile with additional noise attenuation measures required by 2.a.iii, if SFV results indicate that any isopleths of concern are still larger than those modeled assuming 10 dB attenuation, before any additional piles can be installed, Revolution Wind must determine, in cooperation with NMFS GARFO/OPR, BOEM, BSEE, and USACE, what additional noise attenuation measures can be implemented. If no additional measures are identified, then pile installation must continue with implementation of the enhanced sound attenuation measures required by 2.a.iii and any expanded zone sizes (and any required additional PSOs). Additionally, Revolution Wind must continued SFV for two additional piles with enhanced sound attenuation | ESA-listed finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |

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| | | | measures., NMFS GARFO/OPR, BOEM, BSEE, and USACE will meet as soon as possible following completion of the SFV required here to discuss whether reinitiation of this consultation is necessary.<br>v. Following installation of the pile with additional noise attenuation measures required by 2.a.iii, if SFV results indicate that all isopleths of concern are within distances to isopleths of concern modeled assuming 10 dB attenuation, SFV must be conducted on three additional piles. If the SFV results from all piles are within the distances to isopleths of concern modeled assuming 10 dB attenuation, then Revolution Wind must continue to implement the additional sound attenuation measures and implement the original clearance and shutdown zones. | | |
| 3 | Construction and installation, O&M, decommissioning | UXO detonation | To implement the requirements of RPM 2, the following measures must be implemented by Revolution Wind:<br>a. Establish a clearance zone for sea turtles extending 500 m around any planned UXO detonation. Maintain the clearance zone for at least 60 minutes prior to any UXO detonation. This requirement expands the size of the clearance zone identified by BOEM as part of the proposed action. Revolution Wind must ensure that there is sufficient PSO coverage to reliably document sea turtle presence within the clearance zone. In the event that a PSO detects a sea turtle outside the 500 m clearance zone, detonation will be delayed until the sea turtle has not been observed for 30 minutes.<br>b. Provide NMFS GARFO with notification of planned UXO detonation as soon as possible but at least 48 hours prior to the planned detonation, unless this 48 hour notification would create delays to the detonation that would result in imminent risk of human life or safety. This notification must include the coordinates of the planned detonation, the estimated charge size, and any other information available on the characteristics of the UXO. NMFS GARFO will provide alerts to NMFS sea turtle and marine mammal stranding network partners consistent with best practices. Notification must be provided via email to nmfs.gar.incidental-take@noaa.gov and by phone to the NMFS GARFO Protected Resources Division (978-281-9328). | | BOEM, BSEE, and NMFS |
| 4 | Construction and installation, O&M, decommissioning | Vessel operations | To implement the requirements of RPM 3, the following conditions must be implemented by vessels transiting to/from the Paulsboro Marine Terminal, consistent with the terms and conditions of the July 19, 2022 Paulsboro Biological Opinion and any subsequent Opinion or amended ITS:<br>a. No later than March 1 of each year, report the number of vessel calls to the Paulsboro Marine Terminal in the previous year by month. This report must also include the type of vessel and its draft. Reports must be filed with the USACE Philadelphia District and NMFS GARFO (nmfs.gar.incidental-take@noaa.gov). (Reference: RPM 1, Term and Condition 1 of the 2022 Paulsboro Biological Opinion)<br>b. Report any sturgeon observed with injuries or mortalities in the Paulsboro Marine Terminal Area to NMFS within 24 hours using the form available at: https://media.fisheries.noaa.gov/2021-07/Take%20Report%20Form%2007162021.pdf?null. Submit forms to nmfs.gar.incidental-take@noaa.gov within 24 hours. (Reference: RPM 2, Term and Condition 2 of the 2022 Paulsboro Biological Opinion).<br>c. Hold any dead sturgeon in cold storage until proper disposal procedures are discussed with NMFS GARFO. (Reference: RPM 3, Term and Condition 5 of the 2022 Paulsboro Biological Opinion).<br>d. Complete procedures for genetic sampling of any dead Atlantic sturgeon that are over 75 cm. (Reference RPM 4, Term and Condition 6 of the 2022 Paulsboro Biological Opinion). More information on submitting genetic samples is included in Term and Condition 6a below; these instructions are consistent with the requirements of the 2022 Paulsboro Opinion.<br>e. In the event that the 2022 Paulsboro Opinion is replaced as a result of reinitiation, or its ITS is amended, comply with the requirements of any new Incidental Take Statement relevant to vessels transiting to/from the Paulsboro Marine Terminal. NMFS GARFO will strive to provide a copy of any new Opinions or amended ITSs to BOEM, BSEE, other action agencies, and Revolution Wind within three business days of their availability. | ESA-listed finfish | BOEM, BSEE, and NMFS |
| 5 | Construction and installation | Reporting requirements | To implement the requirements of RPM 4, Revolution Wind must file a report with NMFS GARFO (nmfs.gar.incidental-take@noaa.gov) in the event that any ESA listed species is observed within the identified shutdown zone during active pile driving. This report must be filed within 48 hours of the incident and include the | ESA-listed finfish, marine | BOEM, BSEE, and NMFS |

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| | | | following: duration of pile driving prior to the detection of the animal(s), location of PSOs and any factors that impaired visibility or detection ability, time of first and last detection of the animal(s), behavioral observations of the animal(s), time the PSO called for shutdown, hammer log (number of strikes, hammer energy), time the pile driving began and stopped, and any measures implemented (e.g., reduced hammer energy) prior to shutdown. If shutdown was determined not to be feasible, the report must include an explanation for that determination and the measures that were implemented (e.g., reduced hammer energy). | mammals, sea turtles | |
| 6 | Construction and installation | Reporting requirements | To implement the requirements of RPM 4, BOEM, BSEE, USACE, and Revolution Wind must implement the following reporting requirements necessary to document the amount or extent of take that occurs during all phases of the proposed action:<br>a. All observations or interactions with sea turtles or sturgeon that occur during the fisheries monitoring surveys must be reported within 48 hours to NMFS GARFO Protected Resources Division by email (nmfs.gar.incidental-take@noaa.gov). Take reports should reference the Revolution Wind project and include the Take Report Form available on NMFS webpage (https://media.fisheries.noaa.gov/2021-07/Take%20Report%20Form%2007162021.pdf?null). Reports of Atlantic sturgeon take must include a statement as to whether a fin clip sample for genetic sampling was taken. Fin clip samples are required in all cases with the only exception being when additional handling of the sturgeon would result in an imminent risk of injury to the fish or the PSO, we expect such incidents to be limited to capture and handling of sturgeon in extreme weather. Instructions for fin clips and associated metadata are available at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-take-reporting-programmatics-greater-atlantic, under the “Sturgeon Genetics Sampling” heading.<br>b. If a North Atlantic right whale is observed at any time by PSOs or project personnel, Revolution Wind must ensure the sighting is immediately reported to NMFS. If immediate reporting is not possible, the report must be made within 24 hours of the sighting.<br>i. The immediate report must be made to the appropriate geographic reporting line:<br>● If in the Northeast Region (ME to VA/NC border) call (866-755-6622).<br>● If in the Southeast Region (NC to FL) call (877-WHALE-HELP or 877-942-5343).<br>● If calling the hotline is not possible, reports can also be made to the U.S. Coast Guard via channel 16 or through the WhaleAlert app (http://www.whalealert.org/).<br>The sighting report must include the time, date, and location (latitude/longitude) of the sighting, number of whales, animal description/certainty of sighting (provide photos/video if taken), lease area/project name, PSO/personnel name, PSO provider company (if applicable), and reporter's contact information.<br>ii. A summary report must be sent within 24 hours to NMFS-GARFO (nmfs.gar.incidental-take@noaa.gov) and NMFS-OPR (PR.ITP.MonitoringReports@noaa.gov) with the above information and confirmation the sighting was reported to the respective hotline, the vessel/platform from which the sighting was made, activity the vessel/platform was engaged in at time of sighting, project construction and/or survey activity ongoing at time of sighting (e.g., pile driving, cable installation, HRG survey), distance from vessel/platform to sighting at time of detection, and any mitigation actions taken in response to the sighting.<br>c. In the event of a suspected or confirmed vessel strike of any ESA listed species, including a sea turtle or sturgeon, by any project vessel in any location, including observation of any injured sea turtle/sturgeon or sea turtle/sturgeon parts, Revolution Wind or their contractors must report the incident to NMFS GARFO (nmfs.gar.incidental-take@noaa.gov; for marine mammals to the NOAA stranding hotline: Maine-Virginia, report to 866755-6622, and from North Carolina-Florida to 877-942-5343 and for sea turtles from Maine-Virginia, report to 866-755-6622, and from North Caroline-Florida to 844-732-8785 as soon as feasible. The report must include the following information: (A) Time, date, and location (latitude/longitude) of the incident; (B) Species identification (if known) or description of the animal(s) involved; (C) Vessel's speed during and leading up to the | ESA-listed finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |

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| | | | incident; (D) Vessel's course/heading and what operations were being conducted (if applicable); (E) Status of all sound sources in use (if applicable); (F) Description of avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike; (G) Environmental conditions (e.g., wind speed and direction, Beaufort scale, cloud cover, visibility) immediately preceding the strike; (H) Estimated size and length of animal that was struck; (I) Description of the behavior of the animal immediately preceding and following the strike; (J) Estimated fate of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and (K) To the extent practicable, photographs or video footage of the animal.<br>d. In the event that an injured or dead whale, sea turtle, or Atlantic sturgeon is sighted, Revolution Wind or their contractor must report the incident to NMFS GARFO (nmfs.gar.incidental-take@noaa.gov). Additionally, injured or dead whales must be reported to the NOAA stranding hotline: Maine-Virginia, report to 866755-6622, and from North Carolina-Florida to 877-942-5343 and for sea turtles from Maine-Virginia, report to 866-755-6622, and from North Caroline-Florida to 844-732-8785., and BSEE (protectedspecies@bsee.gov) as soon as feasible, but no later than 24 hours from the sighting. The report must include the following information: (A) Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable); (B) Species identification (if known) or description of the animal(s) involved; (C) Condition of the animal(s) (including carcass condition if the animal is dead); (D) Observed behaviors of the animal(s), if alive; (E) If available, photographs or video footage of the animal(s); and (F) General circumstances under which the animal was discovered. Staff responding to the hotline call will provide any instructions for handling or disposing of any injured or dead animals, which may include coordination of transport to shore, particularly for injured sea turtles.<br>e. Revolution Wind must compile and submit weekly reports during pile driving that document the pile ID, type of pile, pile diameter, start and finish time of each pile driving event, hammer log (number of strikes, max hammer energy, duration of piling) per pile, any changes to noise attenuation systems and/or hammer schedule, details on the deployment of PSOs and PAMOs, including the start and stop time of associated observation periods by the PSOs and PAMOs, and a record of all observations of marine mammals and sea turtles including time of sighting (UTC), species ID, behavior, distance from vessel to sighting at time of detection (meters), vessel/project activity, platform/vessel name, and mitigation measures taken (if any). These weekly reports must be submitted to NMFS GARFO (nmfs.gar.incidental-take@noaa.gov), BOEM, and BSEE by Revolution Wind or the PSO providers and can consist of raw data. Weekly reports are due on Wednesday for the previous week (Sunday – Saturday).<br>f. Revolution Wind must compile and submit reports following any UXO detonation that provide details on the UXO that was detonated (e.g., charge size), location of the detonation, the start and stop of associated observation periods by the PSOs and PAMOs, details on the deployment of PSOs and PAMOs, and a record of all observations of marine mammals and sea turtles including time of sighting (UTC), species ID, behavior, distance from vessel to sighting at time of detection (meters), vessel activity, platform/vessel name, and mitigation measures taken (if any).. This must include any observations of dead or injured fish or other marine life in the post detonation monitoring period. These reports must be submitted to NMFS GARFO (nmfs.gar.incidental-take@noaa.gov), BOEM, and BSEE by Revolution Wind or the PSO providers and can consist of raw data. Reports must be submitted within one week of the detonation, with reports of dead or injured ESA listed species required to be submitted immediately, but no later than 24 hours following the observation.<br>g. Starting in the first month that in-water activities occur (e.g., cofferdam installation, fisheries surveys), Revolution Wind must compile and submit monthly reports that include a summary of all project activities carried out in the previous month, including dates and location of any fisheries surveys carried out, vessel transits (name, type of vessel, number of transits, vessel activity, and route (this includes transits from all ports, foreign and domestic)), and number of piles installed and pile IDs, and all observations of ESA listed whales, sea turtles, and sturgeon, inclusive of any mitigation measures taken as a result of those observations. These reports must be submitted to NMFS GARFO (nmfs.gar.incidental-take@noaa.gov) and are due on the 15th of the month for the previous month. | | |

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| | | | h. Revolution Wind must submit to NMFS GARFO (nmfs.gar.incidental-take@noaa.gov) an annual report describing all activities carried out to implement their Fisheries Research and Monitoring Plan. This report must include the dates and locations of all ventless trap surveys and otter trawl surveys, inclusive of a summary table of any observations and captures of ESA listed species during these surveys. The report must also summarize all acoustic telemetry and benthic monitoring activities that occurred. Each annual report is due by February 15 (i.e., the report of 2023 activities is due by February 15, 2024). | | |
| 7 | O&M | Meeting requirements for sea turtle observations | To implement the requirements of RPM 4 and to facilitate monitoring of the incidental take exemption for sea turtles, BOEM, BSEE, USACE, and NMFS must meet twice annually to review sea turtle observation records. These meetings/conference calls will be held in September (to review observations through August of that year) and December (to review observations from September to November) and will use the best available information on sea turtle presence, distribution, and abundance, project vessel activity, and observations to estimate the total number of sea turtle vessel strikes in the action area that are attributable to project operations. | Sea turtles | BOEM, BSEE, and NMFS |
| 8 | Construction and installation | Review of plans | To implement RPM 5, within 10 business days of BSEE issuing a no objection to the complete Facility Design Report (FDR)/Fabrication and Installation Report (FIR) (but at least 30 calendar days prior to the initiation of pile driving) or the soonest time the relevant information is available, BOEM and/or BSEE must provide NMFS GARFO (nmfs.gar.incidental-take@noaa.gov) with the following information: number and size of foundations to be installed to support wind turbine generators and offshore substations, installation method for the sea to shore transition (i.e., casing pipe, cofferdam, no containment), the proposed construction schedule (i.e., months when pile driving is planned), and information that has become available on the ports identified for foundation fabrication and load out, WTG pre-assembly and load out, and cable staging. If at that time the amount or extent of incidental take is likely to exceed the maximum amount for each source and type of take considered in this ITS, consultation may need to be reinitiated. NMFS and BOEM will each endeavor to notify the other of the need to reinitiate consultation within 30 calendar days of BOEM's submission to NMFS, and NMFS' receipt of the requested information. | ESA-listed finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |
| 9 | Construction and installation | Review of plans | To implement RPM 5, BOEM, BSEE and/or Revolution Wind must submit an Observer Training Plan for Trawl Surveys as soon as possible after issuance of this Opinion but no later than 7 calendar days prior to the start of trawl surveys. BOEM, BSEE, and Revolution Wind must obtain NMFS GARFO's concurrence with this plan prior to the start of any trawl surveys. As described in Section X.Y, at least one of the survey staff onboard the trawl survey vessels must have completed NMFS Northeast Fisheries Observer Program training within the last 5 years or other training in protected species identification and safe handling (inclusive of taking genetic samples from Atlantic sturgeon). If Revolution Wind will deploy non-NEFOP trained observers, BOEM, BSEE, and/or Revolution Wind must submit a plan to NMFS describing the training that will be provided to the survey observers. | ESA-listed finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |
| 10 | Construction and installation | Review of plans | To implement RPM 5, the plans identified below must be submitted to NMFS GARFO by BOEM, BSEE, and/or Revolution Wind at nmfs.gar.incidental-take@noaa.gov. For each plan, within 45 calendar days of receipt of the plan, NMFS GARFO will provide comments to BOEM, BSEE, and Revolution Wind, including a determination as to whether the plan is consistent with the requirements outlined in this ITS and/or in Table 3.3.1 of this Opinion. If the plan is determined to be inconsistent with these requirements, BOEM, BSEE and/or Revolution Wind must resubmit a modified plan that addresses the identified issues within 30 days of the receipt of the comments but at least 15 calendar days before the start of the associated activity; at that time, BOEM, BSEE and NMFS will discuss a timeline for review and approval of the modified plan. At all times, NMFS, BOEM, and BSEE will be provided at least 3 business days for review of subsequent revisions. BOEM, BSEE and Revolution Wind must receive NMFS GARFO's concurrence with these plans before the identified activity is carried out:<br>a. Passive Acoustic Monitoring Plan. BOEM, BSEE and/or Revolution Wind must submit this Plan to NMFS GARFO at least 180 calendar days before impact pile driving is planned. BOEM, BSEE, and Revolution Wind must obtain NMFS GARFO's concurrence with this plan prior to the start of any pile driving. The Plan must include a description of all proposed PAM equipment, address how the proposed passive acoustic monitoring will follow | ESA-listed finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |

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| | | | standardized measurement, processing methods, reporting metrics, and metadata standards for offshore wind (Van Parijs et al., 2021). The plan must describe all proposed PAM equipment, procedures, and protocols including information to support that it will be able to detect vocalizing right whales within the clearance and shutdown zones. The plan must also incorporate the following requirements: If a North Atlantic right whale (NARW) is detected via real-time PAM, data shall be submitted by BOEM, BSEE and/or Revolution Wind to nmfs.pacmdata@noaa.gov using the NMFS Passive Acoustic Reporting System Metadata and Detection data spreadsheets (https://www.fisheries.noaa.gov/resource/document/passive-acoustic-reporting-system-templates as soon as feasible but no longer than 24 hours after the detection. BOEM, BSEE, and/or Revolution Wind must submit the completed data templates to nmfs.pacmdata@noaa.gov; the full acoustic species Detection data, Metadata and GPS data records, from real-time data, must be submitted within 90 calendar days via the ISO standard metadata forms available on the NMFS Passive Acoustic Reporting System website (https://www.fisheries.noaa.gov/resource/document/passive-acoustic-reporting-system-templates). BOEM, BSEE, and/or Revolution Wind must submit the completed data templates to nmfs.pacmdata@noaa.gov; the full acoustic recordings from real-time systems must be sent to NCEI for archiving within 90 calendar days after pile-driving has ended and instruments have been pulled from the water and confirmation must be sent to NMFS GARFO. If a standardized template is available prior to the plan being submitted, NMFS will provide that template to Revolution Wind for use.<br>b. Marine Mammal and Sea Turtle Monitoring Plan – Pile Driving and UXO Detonation. BOEM, BSEE, and/or Revolution Wind must submit this Plan to NMFS GARFO at least 180 calendar days before any pile driving for foundation installation or any UXO detonation is planned. BOEM, BSEE, and/or Revolution Wind must obtain NMFS GARFO's concurrence with this plan prior to the start of any pile driving for foundation installation or carrying out any UXO detonation. The plan must include: a description of how all relevant mitigation and monitoring requirements contained in the incidental take statement will be implemented, a pile driving installation summary and sequence of events, a description of all training protocols for all project personnel (PSOs, PAMOs, trained crew lookouts, etc.), a description of all monitoring equipment and evidence that it can be used to effectively monitor and detect ESA listed listed marine mammals and sea turtles in the identified clearance and shutdown zones , communications and reporting details, PSO and PAMO schedules, and PSO monitoring and mitigation protocols (including number and location of PSOs) for observations and documentation of sea turtles and ESA listed marine mammals during all pile driving events and UXO detonations. The plan must detail all plans and procedures for sound attenuation, including procedures for adjusting the noise attenuation system(s) and available contingency noise attenuation measures/systems if distances to modeled isopleths of concern are exceeded during SFV. Revolution Wind must also submit an NAS inspection/performance report to NMFS- GARFO (nmfs.gar.incidental-take@noaa.gov) within 72 hours of the performance test which must occur prior to the first pile installation. The plan must also describe how Revolution Wind would determine the number of sea turtles exposed to noise above the 175 dB harassment threshold during impact pile driving of WTG and OSS foundations and how Revolution Wind would determine the number of ESA listed whales exposed to noise above the Level B harassment threshold during impact pile driving of WTG and OSS foundations.<br>c. Alternative Monitoring Plan/Night Time Pile Driving Monitoring Plan. BOEM, BSEE, and/or Revolution Wind must submit this Plan to NMFS GARFO at least 180 calendar days before impact pile driving is planned to begin. BOEM, BSEE, and Revolution Wind must obtain NMFS GARFO's concurrence with this plan prior to the start of pile driving. This plan must contain a thorough description of how Revolution Wind plans to monitor pile driving activities at night including proof of the efficacy of their night vision devices ( e.g., mounted thermal/IR camera systems, hand-held or wearable night vision devices (NVDs), infrared (IR) spotlights) in detecting ESA listed marine mammals and sea turtles over the full extent of the required clearance and shutdown zones, including demonstration that the full extent of the minimum visibility zones (WTG foundations: May – November, 2300 m and December, 4,400 m; OSS foundations: May – November 1,600 m and 2,700 m December) can be effectively and reliably monitored. The Plan must identify the efficacy of the technology at detecting marine mammals and | | |

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| | | | sea turtles in the clearance and shutdowns under all the various conditions anticipated during construction, including varying weather conditions, sea states, and in consideration of the use of artificial lighting. If the plan does not include a full description of the proposed technology, monitoring methodology, and data demonstrating to NMFS GARFO's satisfaction that marine mammals and sea turtles can reliably and effectively be detected within the clearance and shutdown zones for monopiles and pin piles before and during impact pile driving, nighttime pile driving (unless a pile was initiated 1.5 hours prior to civil sunset) may not occur. Additionally, this plan must contain a thorough description of how Revolution Wind plans to monitor pile driving activities during daytime when unexpected changes to lighting or weather occur during pile driving that prevent visual monitoring of the full extent of the clearance and shutdown zones.<br>d. Sound Field Verification Plan. BOEM, BSEE, and/or Revolution Wind must submit to NMFS GARFO at least 180 calendar days before impact pile driving or UXO detonation is planned to begin. BOEM, BSEE, and Revolution Wind must obtain NMFS GARFO's concurrence with this plan prior to the start of pile driving or UXO detonation activities. The plan must describe how Revolution Wind would ensure that the first three monopile installation sites and installation scenarios (i.e., hammer energy, number of strikes) and each UXO/MEC detonation site selected for SFV are representative of the rest of the monopile installation and UXO/MEC sites. If the monitored pile locations are different than the ones used for exposure modeling, justification must be provided for why these locations are representative of the modeling. In the case that these sites are not determined to be representative of all other monopile installation sites and UXO/MEC detonation locations, Revolution Wind must include information on how additional sites would be selected for SFV. The plan must also include the piling schedule and sequence of events, communication and reporting protocols, methodology for collecting, analyzing, and preparing SFV data for submission to NMFS GARFO including instrument deployment, locations of all hydrophones including direction and distance from the pile, hydrophone sensitivity, recorder/measurement layout, and analysis methods, and a template of the interim report to be submitted. The plan must describe how the effectiveness of the sound attenuation methodology would be evaluated based on the results. The plan must also identify additional noise attenuation measures (e.g., add noise attenuation device, adjust hammer operations) that will be deployed to reduce sound levels if measured distances are greater than those modeled.<br>i. SFV Interim Reports. Revolution Wind must provide, as soon as they are available but no later than 48 hours after the installation of each of the first three monopiles, the initial results of the SFV measurements to NMFS GARFO in an interim report. This report is required for each of the first three monopiles installed. The interim report must include data from all hydrophones deployed and include a summary of pile installation activities [pile diameter, pile weight, pile length, water depth, sediment type, hammer type, total strikes, total installation time (start time, end time)), duration of pile driving, max single strike energy, NAS deployments], pile location, recorder locations, modeled and measured distances to thresholds, received levels (rms, peak, and SEL) results from CTD casts/sound velocity profiles, signal and kurtosis rise times, pile driving plots, activity logs, weather conditions. The final results of SFV of monopile installations must be submitted as soon as possible, but no later than within 90 days following completion of pile driving of the three monopiles and UXO/MEC data to date. If there are any updates to the requirements to the contents of the interim plan, including availability of a template, this will be provided to Revolution Wind as soon as any such updates are available.<br>e. North Atlantic Right Whale Vessel Strike Avoidance Plan. BOEM, BSEE, and/or Revolution Wind must submit this plan to NMFS GARFO at least 180 calendar days prior to commencement of vessel use, with the exception of vessels deployed for the fisheries surveys. The plan must provide details on all relevant mitigation and monitoring measures for listed species, vessel transit protocols from all planned ports, vessel-based observer protocols for transiting vessels, proposed alternative monitoring equipment to maintain vessel strike avoidance zone in varying weather conditions, darkness, sea states, and in consideration of the use of artificial lighting. If Revolution Wind plans to implement PAM in any transit corridor to allow vessel transit above 10 knots, the plan must describe how PAM, in combination with visual observations, will be conducted to ensure the transit corridor is clear of North Atlantic right whales. | | |

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| 11 | Construction and installation, O&M, decommissioning | On-site observation and inspection | To implement the requirements of RPM 6, BOEM and BSEE must exercise their authorities to assess the implementation of measures to minimize and monitor incidental take of ESA-listed species during activities described in this Opinion. If any term and condition(s) is/are not being complied with, BOEM and/or BSEE, as appropriate, must immediately take effective action to ensure prompt implementation. | ESA-listed finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |
| 12 | Construction and installation, O&M, decommissioning | On-site observation and inspection | To implement the requirements of RPM 6, Revolution Wind must consent to on-site observation and inspections by Federal agency personnel (including NOAA personnel) during activities described in the Biological Opinion, for the purposes of evaluating the effectiveness and implementation of measures designed to minimize or monitor incidental take. | ESA-listed finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |
| **BOEM-proposed Mitigation and Monitoring Measures in National Marine Fisheries Service (NMFS) Biological Assessment (BA)†** | | | | | |
| 1 | Construction and installation, O&M, and decommissioning | Marine debris awareness training | The Lessee would ensure that vessel operators, employees, and contractors engaged in offshore activities pursuant to the approved COP complete marine trash and debris awareness training annually. The training consists of two parts: 1) viewing a marine trash and debris training video or slide show (described below) and 2) receiving an explanation from management personnel that emphasizes their commitment to the requirements. The marine trash and debris training videos, training slide packs, and other marine debris related educational material may be obtained at https://www.bsee.gov/debris or by contacting BSEE. The training videos, slides, and related material may be downloaded directly from the website. Operators engaged in marine survey activities must continue to develop and use a marine trash and debris awareness training and certification process that reasonably assures that their employees and contractors are in fact trained. The training process must include the following elements:<br>• Viewing of either a video or slide show by the personnel specified above<br>• An explanation from management personnel that emphasizes their commitment to the requirements<br>• Attendance measures (initial and annual)<br>• Recordkeeping and the availability of records for inspection by DOI<br>By January 31 of each year, the Lessee would submit to the DOI an annual report that describes its marine trash and debris awareness training process and certifies that the training process has been followed for the previous calendar year. The Lessee would send the reports via email to BOEM (at renewable_reporting@boem.gov) and to BSEE via TIMSWeb with a notification email (at marinedebris@bsee.gov). | Finfish and EFH, marine mammals, sea turtles | BOEM, BSEE, and USACE |
| 2 | Construction and installation and postconstruction and installation | Marine debris elimination | Materials, equipment, tools, containers, and other items used in Outer Continental Shelf (OCS) activities which could be lost or discarded overboard must be clearly marked with the vessel or facility identification. All markings must clearly identify the owner and must be durable enough to resist the effects of the environmental conditions to which they may be exposed. | Birds, Finfish and EFH, marine mammals, sea turtles | BOEM, BSEE, and USACE |
| 3 | Construction and installation and postconstruction and installation | Incorporate letter of authorization (LOA) requirements | The measures required by the final MMPA LOA for Incidental Take Regulations (ITRs) will be incorporated into COP approval, and BOEM and/or BSEE would monitor compliance with these measures. | Marine mammals | BOEM and BSEE |
| 4 | Construction and installation, postconstruction and installation monitoring | Passive acoustic monitoring (PAM) plan | BOEM, BSEE, and USACE would ensure that Revolution Wind prepares a PAM plan that describes all proposed equipment, deployment locations, detection review methodology and other procedures, and protocols related to the required use of PAM for monitoring. This plan must be submitted to NMFS, BOEM (at renewable_reporting@boem.gov), and BSEE (via TIMSWeb with a notification email at protectedspecies@bsee.gov) for review and concurrence preferably 180 days but no later than 120 days prior to the planned start of pile driving. | Finfish, marine mammals | BOEM, BSEE, USACE, and NMFS |

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| 5 | Construction, O&M, and decommissioning | Passive acoustic monitoring (PAM) | Use PAM buoys or autonomous PAM devices to record ambient noise, marine mammals, and cod vocalizations in the Lease Area before, during, and immediately after construction (at least 25 years of operation (or as may be extended) to monitor Project noise. The archival recorders must have a minimum capability of detecting and storing acoustic data on anthropogenic noise sources (such as vessel noise, pile driving, WTG operation, and whale detections), marine mammals, and cod vocalizations in the Lease Area. Monitoring would also occur during the decommissioning phase. The total number of PAM stations and array configuration will depend on the size of the zone to be monitored, the amount of noise expected in the area, and the characteristics of the signals being monitored to accomplish both monitoring during constructions, and also meet post-construction monitoring needs. Results must be provided within 90 days of construction completion and again within 90 days of the 1-year, 2-year, and 3-year anniversary of collection. The underwater acoustic monitoring must follow standardized measurement and processing methods and visualization metrics developed by the Atlantic Deepwater Ecosystem Observatory Network (ADEON) for the U.S. Mid- and South Atlantic OCS (see https://adeon.unh.edu/). At least two buoys must be independently deployed within or bordering the Lease Area or one or more buoys must be deployed in coordination with other acoustic monitoring efforts in the RI/MA and MA WEAs.<br>As an alternative to conducting PAM in its project area, the lessee may opt to meet this monitoring requirement through an annual deposit to BOEM's Environmental Studies Program in support of its Partnership for an Offshore Wind Energy Regional Observation Network (POWERON) initiative. The lessee's contribution would cover activities within its lease area, such as the purchase of instruments, annual deployments and refurbishment, data processing, and long-term data archiving. Funding from BOEM, other partners, and potentially other lessees will support long-term PAM throughout the region which will enable broader-scale analyses on cumulative effects to marine species. Under this option, the lessee will be expected to cooperate with the POWERON team to facilitate deployment and retrieval of instruments within the project area. If necessary, the lessee may request temporary withholding of the public release of acoustic data that has been collected within its project area. | Finfish, marine mammals | BOEM, BSEE, USACE, and NMFS |
| 6 | Construction and installation | Pile driving monitoring plan | BOEM, BSEE, and USACE would ensure that Revolution Wind prepares and submits to BSEE (via TIMSWeb and notification email at protectedspecies@bsee.gov) and BOEM (at renewable_reporting@boem.gov) for review and concurrence preferably 180 days but no later than 120 days before start of pile driving. Reporting to BSEE would follow JOINT NTL 2023-N01, Appendix B. The Lessee must not conduct pile driving operations at any time when lighting or weather conditions (e.g., darkness, rain, fog, sea state) prevent visual monitoring of the full extent of the clearance and shutdown zones including not initiating pile driving earlier than 1 hour after civil sunrise or later than 1.5 hours prior to civil sunset.<br>Pile driving at night may only occur with prior approval of an AMP. The Lessee must submit an AMP to BOEM and NMFS for review and approval at least 6 months prior to the planned start of pile-driving. This plan may include deploying additional observers, alternative monitoring technologies such as night vision, thermal, and infrared technologies, or use of PAM and must demonstrate the ability and effectiveness to maintain all clearance and shutdown zones during daytime as outlined below in Part 1 and nighttime as outlined in Part 2 to BOEM's and NMFS's satisfaction.<br>The AMP must include two stand-alone components as described below:<br>Part 1 – Daytime when lighting or weather (e.g., fog, rain, sea state) conditions prevent visual monitoring of the full extent of the clearance and shutdown zones. Daytime being defined as one hour after civil sunrise to 1.5 hours before civil sunset.<br>Part 2 – Nighttime inclusive of weather conditions (e.g., fog, rain, sea state). Nighttime being defined as 1.5 hours before civil sunset to one hour after civil sunrise.<br>If a protected marine mammal or sea turtle is observed entering or found within the shutdown zones after impact pile-driving has commenced, the Lessee would follow shutdown procedures outlined in the Protected Species Mitigation Monitoring Plan (PSMMP; Appendix B). The Lessee would notify BOEM and NMFS of any shutdown | Marine mammals, Sea turtles | BOEM, BSEE, and NMFS |

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| | | | occurrence during piling driving operations within 24 hours of the occurrence unless otherwise authorized by BOEM and NMFS.<br>The AMP should include, but is not limited to the following information:<br>• Identification of night vision devices (e.g., mounted thermal/IR camera systems, hand-held or wearable NVDs, IR spotlights), if proposed for use to detect protected marine mammal and sea turtle species.<br>• The AMP must demonstrate (through empirical evidence) the capability of the proposed monitoring methodology to detect marine mammals and sea turtles within the full extent of the established clearance and shutdown zones (i.e., species can be detected at the same distances and with similar confidence) with the same effectiveness as daytime visual monitoring (i.e., same detection probability). Only devices and methods demonstrated as being capable of detecting marine mammals and sea turtles to the maximum extent of the clearance and shutdown zones will be acceptable.<br>• Evidence and discussion of the efficacy (range and accuracy) of each device proposed for low visibility monitoring must include an assessment of the results of field studies (e.g., Thayer Mahan demonstration), as well as supporting documentation regarding the efficacy of all proposed alternative monitoring methods (e.g., best scientific data available).<br>• Procedures and timeframes for notifying NMFS and BOEM of Revolution Wind's intent to pursue nighttime pile-driving.<br>• Reporting procedures, contacts and timeframes.<br>BOEM may request additional information, when appropriate, to assess the efficacy of the AMP. For mammals see Appendix B MMPA rule. | | |
| 7 | Construction and installation | Protected species observers (PSO) coverage | BOEM, BSEE, and USACE would ensure that PSO coverage is sufficient to reliably detect marine mammals and sea turtles at the surface in clearance and shutdown zones to execute any pile driving delays or shutdown requirements. If, at any point prior to or during construction, the PSO coverage that is included as part of the Proposed Action is determined not to be sufficient to reliably detect ESA-listed whales and sea turtles within the clearance and shutdown zones, additional PSOs and/or platforms must be deployed. Determinations prior to construction must be based on review of the pile driving monitoring plan. Determinations during construction would be based on review of the weekly pile driving reports and other information, as appropriate. | Marine mammals, Sea turtles | BOEM, BSEE, and USACE |
| 8 | Construction and installation | Sound field verification (SVF) | NMFS, BOEM, BSEE, and USACE would ensure that if the clearance and/or shutdown zones are expanded, PSO coverage is sufficient to reliably monitor the expanded clearance and/or shutdown zones. Additional observers must be deployed on additional platforms for every 1,500 m that a clearance or shutdown zone is expanded beyond the distances modeled prior to verification.<br>To validate the estimated sound field, SVF measurements would be conducted during pile driving of the first three monopiles installed over the course of the Project, with noise attenuation activated. A SVF plan would be submitted to NMFS, BOEM, USACE, and BSEE for review and approval preferably 180 days but no later than 120 days prior to planned start of pile driving. This plan would describe how Revolution Wind would ensure that the first three monopile installation sites selected for sound field are representative of the rest of the monopile installation sites and, in the case that they are not, how additional sites would be selected for SVF. This plan would also include methodology for collecting, analyzing, and preparing SFV data for submission to NMFS. The plan would describe how the effectiveness of the sound attenuation methodology would be evaluated based on the results. In the event that Revolution Wind obtains technical information that indicates a subsequent monopile is likely to produce larger sound fields, SFV would be conducted for those subsequent monopiles. | Marine mammals, Sea turtles, Finfish, Benthic Habitat, EFH, Invertebrates | BOEM, BSEE, NMFS, and USACE |
| 9 | Construction and installation | Shutdown zones and pre-start clearance zone adjustment | BOEM, BSEE, and NMFS may consider adjustments in the pre-start clearance and/or shutdown zones based on the initial SFV measurements. Revolution Wind will provide the initial results of each SFV measurement to BOEM, | Marine mammals | BOEM, BSEE, NMFS, and USACE |

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| | | | BSEE, and NMFS in an interim report after each monopile installation. Interim reports must be submitted as soon as they are available but no later than 48 hours after each installation.<br>Revolution Wind will conduct an SFV to empirically determine the distances to the isopleths corresponding to Level A harassment and Level B harassment thresholds, including at the locations corresponding to the modeled distances to the Level A harassment and Level B harassment thresholds. If initial SFV measurements indicate distances to the isopleths are less than the distances predicted by modeling assuming 10-decibel (dB) attenuation, Revolution Wind may request a modification of the clearance and shutdown zones for impact pile driving. For a modification request to be considered, Revolution Wind must have conducted SFV on at least three piles to verify that zone sizes are consistently smaller than predicted by modeling. If initial SFV measurements from any foundation indicate distances to the isopleths are greater than the distances predicted by modeling, Revolution Wind would implement additional sound attenuation measures prior to conducting additional pile driving. Additional measures may include improving the efficacy of the implemented noise attenuation technology and/or modifying the piling schedule to reduce the sound source. If modeled zones cannot be achieved by these corrective actions, Revolution Wind must install an additional noise mitigation system to achieve the modelled ranges. Each sequential modification would be evaluated empirically by SFV of three additional foundations with the new sound attenuation technology. Additionally, in the event that SFV measurements continue to indicate distances to isopleths corresponding to Level A harassment and Level B harassment thresholds are consistently greater than the distances predicted by modeling, BOEM, BSEE, or NMFS may expand the relevant clearance and shutdown zones and associated monitoring measures. | | |
| 10 | Construction and installation | Shutdown zones and pre-start clearance zone adjustment | BOEM, BSEE, and NMFS may consider adjustments in the pre-start clearance and/or shutdown zones based on the initial SFV measurements. Revolution Wind would provide the initial results of the SFV measurements to NMFS in an interim report after each monopile installation for the first three piles as soon as they are available but no later than 48 hours after each installation.<br>Revolution Wind would conduct an SFV to empirically determine the distances to the isopleths corresponding to hearing injury and behavioral effects thresholds for sea turtles, including at the locations corresponding to the modeled distances to these thresholds. If initial SFV measurements indicate distances to the isopleths are less than the distances predicted by modeling assuming 10-decibel (dB) attenuation, Revolution Wind may request a modification of the clearance and shutdown zones for impact pile driving. For a modification request to be considered by NMFS, Revolution Wind must have conducted SFV on at least three piles to verify that zone sizes are consistently smaller than predicted by modeling. If initial SFV measurements indicate distances to the isopleths are greater than the distances predicted by modeling, Revolution Wind would implement additional sound attenuation measures prior to conducting additional pile driving. Additional measures may include improving the efficacy of the implemented noise attenuation technology and/or modifying the piling schedule to reduce the sound source. If modeled zones cannot be achieved by these corrective actions, Revolution Wind would install an additional noise mitigation system to achieve the modelled ranges. Each sequential modification would be evaluated empirically by SFV. Additionally, in the event that SFV measurements continue to indicate distances to isopleths corresponding to hearing injury and behavioral effects thresholds are consistently greater than the distances predicted by modeling, NMFS may expand the relevant clearance and shutdown zones and associated monitoring measures. | Sea turtles | BOEM, BSEE, NMFS, and USACE |
| 11 | Construction and installation | Monitoring zone for sea turtles | BOEM, BSEE, and USACE would ensure that Revolution Wind would monitor a 500 m clearance and shutdown zone for sea turtles for the full duration of all pile driving activities and for 30 minutes following the cessation of pile driving activities and record all observations in order to ensure that all take that occurs is documented. | Sea turtles | BOEM, BSEE, and USACE |
| 12 | Construction and installation, O&M, and conceptual decommissioning | Reporting of all North Atlantic right whale (NARW) sightings | If a NARW is observed at any time by PSOs or personnel on any Project vessels, during any Project-related activity, or during vessel transit, Revolution Wind must report the sighting information to NMFS as soon as feasible and no later than within 24 hours after conclusion of the detection event (the time, location, number of animals, closest point of approach of animals, animal behavior, activities at time of detection, vessel speed, and any mitigation measures | Marine mammals | BOEM, BSEE, USACE, and NMFS |

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| | | | implemented) via the WhaleAlert app (http://www.whalealert.org/), NMFS Right Whale Sighting Advisory System hotline (phone), and PR.ITP.MonitoringReports@noaa.gov. | | |
| 13 | Construction and installation, O&M, and decommissioning | Vessel strike avoidance measures for sea turtles | Between June 1 and November 30, Revolution Wind must have a trained lookout posted on all vessel transits during all phases of the Project to observe for sea turtles. The trained lookout must communicate any sightings, in real time, to the captain so that the requirements in (e) below can be implemented.<br>a. The trained lookout must monitor https://seaturtlesightings.org/ prior to each trip and report any observations of sea turtles in the vicinity of the planned transit to all vessel operators/captains and lookouts on duty that day.<br>b. The trained lookout must maintain a vigilant watch and monitor a vessel strike avoidance zone (500 m) at all times to maintain minimum separation distances from ESA-listed species. Alternative monitoring technology (e.g., night vision and thermal cameras) must be available to ensure effective watch at night and in any other low-visibility conditions. If the trained lookout is a vessel crew member, this must be their designated role and primary responsibility while the vessel is transiting. Any designated crew lookouts would receive training on protected species identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements.<br>c. If a sea turtle is sighted within 100 m or less of the operating vessel's forward path, the vessel operator must slow down to 4 knots (unless unsafe to do so) and then proceed away from the turtle at a speed of 4 knots or less until there is a separation distance of at least 100 m at which time the vessel may resume normal operations. If a sea turtle is sighted within 50 m of the forward path of the operating vessel, the vessel operator must shift to neutral when safe to do so wait for the turtle to pass beyond 50m and then engage engines and travel proceed away from the turtle at a speed of 4 knots until a separation distance of 100 m is observed The vessel may resume normal operations once it has passed the turtle.<br>d. Vessel captains/operators would avoid transiting through areas of visible jellyfish aggregations or floating sargassum lines or mats. In the event that operational safety prevents avoidance of such areas, vessels must slow to 4 knots while transiting through such areas.<br>e. All vessel crew members must be briefed in the identification of ESA-listed species of sea turtles and in regulations and best practices for avoiding vessel collisions. Reference materials must be available aboard all Project vessels for identification of sea turtles. The expectation and process for reporting of sea turtles (including live, entangled, and dead individuals) must be clearly communicated and posted in highly visible locations aboard all Project vessels, so that there is an expectation for reporting to the designated vessel contact (such as the lookout or the vessel captain), as well as a communication channel and process for crew members to do so.<br>f. The only exception is when the safety of the vessel or crew necessitates deviation from these requirements on an emergency basis. If any such incidents occur, they must be reported to NMFS and BSEE within 24 hours.<br>g. If a vessel is carrying a PSO or trained lookout for the purposes of maintaining watch for North Atlantic right whales, an additional lookout is not required and this PSO or trained lookout must maintain watch for whales, giant manta rays, and sea turtles. | Sea turtles | BOEM, BSEE, and USACE |
| 14 | Construction and installation, postconstruction and installation monitoring | Sampling gear | All sampling gear would be hauled out at least once every 30 days, and all gear must be removed from the water and all gear must be removed from the water and stored on land between survey seasons to minimize risk of entanglement. | Finfish, marine mammals, sea turtles, invertebrates | BOEM and BSEE |
| 15 | Construction and installation, postconstruction and installation monitoring | Lost survey gear | If any survey gear is lost, all reasonable efforts that do not compromise human safety must be undertaken to recover the gear. All lost gear must be reported to NMFS (nmfs.gar.incidental-take@noaa.gov) and BSEE (via TIMSWeb and notification email at marinedebris@bsee.gov) within 24 hours of the documented time of missing or | Finfish, marine mammals, sea | BOEM, BSEE, and NMFS |

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| | | | lost gear. This report must include information on any markings on the gear and any efforts undertaken or planned to recover the gear. | turtles, invertebrates | |
| 16 | Construction and installation, postconstruction and installation monitoring | Training | At least one of the survey staff onboard the trawl surveys and ventless trap surveys must have completed Northeast Fisheries Observer Program (NEFOP) observer training (within the last 5 years) or other training in protected species identification and safe handling (inclusive of taking genetic samples from Atlantic sturgeon). Reference materials for identification, disentanglement, safe handling, and genetic sampling procedures must be available on board each survey vessel. BOEM and BSEE would ensure that Revolution Wind prepares a training plan that addresses how this requirement would be met and that the plan is submitted to NMFS in advance of any trawl or trap surveys. This requirement is in place for any trips where gear is set or hauled. | Finfish | BOEM, BSEE, and NMFS |
| 17 | Construction and installation, postconstruction and installation monitoring | Sea turtle disentanglement | Vessels deploying fixed gear (e.g., pots/traps) would have adequate disentanglement equipment (i.e., knife and boathook) onboard. Any disentanglement would occur consistent with the Northeast Atlantic Coast STDN disentanglement guidelines (https://www.reginfo.gov/public/do/DownloadDocument?objectID=102486501) and the procedures described in *Careful Release Protocols for Sea Turtle Release with Minimal Injury* (NOAA Technical Memorandum 580; https://repository.library.noaa.gov/view/noaa/3773) (NOAA 2008). | Sea turtles | BOEM, BSEE, and NMFS |
| 18 | Construction and installation, postconstruction and installation monitoring | Sea turtle/Atlantic sturgeon identification and data collection | Any sea turtles or Atlantic sturgeon caught and/or retrieved in any fisheries' survey gear must first be identified to species or species group. Each ESA-listed species caught and/or retrieved must then be properly documented using appropriate equipment and data collection forms. Biological data, samples, and tagging must occur as outlined below. Live, uninjured animals should be returned to the water as quickly as possible after completing the required handling and documentation.<br>a. The *Sturgeon and Sea Turtle Take Standard Operating Procedures* must be followed (NOAA 2021a; https://media.fisheries.noaa.gov/dammigration/sturgeon_&_sea_turtle_take_sops_external.pdf).).<br>b. Survey vessels must have a passive integrated transponder (PIT) tag reader onboard capable of reading 134.2-kilohertz and 125-kilohertz encrypted tags (e.g., Biomark GPR Plus Handheld PIT Tag Reader), and this reader be used to scan any captured sea turtles and sturgeon for tags. Any recorded tags must be recorded on the take reporting form (see below).<br>c. Genetic samples must be taken from all captured Atlantic sturgeon (alive or dead) to allow for identification of the distinct population segment (DPS) of origin of captured individuals and tracking of the amount of incidental take. This must be done in accordance with the *Procedure for Obtaining Fin Clips from Sturgeon for Genetic Analysis* (NOAA 2019; https://media.fisheries.noaa.gov/dammigration/sturgeon_genetics_sampling_revised_june_2019.pdf).<br>i. Fin clips must be sent to a NMFS-approved laboratory capable of performing genetic analysis and assignment to DPS of origin. To the extent authorized by law, BOEM is responsible for the cost of the genetic analysis. Arrangements must be made for shipping and analysis in advance of submission of any samples; these arrangements must be confirmed in writing to NMFS within 60 days of the receipt of this incidental take statement (ITS). Results of genetic analysis, including assigned DPS of origin, must be submitted to NMFS within 6 months of the sample collection.<br>ii. Subsamples of all fin clips and accompanying metadata forms must be held and submitted to a tissue repository (e.g., the Atlantic Coast Sturgeon Tissue Research Repository) on a quarterly basis. The Sturgeon Genetic Sample Submission Form is available for download at https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-take-reporting-programmatics-greater-atlantic.<br>d. All captured sea turtles and Atlantic sturgeon must be documented with required measurements and photographs. The animal's condition and any marks or injuries must be described. This information must be entered as part of the record for each incidental take. A NMFS Take Report Form would be filled out | Finfish, Sea turtles | BOEM, BSEE, NMFS, and USACE |

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| | | | for each individual sturgeon and sea turtle (download at: https://media.fisheries.noaa.gov/2021-11/Sturgeon-Sea-Turtle-Take-SOPs-external-11032021.pdf). | | |
| 19 | Construction and installation, postconstruction and installation monitoring | Sea turtle/Atlantic sturgeon handling and resuscitation guidelines | Any sea turtles or Atlantic sturgeon caught and retrieved in gear used in fisheries surveys must be handled and resuscitated (if unresponsive) according to established protocols and whenever at-sea conditions are safe for those handling and resuscitating the animal(s) to do so. Specifically:<br>a. Priority must be given to the handling and resuscitation of any sea turtles or sturgeon that are captured in the gear being used, if conditions at sea are safe to do so. Handling times for these species should be minimized (i.e., kept to 15 minutes or less) to limit the amount of stress placed on the animals.<br>b. All survey vessels must have copies of the sea turtle handling and resuscitation requirements found at 50 CFR 223.206(d)(1) prior to the commencement of any on-water activity (download at: https://media.fisheries.noaa.gov/ dammigration/sea_turtle_handling_and_resuscitation_measures.pdf). These handling and resuscitation procedures must be carried out any time a sea turtle is incidentally captured and brought onboard the vessel during the proposed actions.<br>c. If any sea turtles that appear injured, sick, or distressed, are caught and retrieved in fisheries survey gear, survey staff must immediately contact the Greater Atlantic Region Marine Animal Hotline at 866-755-6622 for further instructions and guidance on handling the animal, and potential coordination of transfer to a rehabilitation facility. If unable to contact the hotline (e.g., due to distance from shore or lack of ability to communicate via phone), the USCG should be contacted via VHF marine radio on Channel 16. If required, hard-shelled sea turtles (i.e., non- leatherbacks) may be held on board for up to 24 hours following handling instructions provided by the Hotline, prior to transfer to a rehabilitation facility.<br>d. Attempts must be made to resuscitate any Atlantic sturgeon that are unresponsive or comatose by providing a running source of water over the gills as described in the sturgeon resuscitation guidelines (NOAA 2020; https://media.fisheries.noaa.gov/dammigration-miss/Resuscitation-Cards-120513.pdf).<br>e. Provided that appropriate cold storage facilities are available on the survey vessel, following the report of a dead sea turtle or sturgeon to NMFS, and if NMFS requests, any dead sea turtle or Atlantic sturgeon must be retained on board the survey vessel for transfer to an appropriately permitted partner or facility on shore as safe to do so.<br>f. Any live sea turtles or Atlantic sturgeon caught and retrieved in gear used in any fisheries survey must ultimately be released according to established protocols and whenever at-sea conditions are safe for those releasing the animal(s) to do so. | Finfish, Sea turtles | BOEM, BSEE, NMFS, and USACE |
| 20 | Construction and installation, postconstruction and installation monitoring | Take notification | GARFO Protected Resources Division (PRD) and BSEE must be notified as soon as possible of all observed takes of sea turtles and Atlantic sturgeon occurring as a result of any fisheries survey. Specifically:<br>a. GARFO PRD and DOI (BOEM and BSEE) must be notified within 24 hours of any interaction with a sea turtle or sturgeon (nmfs.gar.incidental- take@noaa.gov and DOI via TIMSWeb and notification email at protectedspecies@bsee.gov). The report must include at a minimum 1) survey name and applicable information (e.g., vessel name, station number); 2) GPS coordinates describing the location of the interaction (in decimal degrees); 3) gear type involved (e.g., bottom trawl, longline); 4) soak time, gear configuration, and any other pertinent gear information; 5) time and date of the interaction; and 6) identification of the animal to the species level. Additionally, the email must transmit a copy of the NMFS Take Report Form (download at: https://media.fisheries.noaa.gov/2021-07/Take%20Report%20Form%2007162021.pdf?null) and a link to or acknowledgement that a clear photograph or video of the animal was taken (multiple photographs are suggested, including at least one photograph of the head scutes). If reporting within 24 hours is not possible due to distance from shore or lack of ability to communicate via telephone, fax, or email, reports must be submitted as soon as possible; late reports must be submitted with an explanation for the delay. | Finfish, Sea turtles | BOEM, BSEE, NMFS, and USACE |

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| | | | b. At the end of each survey season, a report must be sent to NMFS that compiles all information on any observations and interactions with ESA-listed species. This report must also contain information on all survey activities that took place during the season including location of gear set, duration of soak/trawl, and total effort. The report on survey activities must be comprehensive of all activities, regardless of whether ESA-listed species were observed. | | |
| 21 | Construction and installation, O&M, and decommissioning | Monthly/ annual reporting requirements | BOEM and BSEE would ensure that Revolution Wind submits regular reports (in consultation with NMFS) necessary to document the amount or extent of take that occurs during all phases of the proposed action. Details of reporting must be coordinated between Revolution Wind, NMFS, BOEM, and BSEE. All reports would be sent to: nmfs.gar.incidental- take@noaa.gov and BSEE via TIMSWeb and notification email at protectedspecies@bsee.gov. | Finfish, marine mammals, sea turtles | BOEM, BSEE, and NMFS |
| 22 | Construction and installation, O&M, and decommissioning | Vessel strike protected species observer requirements | Protected Species Observer Requirements (Construction)(Operations)(Decommissioning). The Lessee must ensure that vessel operators and crew members maintain a vigilant watch for marine mammals and sea turtles, and reduce vessel speed, alter the vessel's course, or stop the vessel as necessary to avoid striking marine mammals or sea turtles.<br>All vessels must have a visual observer on board who is responsible for monitoring the vessel strike avoidance zone for marine mammals and sea turtles. Visual observers may be PSO or crew members, but crew members responsible for these duties must be provided sufficient training by the Lessee to distinguish marine mammals from other phenomena and must be able to identify a marine mammal as a North Atlantic right whale, other whale (defined in this context as sperm whales or baleen whales other than North Atlantic right whales), or other marine mammal. Crew members serving as visual observers must not have duties other than observing for marine mammals while the vessel is operating over 10 kts;<br>Vessel Communication of Threatened and Endangered Species Sightings (Planning) (Construction) (Operations) (Decommissioning). The Lessee must ensure that whenever multiple Project vessels are operating, any detections of ESA-listed species (marine mammals and sea turtles) are communicated in near real time to these personnel on the other Project vessels: Protected Species Observer (PSO), vessel captains, or both.<br>Year-round, all vessel operators must monitor, the project's Situational Awareness System, WhaleAlert, US Coast Guard VHF Channel 16, and the Right Whale Sighting Advisory System (RWSAS) for the presence of North Atlantic right whales once every 4-hour shift during project-related activities. The PSO and PAM operator monitoring teams for all activities must also monitor these systems no less than every 12 hours. If a vessel operator is alerted to a North Atlantic right whale detection within the project area, they must immediately convey this information to the PSO and PAM teams. For any UXO/MEC detonation, these systems must be monitored for 24 hours prior to blasting;<br>Any observations of any large whale by any of the Lessee's staff or contractor, including vessel crew, must be communicated immediately to PSOs and all vessel captains to increase situational awareness. | Marine mammals | BOEM, BSEE, NMFS, and USACE |
| 23 | O&M and decommissioning | Vessel speed requirements | Between November 1st and April 30th, all vessels, regardless of size, must operate at 10 kts or less when traveling between the lease area and ports in New Jersey, New York, Maryland, Delaware, and Virginia;<br>All vessels, regardless of size, must immediately reduce speed to 10 kts or less when any large whale, mother/calf pairs, or large assemblages of non-delphinid cetaceans are observed (within 500 m) of an underway vessel;<br>All vessels, regardless of size, must immediately reduce speed to 10 kts or less when a North Atlantic right whale is sighted, at any distance, by anyone on the vessel;<br>If a vessel is traveling at greater than 10 knots, in addition to the required dedicated visual observer, the Lessee must monitor the transit corridor in real-time with PAM prior to and during transits. If a North Atlantic right whale is detected via visual observation or PAM within or approaching the transit corridor, all crew transfer vessels must travel at 10 kts or less for 12 hours following the detection. Each subsequent detection shall trigger a 12-hour reset. A slowdown in the transit corridor expires when there has been no further visual or acoustic detection in the transit corridor in the past 12 hours; | Marine mammals | BOEM, BSEE, NMFS, and USACE |

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| | | | All underway vessels (e.g., transiting, surveying) operating at any speed must have a dedicated visual observer on duty at all times to monitor for marine mammals within a 180° direction of the forward path of the vessel (90° port to 90° starboard) located at an appropriate vantage point for ensuring vessels are maintaining appropriate separation distances. Visual observers must be equipped with alternative monitoring technology for periods of low visibility (e.g., darkness, rain, fog, etc.). The dedicated visual observer must receive prior training on protected species detection and identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements in this subpart. Visual observers may be third-party observers (i.e., NMFS-approved PSOs) or crew members. Observer training related to these vessel strike avoidance measures must be conducted for all vessel operators and crew prior to the start of in-water construction activities. Confirmation of the observers' training and understanding of the Incidental Take Authorization (ITA) requirements must be documented on a training course log sheet and reported to NMFS;<br>All vessels must maintain a minimum separation distance of 500 m from North Atlantic right whales. If underway, all vessels must steer a course away from any sighted North Atlantic right whale at 10 kts or less such that the 500-m minimum separation distance requirement is not violated. If a North Atlantic right whale is sighted within 500 m of an underway vessel, that vessel must shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 500 m. If a whale is observed but cannot be confirmed as a species other than a North Atlantic right whale, the vessel operator must assume that it is a North Atlantic right whale and take the vessel strike avoidance measures described in this paragraph (b)(2)(xi);<br>All vessels must maintain a minimum separation distance of 100 m from sperm whales and non-North Atlantic right whale baleen whales. If one of these species is sighted within 100 m of an underway vessel, that vessel must shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 100 m;<br>All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all delphinoid cetaceans and pinnipeds, with an exception made for those that approach the vessel (e.g., bow-riding dolphins). If a delphinid cetacean or pinniped is sighted within 50 m of an underway vessel, that vessel must shift the engine to neutral, with an exception made for those that approach the vessel (e.g., bow-riding dolphins). Engines must not be engaged until the animal(s) has moved outside of the vessel's path and beyond 50 m;<br>When a marine mammal(s) is sighted while a vessel is underway, the vessel must take action as necessary to avoid violating the relevant separation distances (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If a marine mammal(s) is sighted within the relevant separation distance, the vessel must reduce speed and shift the engine to neutral, not engaging the engine(s) until the animal(s) is clear of the area. This does not apply to any vessel towing gear or any situation where respecting the relevant separation distance would be unsafe (i.e., any situation where the vessel is navigationally constrained);<br>All vessels underway must not divert or alter course to approach any marine mammal. Any vessel underway must avoid speed over 10 kts or abrupt changes in course direction until the animal is out of an on a path away from the separation distances; and<br>For in-water construction heavy machinery activities other than impact or vibratory pile driving, if a marine mammal is on a path towards or comes within 10 m of equipment, the Lessee must cease operations until the marine mammal has moved more than 10 m on a path away from the activity to avoid direct interaction with equipment. | | |

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| **BOEM-Proposed Monitoring Measures Developed in Conjunction with Cooperating Agencies** | | | | | |
| 1 | O&M | Periodic underwater surveys, reporting of monofilament and other fishing gear around WTG foundations | The Lessee must monitor potential loss of fishing gear near WTG foundations by surveying at least 10%Revolution Wind must report the results of the surveys to BOEM (at renewable_reporting@boem.gov) and BSEE (at marinedebris@bsee.gov) in an annual report, submitted by April 30 for the preceding calendar year. Annual reports must be submitted in Microsoft Word format. Photographic and videographic materials must be provided on a portable drive in a lossless format such as TIFF or Motion JPEG 2000. Annual reports must include survey reports that include the survey date; contact information of the operator; the location and pile identification number; photographic and/or video documentation of the survey and debris encountered; any animals sighted; and the disposition of any located debris (i.e., removed or left in place). Required data and reports may be archived, analyzed, published, and disseminated by BOEM. | Marine mammals, sea turtles, finfish | BOEM and BSEE |
| 2 | Preconstruction, Construction, O&M, and decommissioning | Long-term PAM | Long-term monitoring of ambient noise, marine mammal, and cod vocalizations in the Lease Area before, during, and following construction. Continuous recording must occur at least 30 days prior to pile driving, during foundation pile driving, initial operation, and for at least 3 full calendar years of operation to monitor for potential impacts. At least three devices must be independently deployed within the lease area to maximize spatial coverage of the project area based on 10-kilometer spacing between deployment locations or as otherwise agreed between BOEM and the Lessee. The locations of the three buoys must be coordinated with the Regional Wildlife Science Collaborative prior to the plan being submitted to BOEM and BSEE. Devices may be moved to new locations during the recording period, if existing PAM devices will be present in the lease area providing continuous recording. The archival recorders must have a minimum capability of continuously detecting and storing acoustic data on vessel noise, pile-driving, WTG operation, baleen whale vocalizations, and cod vocalizations in the lease area. No later than 180 days prior to buoy deployment, the Lessee must submit to BOEM and BSEE (renewable_reporting@boem.gov and OSWsubmittals@bsee.gov) the PAM plan, which describes all proposed equipment, deployment locations, detection review methodology, and other procedures and protocols related to the required use of PAM for monitoring.<br>The PAM plan must detail mooring best practices, data management, storage, measurement, and data processing best practices that are required by BOEM for long-term PAM monitoring. Refer to Regional Wildlife Science Collaborative for Offshore Wind Data Management & Storage Best Practices for Long-term and Archival Passive Acoustic Monitoring (PAM) Data. Other best practices consistent with COP approval should be detailed in the plan. The long-term PAM Plan must include the proposed equipment, sample rate, mooring design, deployment locations, methods for baleen whale and cod detections, and metrics for ambient noise analysis. The long-term PAM plan must be submitted to BOEM and BSEE (at renewable_reporting@boem.gov and OSWsubmittals@bsee.gov) for review and concurrence. BOEM and BSEE will review the long-term PAM Plan and provide comments, if any, on the plan within 45 calendar days, but no later than 90 days of its submittal. The plan must satisfy all outstanding comments to BOEM's and BSEE's satisfaction. The Lessee will receive written concurrence from DOI upon acceptance of the final long-term PAM plan. If DOI does not provide comments on the long-term PAM Plan within 90 calendar days of its submittal, the Lessee may conclusively presume DOI's concurrence with the long-term PAM Plan.<br>Long-term PAM monitoring results must be provided within 180 days of buoy collection and again within 180 days of the annual anniversaries of each the PAM device deployments. All raw data must be sent to NCEI for archiving no later than 6 months following the date of each recorder recovery.<br>As an alternative to conducting long-term PAM in its project area, the lessee may opt to meet this monitoring requirement through an annual deposit to BOEM's Environmental Studies Program in support of its Partnership for an Offshore Wind Energy Regional Observation Network (POWERON) initiative. The lessee's contribution would | Marine Mammals, Finfish, EFH | BOEM and BSEE |

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| | | | cover activities within the area of potential effect of the project, such as the purchase of instruments, annual deployments and refurbishment, data processing, and long-term data archiving. Funding from BOEM, other partners, and potentially other lessees will support long-term PAM throughout the region which will enable broader-scale analyses on cumulative effects to marine species. Under this option, the Lessee will be expected to cooperate with the POWERON team to facilitate deployment and retrieval of instruments within the project area. If necessary, the Lessee may request temporary withholding of the public release of acoustic data that has been collected within its project area. Record long-term measurements of ambient noise, marine mammal, and cod vocalizations in the Lease Area before, during, and following construction. | | |
| **NMFS Essential Fish Habitat (EFH) Conservation Recommendations (CRs) issued June 16, 2023[3]†** | | | | | |
| EFH Conservation Recommendations | | | | | |
| 1-4 | Planning, construction and installation, O&M, decommissioning | Recommendations to minimize adverse impacts to Atlantic cod spawning | 1. To minimize adverse effects to Atlantic cod spawning aggregations in and adjacent to the project area, and to reduce the risk of adverse population level effects to this species:<br>a. No pile driving activities in the lease area should occur between November 1 and March 31 of each year.<br>b. No seafloor disturbing activities should occur between November 1 and March 31 of each year, within the Revolution Wind lease area and along the export cable route (RWEC-OCS) located from KP 45 to KP 56 (mile 28 to 35) which includes the locations where use of the boulder plow is currently proposed.<br>c. No removal or detonation of unexploded ordinances (UXOs) should occur between November 1 and March 31, of each year.<br>d. No HRG sub-bottom profiling (e.g. sparkers, boomers) survey activities should occur between November 1 and March 31, of each year, within the Revolution Wind lease area. This recommendation supersedes the October 2017 EFH consultation on the Site Assessment Plan (SAP) due to new information related to cod spawning activity in the project area.<br>2. To minimize impacts to Atlantic cod sensitive life stages and complex habitats on Cox Ledge:<br>a. No more than the minimum number of turbines required to meet the power purchase agreement should be permitted.<br>b. The largest size turbines considered in the COP (12MW) should be used to further reduce the number of turbines required for a viable project.<br>c. Avoid UXO detonation on and adjacent to Cox Ledge to avoid adverse impacts to complex habitats and other sensitive marine resources.<br>3. To minimize adverse impacts to Atlantic cod spawning habitats:<br>a. Remove the following nine (9) WTGs locations and associated inter array cables to minimize overlap with Atlantic cod spawning habitat: B36, B37, B38, B39, B44, B45, B46, B49, and B50. Turbines are numbered based on WTG labels identified in the Inspire habitat data pop-up viewer.<br>b. Re-route the OSS-link cable connecting the two offshore substations (OSSs) to avoid crossing directly through Atlantic cod spawning and complex habitat. Specifically, the OSS-link should be routed north and east around the area of complex habitat and extend north and west outside of the lease area (and north of the spawning location) to connect to the other OSS station at the northern end of the lease. | Finfish, EFH, Benthic Habitat, Invertebrates | BOEM, BSEE and NMFS |

[3] NMFS issued conservation recommendations to BOEM and USACE for the Revolution Wind project via letter on 6.16.23. As required by section 305(b)(4)(B) of the Magnuson-Stevens Act, USACE and BOEM will provide a detailed response to these conservation recommendations to NMFS regarding which measures will be adopted, partially adopted, or not adopted along with a rationale. At the time of FEIS issuance, BOEM and USACE have yet not determined which conservation recommendations each agency intends to adopt or partially adopt. As such, the full list of conservation recommendations received from NMFS is included in this document.

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| | | | 4. Continue the on-going telemetry and passive acoustic survey within the lease area and expand the existing study beyond the lease area boundaries to identify the full scope of the area affected by project construction and operation and to assess individual, synergistic, and cumulative effects of the project on cod spawning activity pre-, during, and post construction.<br>a. Provide continuous monitoring of Atlantic cod spawning aggregations between November 1 and April 30 prior to the construction of the project, during project construction, and post construction.<br>b. Place additional receivers in pending turbine locations. Once constructed, additional receivers should be added to the turbines to increase coverage.<br>c. Add an additional glider to the ongoing survey to increase the spatial coverage of the Revolution Wind project area. The ongoing survey should focus on increasing survey coverage (i.e. increase the number of glider tracts) within the project area to provide better resolution and detection of cod spawning activity within the project area before, during, and after construction.<br>d. Add a third glider to expand the survey coverage outside the lease area to assess synergistic and cumulative effects of the project on the distribution of cod spawning activity.<br>e. Data and results from this study should be made available to NMFS Habitat and Ecosystem Services Division (HESD). | | |
| 5-10 | Planning, construction and installation, O&M, decommissioning | Recommendations to minimize impacts to benthic habitats | 5. To minimize adverse impacts in complex habitats on Cox Ledge:<br>a. In addition to the nine (9) turbines that overlap with cod spawning habitat, remove the following five (5) WTG and associated inter array cables to minimize impacts to complex habitats: B48, B52, B53, B61, and B62. Turbines are numbered based on WTG labels identified in the Inspire habitat data pop-up viewer.<br>b. Removal of additional turbines beyond the 14 identified above should be selected based on the following criteria (1) adjacent to the areas already planned for removal to reduce habitat fragmentation, (2) located within complex habitats and impacts cannot be minimized through micrositing and (3) impacts to complex habitats from inter array cable connecting the turbines would be reduced. The following turbines and associated cables are consistent with these criteria and should be considered for removal: B42, B43, B54, B55, B69, and B70. Turbines are numbered based on WTG labels identified in the Inspire habitat data pop-up viewer.<br>6. Microsite WTGs, inter array cables and export cables (both RWEC-OCS and RWEC-RI) to avoid complex habitats.<br>a. For any WTGs located within complex habitats that are not removed, the WTGs should be microsited outside identified complex habitats, including large boulders/habitat elements (i.e., >/= 0.5 m in diameter) and into low multibeam backscatter return areas.<br>b. Inter-array, and export cables should be microsited to minimize impacts to complex areas and/or areas of high habitat heterogeneity (diversity of structural elements, including bathymetric features) and complexity. Cables should be microsited around all identified complex habitats, including large boulders/habitat elements (i.e., >/= 0.5 m in diameter) and into low multibeam backscatter return areas.<br>c. Cables should be sited to avoid unexploded ordinances (UXOs) and the relocation or detonation of any UXOs.<br>d. A WTG, inter-array and export cable (included RWEC-OCS and RWEC-RI) micrositing plan should be developed to demonstrate how long-term to permanent adverse impacts to complex habitats and benthic features will be avoided and minimized within the lease area.<br>i. At a minimum, the micrositing plan should include: 1) depictions of the microsited WTGs and cables (i.e., include a figure depicting large boulder locations, multibeam backscatter returns, and the proposed microsited cable); 2) information describing how the microsited locations were selected (i.e., what information other than multibeam backscatter and boulder locations was used to determine the cable path); and 3) for any cables that are identified to be infeasible to be fully microsited around complex habitats and within low multibeam backscatter areas, detailed information supporting the feasibility issues encountered, calculated impact areas of large boulders | Finfish, EFH, Benthic Habitat, Invertebrates | BOEM, BSEE, and NMFS (and USACE for CRs 6, 8-10) |

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| | | | and/or medium to high multibeam backscatter area, and impact minimization measures to be used should be provided.<br>ii. The final micrositing plan should be submitted to NMFS HESD prior to commencement of any in-water work. A copy of a redline-version of the draft plan that addresses any comments or questions submitted by BOEM (or other commenters) should also be provided to NMFS along with the final plan.<br>7. Re-route the current export cable alignment at the exit of the lease area to avoid impacts to complex habitats. The cable corridor should be rerouted to avoid the area of highly complex habitats where the use of a boulder plow is currently proposed (located between KP 45 to KP 56). The habitat data demonstrates that within this area of the project, complex habitats are patchy and soft bottom habitats are found in adjacent areas. The export cable should exit the lease area (referred to as Zone 4 in the EFH assessment) further north to avoid complex habitats and dense fields of large boulders >0.5 m.<br>8. To minimize impacts from boulder/cobble removal/relocation activities, relocate boulders and cobbles as close to the impact area as practicable, in areas immediately adjacent to existing similar complex bottom, placed in a manner that does not hinder navigation or impede commercial fishing, and avoids impacts to existing complex habitats. In order to minimize impacts to complex habitats, boulders that will be relocated using boulder "pick" methods should be relocated outside the area necessary to clear and placed along the edge of existing complex habitats such that the placement of the relocated boulders will result in a marginal expansion of complex habitats into soft-bottom habitats (i.e., boulders should be placed outside the relocation area and in an area of low multibeam backscatter return immediately adjacent to medium or high return areas) and reduce risk to navigation and fishing operations in the area.<br>a. A boulder relocation plan should be developed that identifies where boulders will be removed from and where they will be placed. Resource agencies and the fishing industry should be consulted in preparation of the boulder relocation plan. The plan should identify all areas where a boulder plow will be used during sitepreparation. At a minimum, the plan should include: 1) a clear depiction (i.e., figures) of the location of boulder relocation activities specified by activity type (e.g., pick or plow, removal or placement) and overlaid on multibeam acoustic backscatter data; 2) a detailed methodology for each type of boulder relocation activity and technical feasibility constraints; 3) any proposed measures to minimize impacts to attached epifaunal assemblages on boulder surfaces; 4) measures taken to avoid further adverse impacts to complex habitat and fishing operations; and 5) a summary of any consultation with resources agencies and the fishing industry in development of the plan.<br>b. The final, BOEM approved pre-construction boulder relocation plan should be submitted to NMFS HESD prior to commencement of any in-water work. A copy of a redline-version of the draft plan that addresses any comments or questions submitted by BOEM (or other commenters) should also be provided to NMFS HESD along with the final plan.<br>c. In all offshore/nearshore areas where seafloor preparation activities include the use of boulder plows, boulder picks, jets, grapnel runs or similar methods used, post-construction acoustic surveys (e.g. multibeam backscatter and side scan sonar) capable of detecting bathymetry changes of 0.5 feet (ft.) or less, should be completed to demonstrate how the benthos were modified by seabed preparation activities and project construction.<br>i. In areas where boulder plows are used and the berm height exceeds three ft. above the existing grade, the created berm should be restored to match that of the existing grade/pre-construction conditions.<br>d. Data should be provided to NMFS HESD in an online viewer with preconstruction and post-construction survey data. As-built post-construction information should also be provided, including information on how, if at all, the final boulder placement differs from the boulder relocation plan and why such changes were necessary.<br>9. Avoid anchoring in complex habitats and areas of high habitat heterogeneity and complexity during all phases of the project including any area where large boulders (>/= 0.5 m in diameter) or medium to high multibeam backscatter returns occur. | | |

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| | | | a. If anchoring is necessary in complex habitats and areas of high habitat heterogeneity, extend the anchor lines to the extent practicable to minimize the number of times the anchors must be raised and lowered to reduce the amount of habitat disturbance.<br>b. Jack-up barge locations should avoid complex habitats for WTG construction and maintenance. Where full avoidance is not feasible, the proposed locations for the jack-up barge should be selected to avoid, and in order of priority:<br>i. Complex habitats with high density large boulders;<br>ii. Complex habitats with medium density large boulders;<br>iii. Complex habitats with low density large boulders;<br>iv. Complex habitats with scattered large boulders;<br>v. Complex habitats with no large boulders.<br>c. For any area where large boulders or medium to high multibeam backscatter returns occur and vessels must remain stationary, dynamic positioning systems (DPS) or mid-line buoys on anchor chains should be required.<br>d. An anchoring plan should be developed to demonstrate how anchoring will be avoided and minimized in these habitats during all phases of the project and in both state and federal waters. At a minimum, the anchoring plan to be developed should include: 1) depictions of the lease and export cable areas that clearly identify areas, using GPS location coordinates, where large boulders and/or medium to high backscatter returns occur, and either: a) DPS, or b) mid-lines buoys are required for anchoring; 2) information describing the operations and number of vessels that will be necessary to maintain vessel position using DPS or mid-line buoys within complex areas (i.e., large boulder and medium to high multibeam backscatter areas); and 3) for any complex habitat area that is identified for it to be infeasible to be fully avoid anchoring within or using midline buoys, detailed information supporting the feasibility issues encountered, calculated impact areas of large boulders and/or medium to high multibeam backscatter area, and impact minimization measures to be used should be provided.<br>i. A copy of the anchoring plan, with complex habitat coordinates, should be provided to all vessel operators.<br>ii. The final anchoring plan should be submitted to NMFS HESD prior to commencement of any in-water work. A copy of a redline-version of the draft plan that addresses any comments or questions submitted by BOEM (or other commenters) should also be provided to NMFS along with the final plan.<br>iii. Data should be provided to NMFS in an online viewer with preconstruction and post-construction survey data. As-built post-construction information should also be provided, including information on how, if at all, the final anchoring differed from the anchoring plan and why such changes were necessary.<br>10. To minimize permanent adverse impacts to existing habitats from scour protection:<br>a. Avoid and minimize the use of scour protection by micrositing cables (inter-array cables, RWEC-OCS and RWEC-RI) to allow for full penetration/burial, regardless of habitat type (this can be done by siting cables in appropriate substrates)<br>i. Additional bottom surveys (e.g. sub-bottom cores) should be conducted, as necessary, to inform the micrositing of the cable and reduce the extent of soft bottom habitat conversion via placement of scour protection.<br>ii. Should scour protection be necessary, the minimum amount of scour protection should be used to accomplish the purpose/intent of the scour protection.<br>b. Use natural, rounded stone of consistent grain size in the entirety of any areas with complex habitat to match existing conditions.<br>c. Avoid the use/placement of engineered stone (e.g., riprap; cut, crushed, or graded stone; etc.) or concrete mattresses within complex habitats (i.e., areas with boulders >/= 0.5m, and/or medium to high multibeam backscatter returns). | | |

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| | | | i. As determined through the technical feasibility analysis, if the use of engineered stone or concrete mattresses cannot be avoided in these areas, the impact should be mitigated through the addition of a natural, rounded stone veneer. At a minimum, any exposed surface layer should be designed and selected to provide three-dimensional structural complexity that creates a diversity of crevice sizes (e.g., mixed stone sizes, natural rounded stone veneer) and rounded edges (e.g., tumbled stone, or natural round stone veneer), and be sloped such that outer edges match the natural grade of the seafloor.<br>d. Avoid the use of plastics/recycled polyesters/net material (i.e. rock-filled mesh bags, fronded mattresses)<br>e. Develop a scour and cable protection plan for all habitat areas. At a minimum, the plan should include: 1) a clear depiction of the location and extent of proposed scour or cable protection within complex habitat (i.e., figures displaying existing areas with large boulders and/or medium to high multibeam backscatter returns and the extent of scour or cable protection proposed within each area); 2) all available habitat information for each identified area (e.g., plan view imagery, video transects); and 3) detailed information on the proposed scour or cable protection materials for each area and habitat type;<br>f. The final scour and cable protection plan should be submitted to NMDS HESD prior commencement of any in-water work. A copy of a redline-version of the draft plan that addresses any comments or questions submitted by BOEM (or other commenters) should also be provided to NMFS HESD along with the final plan. | | |
| 11 | Construction and installation | Recommendations to minimize acoustic impacts from pile driving | 11. Require the use of noise mitigating measures during pile driving construction, including the use of soft start procedures and the deployment of noise dampening equipment such as bubble curtains.<br>a. A plan outlining the noise mitigation procedures for both offshore and inshore activities should be filed with BOEM and the USACE for approval before construction commences. BOEM should provide NMFS HESD with a copy of the final plan before in-water work begins. A copy of a redline-version of the draft plan that addresses any comments or questions submitted by BOEM (or other commenters) should also be provided to NMFS HESD along with the final plan.<br>b. The noise mitigation plan should include a process for notifying NMFS HESD within 24 hours if any evidence of a fish kill during construction activity is observed, and contingency plans to resolve issues.<br>c. The noise mitigation plan should include passive acoustic sound verification monitoring during pile driving activities. Additional noise dampening technology should be applied should real-time monitoring indicate noise levels exceed the modeled 10 decibel attenuation levels.<br>d. Acoustic monitoring reports that include any/all noise-related monitoring should be provided to NMFS HESD. | Finfish, Invertebrates | BOEM, BSEE, NMFS and USACE |
| 12-18 | Construction and installation | Recommendations to minimize impacts to Narragansett Bay | 12. Use a land based cable corridor for routing the RWEC-RI to shore to avoid impacts to Narragansett Bay.<br>a. Should the cable be routed through Narragansett Bay, the cable should be routed along the western side of the proposed cable corridor to minimize impacts to juvenile cod HAPC and complex bottom located along the eastern edge of the proposed cable corridor and consistent with EFH CR #6.<br>b. Habitat maps depicting the bottom type, including complex rocky habitats (boulder density), adjacent sandy areas, and SAV should be provided to vessels/captains to ensure HAPCs are avoided. Do not use the delineations of juvenile cod HAPC provided in the EFH assessment, as they are inconsistent with the HAPC definition and do not represent all HAPC in Narragansett Bay.<br>13. To minimize impacts to SAV in Narragansett Bay the following should be required:<br>a. Avoid cable installation, dredging, or other construction activities in SAV.<br>b. Barges should not be moored in SAV or SAV habitat.<br>c. Avoid unconfined dredging and maintain a minimum 100 ft. buffer between the edge of any SAV beds and any equipment staging or anchoring activities.<br>d. Maps derived from updated surveys should be provided to us as well as vessels/captains to ensure SAV is avoided. | Finfish, EFH, Benthic Habitat, Invertebrates | BOEM, BSEE, NMFS and USACE |

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| | | | e. Pre- and post-construction monitoring of the SAV bed in the project area should be conducted. Updated pre-construction surveys should be conducted to ensure the SAV bed is accurately delineated prior to construction. Post construction surveys should be conducted to determine if any unanticipated impacts occurred as the result of project construction.<br>f. Should the project unintentionally impact SAV through frac-out, mooring in the SAV bed, or other direct or indirect effects from construction of the project, compensatory mitigation should be provided for all areas of SAV impacted by construction activities including cable installation and dredging at a minimum ratio of 3:1.<br>i. A compensatory mitigation plan that satisfies each element of a complete compensatory mitigation plan as identified in the published regulations 33 CFR Parts 325 and 332 "Compensatory Mitigation for Losses of Aquatic Resources," (Mitigation Rule) and NOAA's Mitigation Policy for Trust Resources should be required for any impacts to SAV. This plan should be included as a special condition of the permit.<br>14. Avoid in-water work including cable installation, seabed preparation, pile driving, HDD pit excavation, or other extractive or turbidity/sediment-generating activities from February 1 to June 30 of any given year in the nearshore waters to depths of 5 meters (m) to avoid impacts to winter flounder early life stages (eggs, larvae).<br>15. To minimize impacts to estuarine habitats associated with excavation of the HDD exit pits for the sea-to-shore transition, the following should be required:<br>a. Unconfined dredging should not be permitted<br>b. Dredged materials from HDD exit pits should be stored on a barge and used to backfill the excavated areas once construction and installation is complete.<br>c. Detailed frac-out plans should be developed for all areas where HDD is proposed to be used. A copy of the final plan should be provided to NMFS HESD prior to construction.<br>16. To minimize impacts from vessel operation in Narragansett Bay:<br>a. All vessels should float at all stages of the tide.<br>b. All vessels should be required to follow EFH CR 9 and CR 13 to avoid anchoring in rocky and vegetated habitats.<br>17. To minimize impacts to shellfish from construction activities in Narragansett Bay:<br>a. Avoid seafloor disturbance activities including cable installation, dredging, or other construction activities from May 1 to October 14 of any given year.<br>b. A shellfish survey should be conducted prior to the commencement of dredging at the HDD exit pits to identify high densities of shellfish.<br>i. Shellfish beds that are identified should be relocated in coordination with RI DEM prior to commencement of in-water work.<br>c. The cable should be microsited around areas of high density shellfish beds.<br>18. Avoid in-water work from February 15 to June 30 of any given year to avoid impacts to anadromous fish during the upstream in-migration to their spawning grounds. | | |
| 19-21 | O&M | Recommendations to address uncertainties and minimize impacts from project operation | 19. Revise the Benthic Habitat Monitoring Plan to address agency concerns related to the adequacy of the proposed methods to detect changes in the existing benthic community structure of Cox Ledge, the offshore, and inshore project areas. The plan should be required to address potential changes to macrobenthic communities across and within each habitat type in the project area, including the artificial substrates to be constructed.<br>a. The plan should include pre-construction/baseline monitoring data, which should be collected for a minimum of three years for each survey conducted.<br>b. The plan should include post-construction monitoring of the existing, natural soft and hard bottom benthic community structure within the lease area and export cable corridor, post-construction benthic community | Finfish, EFH, Benthic Habitat, Invertebrates | BOEM, BSEE, and NMFS |

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| | | | development, and invasive species (e.g., *Didemnum vexillum*) growth on: 1) constructed habitats, 2) natural habitats within the expected area of project impacts, and 3) within adjacent areas outside the area of impact.<br>c. Post-construction multibeam backscatter and side scan survey results should be conducted and included as a component of the benthic monitoring plan.<br>d. The monitoring plan should also include measures to evaluate: 1) physical changes to the benthic habitat from construction and boulder relocation, including changes in depth, rugosity, and slope through the collection of acoustic data (multibeam bathymetry and backscatter and side scan sonar), 2) biological changes to benthic community structure with distance from the area of impact, including areas impacted by boulder removal, cables, scour protection, and WTGs and 3) invasive species distribution and abundance with associated plans for removing/managing invasives.<br>i. The applicant should consult with the resource agencies in the revision and refinement of this plan and give the resource agencies a minimum of 90 days to review and comment on the plan. The applicant should submit a final plan to BOEM that addresses, and includes, all resource agency comments, as well as the applicant's response to those comments. A copy of the final monitoring plan should be provided to NMFS HESD prior commencement of any in-water work.<br>e. All data and metadata should be made available to NMFS HESD.<br>20. Require the development of an in situ project specific monitoring program to address uncertainties related to impacts of the operation of the Revolution Wind project on EFH and federally managed species. This monitoring recommendation is consistent with principles outlined in NOAA's Mitigation Policy for Trust Resources which highlights the use of the best available scientific information, such as results of surveys and other data collection efforts when existing information is not sufficient for the evaluation of proposed actions and mitigation, or when additional information would facilitate more effective or efficient mitigation recommendations. The project specific monitoring program should measure in situ the stressors created by project operation on the ecosystem from operational noise, electromagnetic fields (EMF), wind wake effects, and the presence of structures. Studies should also evaluate the biological effects of those stressors on commercially important species in the project area such as Atlantic cod, monkfish and ocean quahog. Monitoring plans should include the collection of baseline data and be provided to NMFS GARFO and NEFSC for review and comment within 90 days of ROD issuance. A response to NMFS comments should be provided. These monitoring studies should be developed in partnership with NMFS and other scientific institutions to aid in addressing the following questions:<br>a. How far do effects on sound pressure, particle motion, and substrate vibration extend from the individual WTGs and the Revolution Wind Farm collectively?<br>i. What effect do these operational noise effects have on the distribution of larvae for species with designated EFH in the project area and prey for these species (i.e. sand lance)?<br>b. What is the spatial distribution of the EMF emissions around inter-array, OSSlink and export cables (RWEC-OCS and RWEC-RI)?<br>i. What is the behavioral response to the altered EMF of fisheries resource species/life stages with known EMF-sensitivity?<br>c. How far does the marine and atmospheric wind wake extend from the Revolution Wind Farm during operation?<br>i. What are the effects on physical water column properties, primary and secondary production, and larval dispersal for species with designated EFH in the project area?<br>d. What is the distribution, abundance, survival, growth rate, and recruitment rate of cod larvae along a distance gradient from offshore wind structures?<br>21. Require the implementation of preventive measures to reduce the risk of contaminant emissions or accidental release of chemicals. Such measures may include backup systems, secondary containments, closed loop systems, and/or recovery tanks. | | |

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| | | | a. To reduce the contaminants in the water column Al anodes should be used for the turbine rather than Zn anodes. | | |
| 22 | Decommissioning | Project Decommissioning | 22. The EFH consultation should be reinitiated prior to decommissioning turbines to ensure that the impact to EFH as a result of the decommissioning activities have been fully evaluated and minimized to the extent practicable. Pre-consultation coordination related to decommissioning should occur at least five years prior to proposed decommissioning. | EFH | BOEM, BSEE, NMFS and USACE |
| Fish and Wildlife Coordination Act Recommendations – USACE jurisdiction | | | | | |
| 1 | Construction and installation, O&M, decommissioning | In-water work | No in-water work should occur between April 1 to June 30 of any calendar year to avoid and minimize potential impacts to horseshoe crabs spawning along the beaches of the Western Passage of Narragansett Bay. | Invertebrates | NMFS and USACE |
| 2 | Construction and installation | Reduction of WTG and IAC | To minimize impacts to American lobster and Jonah crab populations, the number of turbine locations and associated inter array cables should be reduced to the greatest extent possible, consistent with EFH CRs 2-3 and 5. Data and survey results from the proposed ventless trap surveys should be provided to NMFS HESD. | Invertebrates | NMFS and USACE |
| 3 | Construction and installation, O&M, decommissioning | NOAA Fisheries scientific surveys | The project should be required to mitigate the major impacts to NOAA Fisheries scientific surveys consistent with NMFS-BOEM Federal Survey Mitigation Strategy - Northeast U.S. Region. Revolution Wind's plans to mitigate these impacts at the project and regional levels should be provided to NMFS for review and approval prior to BOEM's decision on its acceptance. Mitigation is necessary to ensure that NOAA Fisheries can continue to accurately, precisely, and timely execute our responsibilities to monitor the status and health of trust resources. | Other uses | NMFS and USACE |
| 4 | Construction and installation, O&M | Locations of boulders, berms, and protection measures | Locations of relocated boulders, created berms, and scour protection, including cable protection measures (i.e., concrete mattresses) should be provided to NMFS and the public as soon as possible to help inform marine users, including, but not limited to the fishing industry and entities conducting scientific surveys of potential gear obstructions. | Commercial Fisheries, Other uses | NMFS and USACE |
| **BOEM-proposed Mitigation and Monitoring Measures in the NMFS EFH Assessment†** | | | | | |
| 1 | Construction and installation | Bottom-disturbing restrictions | BOEM would restrict bottom-disturbing activities from January through April, with the addition of December with contingencies as described in the MMPA final rule. Revolution Wind would be required to develop an adaptive acoustic monitoring plan for spawning Atlantic cod from November through March, including restrictions on Project activities if Atlantic cod aggregations indicative of spawning are detected. | EFH, finfish | BOEM, BSEE |
| 2 | Construction and installation | Micrositing | All WTG and OSS foundations would be positioned within micrositing windows to avoid impacts to large-grained complex and complex habitats to the extent practicable. | EFH , finfish, benthic habitat, invertebrates | BOEM, BSEE, NMFS |
| 3 | Construction and installation, O&M, and decommissioning | Anchoring Plan | BOEM would require Revolution Wind to develop an anchoring plan to avoid minimize adverse impacts on benthic habitat during Project construction *and* from O&M activities throughout the life of the Project. The anchoring plan would delineate sensitive large-grained complex and complex habitats, including eelgrass and kelp beds, and identify areas where anchoring activities are restricted. | EFH , finfish, benthic habitat, invertebrates | BOEM, BSEE, NMFS |
| 4 | Construction, installation, and O&M | Live and hard bottom impact monitoring | The Lessee would develop and implement a monitoring plan for live and hard-bottom features that may be impacted by proposed activities. The monitoring plan would also include assessing the recovery time for these sensitive habitats. BOEM recommends that all monitoring reports classify substrate conditions following Coastal and Marine Ecological Classification Standard (CMECS) standards, including live bottoms (e.g., submerged aquatic | EFH, benthic habitat, and invertebrates | BOEM, BSEE, NMFS |

| Mitigation Number | Proposed Project Phase | Mitigation or Monitoring Measure | Description of Mitigation and Monitoring Measures Resulting from Consultations | Resource Area Mitigated | BOEM's Identification of the Anticipated Enforcing Agency* |
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| | | | vegetation and corals and topographic features). The plan would also include a means of recording observations of any increased coverage of invasive species in the impacted hard-bottom areas. | | |
| 5 | Construction and installation, O&M, and decommissioning | Live and hard bottom habitat mapping and avoidance | Vessel operators would be provided with maps of sensitive hard-bottom habitat in OSW project areas, as well as a proposed anchoring plan that would avoid or minimize impacts on the hard-bottom habitat to the greatest extent practicable. These plans would be provided for all anchoring activity, including construction, maintenance, and decommissioning. | EFH, benthic habitat, and invertebrates | BOEM, BSEE, NMFS |
| 6 | Construction, installation, and O&M | Scour and cable protection | To the extent technically and economically feasible, the Lessee must ensure that all materials used for scour and cable protection consist of natural or engineered stone that does not inhibit epibenthic growth. The materials selected for protective purposes should mirror the natural environment and provide similar habitat functions. | EFH , finfish, benthic habitat, invertebrates | BOEM, BSEE, NMFS |
| 7 | O&M | Post-installation cable monitoring | Revolution Wind would be required to inspect all cables after construction is completed to document exact location, burial depth, and post-installation benthic habitat conditions. Inspections must be completed within 6 months of Project commissioning, annually for the first 3 years following construction, and as needed following major storm events. Monitoring reports would be submitted to BOEM within 45 days of survey completion. | EFH , finfish, benthic habitat, invertebrates | BOEM, BSEE, NMFS |
| 8 | Construction and installation | Atlantic cod spawning monitoring plan | At least 90 days prior to inter-array cable installation (e.g., boulder relocation, pre-cut trenching, cable crossing installation, cable lay and burial) and foundation site preparation (e.g., scour protection installation), BOEM would require the Lessee to provide DOI with a plan to monitor for Atlantic cod aggregations that are indicative of spawning behavior during the above-listed activities between November 1 and March 30 of each year (Plan). The objective of the Plan is to detect Atlantic cod aggregations and avoid or minimize the above-listed activities in any area with aggregations of Atlantic cod indicative of spawning behavior, as technically and economically feasible. The Lessee must include in the Plan details on detection thresholds (e.g., density and location) of spawning Atlantic cod aggregations that would trigger the adaptive management of activities described in this paragraph, including any restrictions on activities in any area with aggregations of Atlantic cod indicative of spawning behavior, and analysis of technical and/or economic infeasibility. | Finfish and EFH | BOEM, BSEE, NMFS |
| **BOEM-proposed Measures from the Data Collection and Site Survey Activities for Renewable Energy on the Atlantic OCS BA** | | | | | |
| 1 | Construction and installation, O&M, and decommissioning | Data collection BA BMPs | BOEM and BSEE would ensure that all Project design criteria and BMPs incorporated in the Atlantic data collection consultation for offshore wind activities (Baker and Howson 2021) shall be applied to activities associated with the construction, maintenance and operations of the Project as applicable. | Finfish, marine mammals, sea turtles | BOEM and BSEE |
| **NMFS-proposed Measures to Minimize Impacts on Benthic Habitat** | | | | | |
| 1 | Construction and installation | Scour and cable protection | Revolution Wind would be required to use natural rounded stone for cable and scour protection within large-grained complex and complex habitats and avoid use of concrete mattresses where practicable. The selected materials should be designed and placed to provide three-dimensional structural complexity. To the extent technically and economically feasible, the Lessee must ensure that all materials used for these measures consist of natural or engineered stone that does not inhibit epibenthic growth and provides three-dimensional complexity in height and in interstitial spaces. | Benthic habitat | BOEM and BSEE |

| Mitigation Number | Proposed Project Phase | Mitigation or Monitoring Measure | Description of Mitigation and Monitoring Measures Resulting from Consultations | Resource Area Mitigated | BOEM's Identification of the Anticipated Enforcing Agency* |
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| **Other BOEM-proposed Mitigation Measures** | | | | | |
| 1 | Construction, O&M | Vessel speed restriction | BOEM will require Revolution Wind to comply with NMFS's vessel strike avoidance and reporting measures included in the final MMPA ITR and ESA biological opinion. | Marine mammals, Sea turtles | BOEM and BSEE |
| 2 | Construction and installation, O&M, conceptual decommissioning | Anchoring plan | BOEM requires the applicant to develop an anchoring plan to ensure anchoring is avoided and minimized in complex habitats, near identified marine cultural resources, and identified unexploded ordnance during construction and maintenance of the Project. The anchoring plan is required to be provided for review and comment prior to BOEM approval. | Benthic habitat, EFH, invertebrates, finfish, and cultural resources | BOEM and BSEE |

* At the time of preparation of this document, BOEM and BSEE are in the process of transferring enforcement authorities from BOEM to BSEE.

**Table F-3. Additional Mitigation and Monitoring Measures Under Consideration**

| Mitigation Number | Proposed Project Phase | Mitigation or Monitoring Measure | Description of Additional Mitigation and Monitoring Measures Under Consideration | Resource Area Affected | BOEM's Identification of the Anticipated Enforcing Agency* |
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| **Additional BOEM-proposed Mitigation Measures** | | | | | |
| 1 | Construction, O&M | Environmental data sharing with federally recognized tribes | No later than 90 days after COP approval, Revolution Wind must, at a minimum, contact the federally recognized tribes currently consulting on the Project in order to solicit their interest in receiving the following: reports generated as a result of the fisheries and benthic monitoring plan; reporting of all NARW sightings; injured or dead protected species reporting (turtles and NARW); NARW PAM monitoring; PSO reports (e.g., weekly pile driving reports); and pile-driving schedule and changes thereto. At a minimum, Revolution Wind should offer access to the following federally recognized tribes: Delaware Nation, Delaware Tribe of Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mohegan Tribe of Connecticut, Narragansett Indian Tribe, Shinnecock Indian Nation, Wampanoag Tribe of Gay Head (Aquinnah). Revolution Wind must provide access to non-proprietary/non-confidential business information to the federally recognized tribes no later than 30 days after the information becomes available. | Environmental Justice | BOEM |
| 2 | Construction, installation, and decommissioning | Environmental justice outreach planning | In areas where environmental justice communities experience direct impacts from onshore construction activities relating to onshore cable emplacement and installation of onshore substation and interconnection facility infrastructure, Revolution Wind shall outreach with local communities to provide opportunities for community residents and local authorities to engage with Revolution Wind on Project activities. This engagement may be partially fulfilled through Revolution Wind's planned coordination with local authorities during construction of onshore facilities to minimize local traffic impacts (see EPM EJ-3 in Table F-1). As applicable, this engagement may also be partially fulfilled by enhanced stakeholder outreach conducted to meet requirements identified in Rhode Island Department of Environmental Management's regulations and policies regarding environmental justice focus areas related to investigation and remediation of contaminated soil and groundwater (see EPM EJ-4 in Table F-1). Additional engagement opportunities, informed by coordination with applicable local and state authorities, shall be offered in a timely and locally | Environmental justice | BOEM and BSEE |

| Mitigation Number | Proposed Project Phase | Mitigation or Monitoring Measure | Description of Additional Mitigation and Monitoring Measures Under Consideration | Resource Area Affected | BOEM's Identification of the Anticipated Enforcing Agency* |
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| | | | appropriate manner, including language considerations. Outreach and engagement efforts with environmental justice communities, and outcomes of engagement, shall be summarized and reported to BOEM within 60 days after completion of onshore facilities construction. | | |
| 3 | Construction, Installation and O&M | Visual impacts monitoring plan | Monitoring visual effects during construction and operations (daytime and nighttime). | Visual resources | BOEM and BSEE |
| 4 | Construction | Boulder relocation plan | To minimize the number of potential seafloor obstructions that may interact with bottom trawl fisheries, the Lessee must submit to BOEM a boulder relocation plan that will include the following:<br>1) Identification of areas of active (within last 5 years) bottom trawl fishing, areas where boulders > 2 m in diameter are anticipated to occur, and areas where boulders are expected to be relocated for Project purposes<br>2) Methods to minimize the quantity of seafloor obstructions from relocated boulders in areas of active bottom trawl fishing, as identified in #1<br>The plan must be submitted to BOEM at least 90 days prior to inter-array cable corridor preparation and cable installation (e.g., boulder relocation, pre-cut trenching, cable crossing installation, cable lay and burial) and foundation site preparation (e.g., scour protection installation). | Commercial and recreational fishing, EFH | BOEM and BSEE |
| 5 | Construction | Mobile gear–friendly cable protection measures | Cable protection measures should reflect the pre-existing conditions at the site. This mitigation measure chiefly ensures that seafloor cable protection does not introduce new hangs for mobile fishing gear. Thus, the cable protection measures should be trawl-friendly with tapered/sloped edges. If cable protection is necessary in "non-trawlable" habitat, such as rocky habitat, then the lessee should consider using materials that mirror the benthic environment. | Commercial fisheries | BOEM and BSEE |
| 6 | | Shoreside seafood business analysis | In addition to the Direct Compensation Fund proposed by the Lessee, BOEM would require the Lessee to ensure that the Direct Compensation Fund includes losses to shoreside seafood support services. The Lessee shall analyze the impacts to shoreside seafood support services within the communities nearby ports listed in Table 3.9-12. The shoreside seafood business analysis would be used to further supplement funds available for settling claims of lost (unrecovered) economic activity as a result of the Revolution Wind Farm and Export Cable project.<br>The Lessee must submit to BOEM a report that includes (1) a description of the structure of the Fund and its consistency with BOEM's draft Guidance and (2) an analysis of the impacts of the Project on shoreside businesses for review and comment. The Lessee must then submit to BOEM evidence of the implementation of the Fund, including:<br>• A description of any implementation details not covered in the report to BOEM regarding the mechanism established to compensate for losses to commercial and for-hire recreational fishermen and related shoreside businesses resulting from all phases of the project development on the Lease Area (pre-construction, construction, operation, and decommissioning);<br>• The Fund charter, including the governance structure, audit and public reporting procedures, and standards for paying compensatory mitigation for impacts to fishers and related shoreside businesses from lease area development; and<br>• Documentation regarding the funding account, including the dollar amount, establishment date, financial institution, and owner of the account. | Commercial fisheries | BOEM and BSEE |
| 7 | Construction, O&M | Post-installation cable monitoring | Revolution Wind must provide BOEM with a cable monitoring report following each inter-array and export cable inspection to determine cable location, burial depths, state of the cable, and site conditions. An inspection of the inter-array cable and export cable is expected to include high-resolution geophysical (HRG) methods, such as a multi-beam bathymetric survey equipment, and is expected to identify seabed features, natural and human-made hazards, and site conditions along federal sections of the cable routing. | Benthic habitat, EFH, invertebrates, finfish, and commercial fisheries and for-hire recreational fishing | BOEM and BSEE |

| Mitigation Number | Proposed Project Phase | Mitigation or Monitoring Measure | Description of Additional Mitigation and Monitoring Measures Under Consideration | Resource Area Affected | BOEM's Identification of the Anticipated Enforcing Agency* |
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| | | | In federal waters, the initial inter-array and export cable inspection would be carried out within 6 months of commissioning, and subsequent inspections would be carried out at years 1, 2, and every 3 thereafter and after a major storm event. Major storm events are defined as when metocean conditions at the facility meet or exceed the 1 in 50-year return period calculated in the metocean design basis, to be submitted to BOEM with the facility design report (FDR). If conditions warrant adjustment to the frequency of inspections following the Year 2 survey, a revised monitoring plan may be provided to BOEM for review.<br>In addition to inspection, the export cable would be monitored continuously with the as-built Distributed Temperature Sensing System. If distributed temperature sensing data indicate that burial conditions have deteriorated or changed significantly and remedial actions are warranted, the distributed temperature sensing data, a seabed stability analysis, and report of remedial actions taken or scheduled must be provided to BOEM within 45 calendar days of the observations.<br>The Distributed Temperature Sensing data, cable monitoring survey data, and cable conditions analysis for each year must be provided to BOEM as part of the annual compliance reports, required by 30 CFR 285.633(b). | | |
| 8 | Construction and installation, O&M, conceptual decommissioning | Anchoring plan | BOEM requires the applicant to develop an anchoring plan to ensure anchoring is avoided and minimized in complex habitats, archaeological resources, and unexploded ordnances during construction and maintenance of the Project. The anchoring plan is required to be provided for review and comment prior to BOEM approval. | Benthic habitat, EFH, finfish, invertebrates, and cultural resources | BOEM and BSEE |
| 9 | Planning, construction and installation, O&M, decommissioning | Federal survey mitigation | There are 14 NMFS scientific surveys that overlap with wind energy development in the northeast region and eight of these surveys overlap with the Project. As per NMFS and BOEM Survey Mitigation strategy actions 1.3.1, 1.3.2, 2.1.1, and 2.1.2 (Hare et al. 2022), within 120 calendar days of COP Approval, the Lessee must submit to BOEM a draft survey mitigation agreement between NMFS and the Lessee. The survey mitigation agreement will describe how the Lessee will mitigate the Project impacts on the eight NMFS surveys. If after consultation with NMFS NEFSC, BOEM deems the survey mitigation agreement acceptable, the mitigation will be considered required as a term and condition of the Project's COP approval.<br>As soon as reasonably practicable, but no later than 30 days after the issuance of the Project's COP Approval, the Lessee will initiate coordination with NMFS NEFSC to develop the survey mitigation agreement described above. Mitigation activities specified under the agreement will be designed to mitigate the Project impacts on the following NMFS NEFSC surveys: (a) Spring Bottom Trawl survey; (b) Autumn Multi-species Bottom Trawl survey; (c) Ecosystem Monitoring survey; (d) NARW aerial survey; (e) Aerial marine mammal and sea turtle survey; (f) Shipboard marine mammal and sea turtle survey; (g) Atlantic surfclam and ocean quahog survey; and (h) Atlantic sea scallop survey. At a minimum, the survey mitigation agreement will describe actions needed and the means to address impacts on the affected surveys due to the preclusion of sampling platforms and impacts on statistical designs. In terms of statistical design, the project will be viewed as a discrete stratum in surveys that use a random stratified design. Other anticipated Project impacts on NMFS surveys such as changes in habitat and increased operational costs due to loss of sampling efficiencies may also be addressed in the agreement.<br>The survey mitigation agreement will identify activities that will result in the generation of data equivalent to data generated by NMFS's affected surveys for the duration of the Project. The survey mitigation agreement will describe the implementation procedures by which the Lessee will work with NEFSC to generate, share, and manage the data required by NEFSC for each of the surveys impacted by the Project, as mutually agreed upon between the Lessee and NMFS/NEFSC. The survey mitigation agreement must also describe the Lessee's participation in the NMFS NEFSC Northeast Survey Mitigation Program to support activities that address regional-level impacts for the surveys listed above. | Commercial and recreational fishing, marine mammals, other marine uses, sea turtles | BOEM and BSEE |

| Mitigation Number | Proposed Project Phase | Mitigation or Monitoring Measure | Description of Additional Mitigation and Monitoring Measures Under Consideration | Resource Area Affected | BOEM's Identification of the Anticipated Enforcing Agency* |
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| **USFWS Biological Opinion Proposed Conservation Recommendations issued May 30, 2023[4]†** | | | | | |
| 1 | Construction and O&M | Adopt compensatory mitigation ratios greater than 1:1 | Estimated levels of collision mortality are associated with high uncertainty. Future advancements in SCRAM are expected to substantially reduce, but not eliminate, uncertainty. In addition, compensatory mitigation actions will likely be associated with their own levels of uncertainty (*e.g.*, probability of success, actual number of bird mortalities offset), and may occur later in time that the project-induced mortality. Thus, the USFWS recommends a compensatory mitigation ratio greater than 1:1, particularly given the extent of full buildout of WTGs anticipated on the OCS. | Birds | USFWS |
| 2 | O&M | Establish an Offshore Wind Adaptive Monitoring and Impact Minimization Framework to guide and coordinate monitoring, research, and avian impacts assessment coastwide. | To address USFWS concerns related to potential effects of WTG operation on listed and other species of concern, at both the project and coastwide scales, the USFWS recommends that the BOEM develop and adopt an Offshore Wind Adaptive Monitoring and Impact Minimization Framework (Framework) for flying wildlife. Many details will need to be worked out, but here the USFWS provides some basic principles for establishment, adoption, and operation of the Framework.<br>• Establish a Framework Principals Group to consist of representatives from the BOEM, the BSEE, the USFWS, State natural resource agencies responsible for management of birds, bats, and insect, and offshore wind energy developers/operators.<br>• Develop and adopt a written Framework foundational document specifying:<br>  ○ the governance structure of the Principals Group;<br>  ○ the geographic coverage of the Framework;<br>  ○ the species covered by the Framework; and<br>  ○ the duration of the Framework.<br>• Establish an annual operating budget for the Framework to be funded by offshore wind energy developers/operators.<br>• Arrange for the Principals Group to meet at least annually, and for the Framework foundational document to be updated at least every 5 years.<br>• Provide for experts (both internal and external to the Principals Group) to regularly assess new and improved technologies and methods for estimating collision risk of covered species and measuring or detecting collisions. Adopt and deploy such methods deemed most promising by the Principals Group.<br>• Coordinate monitoring and research across wind energy projects. Share and pool data and research results coastwide.<br>• Provide for experts (both internal and external to the Principals Group) to regularly assess new and improved technologies and methods for minimizing collision risk of covered species. Adopt and deploy such technologies/methods deemed most promising by the Principals Group.<br>• Provide for experts (both internal and external to the Principals Group) to periodically assess new and improved technologies and methods for evaluating indirect effects to covered species from WTG avoidance behaviors (e.g., impacts to time and energy budgets).<br>• Periodically assess the level and type of compensatory mitigation necessary to offset any unavoidable direct and indirect effects of WTG operation on covered species. Adopt and require the levels and types of mitigation deemed appropriate by the Principals Group. | Birds and bats | USFWS |

[4] The USFWS acknowledges that the manner and extent to which these recommendations are implemented are at the discretion of BOEM/BSEE.

| Mitigation Number | Proposed Project Phase | Mitigation or Monitoring Measure | Description of Additional Mitigation and Monitoring Measures Under Consideration | Resource Area Affected | BOEM's Identification of the Anticipated Enforcing Agency* |
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| | | | • Consider partnering with other stakeholders or cross-sector organizations to provide administrative, institutional, and technical support to the Principals Group. | | |
| 3 | Construction and installation, O&M, conceptual decommissioning | Conduct a coastwide buildout analysis that considers all existing, proposed, and future offshore wind energy development on the Atlantic OCS. | The definition of "cumulative effects" at 50 CFR 402.02 excludes future Federal actions because such actions will be subject to their own consultations under section 7 of the ESA. Further, the analysis of environmental baseline conditions for each subsequent consultation would be limited to the action area of that particular project. While we can use the Status of the Species section of a biological opinion to capture the anticipated effects of completed consultations, we cannot consider additive effects of concurrent, ongoing consultations. Even this creates a situation where the effects analysis for each individual offshore wind energy project cannot fully account for synergistic effects that may occur with nearby projects and especially not full build-out of offshore wind infrastructure along the coast.<br>Besides the two existing offshore wind energy facilities (Block Island Wind offshore Rhode Island and Coastal Virginia Offshore Wind), we understand there are 26 additional projects in various stages of development offshore the U.S. coast from Maine to Virginia. As the Department of the Interior continues moving toward the national goal of deploying 30 gigawatts of offshore wind by 2030, we anticipate still more projects beyond those 26 (*e.g.*, within the New York Bight, Central Atlantic, and Gulf of Maine). While the Service will complete a thorough assessment of potential direct and indirect effects for each individual offshore wind project, a coastwide analysis may indicate or suggest additive and/or synergistic effects among projects. Therefore, the Service recommends that BOEM analyze potential aggregate effects from WTG operation at a coastwide scale. A coastwide analysis will work in concert with the Offshore Wind Adaptive Monitoring and Impact Minimization Framework to comprehensively assess, monitor, and manage avian impacts from wind energy development along the U.S. Atlantic coast. A Programmatic consultation for wind energy development in the New York Bight is already underway and could set the stage for a full coastwide analysis. Ultimately, a coastwide programmatic Opinion may emerge as the most effective and efficient mechanism for assessing, monitoring, minimizing, and offsetting effects to listed birds from WTG operation on the OCS. | Birds | USFWS |

* At the time of preparation of this document, BOEM and BSEE are in the process of transferring enforcement authorities from BOEM to BSEE.

† Mitigation measures and description are taken directly from NMFS (2023), USFWS (2023) , BOEM (2023a, 2023b, 2023c, 2023d), and have not been edited.

**Table F-4. Draft NMFS Proposed Incidental Take Regulations (ITR) Pursuant to the Marine Mammal Protection Act (MMPA) issued to BOEM for consideration on June 5, 2023**

| Measure Number | Description of Measures that may be Required by Other Authorizations and Permits Issued to the Lessee |
|---|---|
| **Draft NMFS Proposed Incidental Take Regulations (ITR) Pursuant to the Marine Mammal Protection Act (MMPA) issued to BOEM for consideration on June 5, 2023†** | |
| General Conditions | |
| 1 | A copy of any issued LOA must be in the possession of Revolution Wind and its designees, all vessel operators, visual protected species observers (PSOs), passive acoustic monitoring (PAM) operators, pile driver operators, and any other relevant designees operating under the authority of the issued LOA; |
| 2 | Revolution Wind must conduct briefings between construction supervisors, construction crews, and the PSO and PAM team prior to the start of all construction activities, and when new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring and reporting protocols, and operational procedures. An informal guide must be included with the Marine Mammal Monitoring Plan to aid personnel in identifying species if they are observed in the vicinity of the project area; |

| Measure Number | Description of Measures that may be Required by Other Authorizations and Permits Issued to the Lessee |
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| 3 | Revolution Wind must instruct all vessel personnel regarding the authority of the PSO(s). For example, the vessel operator(s) would be required to immediately comply with any call for a shutdown by the Lead PSO. Any disagreement between the Lead PSO and the vessel operator would only be discussed after shutdown has occurred; |
| 4 | Revolution Wind must ensure that any visual observations of an ESA-listed marine mammal are communicated to PSOs and vessel captains during the concurrent use of multiple project-associated vessels (of any size; e.g., construction surveys, crew/supply transfers, etc); |
| 5 | If an individual from a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized take number has been met, is observed entering or within the relevant Level B harassment zone for each specified activity, pile driving and pneumatic hammering activities, and HRG acoustic sources must be shut down immediately, unless shutdown is not practicable, or be delayed if the activity has not commenced. Impact and vibratory pile driving, pneumatic hammering, UXO/MEC detonation, and initiation of HRG acoustic sources must not commence or resume until the animal(s) has been confirmed to have left the relevant clearance zone or the observation time has elapsed with no further sightings. UXO/MEC detonations may not occur until the animal(s) has been confirmed to have left the relevant clearance zone or the observation time has elapsed with no further sightings; |
| 6 | Prior to and when conducting any in-water construction activities and vessel operations, Revolution Wind personnel (e.g., vessel operators, PSOs) must use available sources of information on North Atlantic right whale presence in or near the project area including daily monitoring of the Right Whale Sightings Advisory System, and monitoring of Coast Guard VHF Channel 16 throughout the day to receive notification of any sightings and/or information associated with any Slow Zones (i.e., Dynamic Management Areas (DMAs) and/or acoustically-triggered slow zones) to provide situational awareness for both vessel operators and PSOs; and |
| 7 | Any marine mammals observed within a clearance or shutdown zone must be allowed to remain in the area (i.e., must leave of their own volition) prior to commencing impact and vibratory pile driving activities, pneumatic hammering, or HRG surveys. |
| 8 | Revolution Wind must treat any large whale sighted by a PSO or acoustically detected by a PAM operator as if it were a North Atlantic right whale, unless a PSO or a PAM operator confirms it is another type of whale. |
| Vessel Strike Avoidance Measures | |
| 1 | Prior to the start of construction activities, all vessel operators and crew must receive a protected species identification training that covers, at a minimum:<br>i) Sightings of marine mammals and other protected species known to occur or which have the potential to occur in the Revolution Wind project area;<br>ii) Training on making observations in both good weather conditions (i.e., clear visibility, low winds, low sea states) and bad weather conditions (i.e., fog, high winds, high sea states, with glare);<br>iii) Training on information and resources available to the project personnel regarding the applicability of Federal laws and regulations for protected species;<br>iv) Observer training related to these vessel strike avoidance measures must be conducted for all vessel operators and crew prior to the start of in-water construction activities; and<br>v) Confirmation of marine mammal observer training (including an understanding of the LOA requirements) must be documented on a training course log sheet and reported to NMFS. |
| 2 | All vessels must abide by the following:<br>i) All vessel operators and crews, regardless of their vessel's size, must maintain a vigilant watch for all marine mammals and slow down, stop their vessel, or alter course, as appropriate, to avoid striking any marine mammal;<br>ii) All vessels must have a visual observer on board who is responsible for monitoring the vessel strike avoidance zone for marine mammals. Visual observers may be PSO or crew members, but crew members responsible for these duties must be provided sufficient training by Revolution Wind to distinguish marine mammals from other phenomena and must be able to identify a marine mammal as a North Atlantic right whale, other whale (defined in this context as sperm whales or baleen whales other than North Atlantic right whales), or other marine mammal. Crew members serving as visual observers must not have duties other than observing for marine mammals while the vessel is operating over 10 knots (kns);<br>iii) Year-round and when a vessel is in transit, all vessel operators must continuously monitor US Coast Guard VHF Channel 16, over which North Atlantic right whale sightings are broadcasted. At the onset of transiting and at least once every four hours, vessel operators and/or trained crew members must monitor the project's Situational Awareness System, WhaleAlert, and the Right Whale Sighting Advisory System (RWSAS) for the presence of North Atlantic right whales Any observations of any large whale by any Revolution Wind staff or contractors, including vessel crew, must be communicated immediately to PSOs, PAM operator, and all vessel captains to increase situational awareness. Conversely, any large whale observation or detection via a sighting network (e.g., Mysticetus) by PSOs or PAM operators must be conveyed to vessel operators and crew;<br>iv) Any observations of any large whale by any Revolution Wind staff or contractor, including vessel crew, must be communicated immediately to PSOs and all vessel captains to increase situational awareness;<br>v) All vessels must comply with existing NMFS vessel speed regulations, as applicable, for North Atlantic right whales;<br>vi) In the event that any Slow Zone (designated as a DMA) is established that overlaps with an area where a project-associated vessel would operate, that vessel, regardless of size, will transit that area at 10 kns or less;<br>vii) Between November 1st and April 30th, all vessels, regardless of size, would operate port to port (specifically from ports in New Jersey, New York, Maryland, Delaware, and Virginia) at 10 kns or less, except for vessels while transiting in Narragansett Bay or Long Island Sound which have not been demonstrated by best available science to provide consistent habitat for North Atlantic right whales;<br>viii) All vessels, regardless of size, must immediately reduce speed to 10 kns or less when any large whale, mother/calf pairs, or large assemblages of non-delphinid cetaceans are observed (within 500 m) of an underway vessel;<br>ix) All vessels, regardless of size, must immediately reduce speed to 10 kns or less when a North Atlantic right whale is sighted, at any distance, by anyone on the vessel;<br>x) If a vessel is traveling at greater than 10 kns, in addition to the required dedicated visual observer, Revolution Wind must monitor the transit corridor in real-time with PAM prior to and during transits. If a North Atlantic right whale is detected via visual observation or PAM within or approaching the transit corridor, all crew transfer vessels must travel at 10 kns or less for 12 hours following the detection. Each subsequent |

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| | detection triggers an additional 12-hour period at 10 kns or less. A slowdown in the transit corridor expires when there has been no further visual or acoustic detection of North Atlantic right whales in the transit corridor for 12 hours;<br>xi) All underway vessels (e.g., transiting, surveying) operating at any speed must have a dedicated visual observer on duty at all times to monitor for marine mammals within a 180° direction of the forward path of the vessel (90° port to 90° starboard) located at an appropriate vantage point for ensuring vessels are maintaining appropriate separation distances. Visual observers must be equipped with alternative monitoring technology for periods of low visibility (e.g., darkness, rain, fog, etc.). The dedicated visual observer must receive prior training on protected species detection and identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements in this proposed action. Visual observers may be third-party observers (i.e., NMFS-approved PSOs) or crew members. Observer training related to these vessel strike avoidance measures must be conducted for all vessel operators and crew prior to the start of in-water construction activities;<br>xii) All vessels must maintain a minimum separation distance of 500 m from North Atlantic right whales. If underway, all vessels must steer a course away from any sighted North Atlantic right whale at 10 kns or less such that the 500-m minimum separation distance requirement is not violated. If a North Atlantic right whale is sighted within 500 m of an underway vessel, that vessel must shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 500 m. If a whale is observed but cannot be confirmed as a species other than a North Atlantic right whale, the vessel operator must assume that it is a North Atlantic right whale and take the vessel strike avoidance measures described herein;<br>xiii) All vessels must maintain a minimum separation distance of 100 m from sperm whales and baleen whales other than North Atlantic right whales. If one of these species is sighted within 100 m of an underway vessel, that vessel must shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 100 m;<br>xiv) All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all delphinoid cetaceans and pinnipeds, with an exception made for those that approach the vessel (e.g., bow-riding dolphins). If a delphinid cetacean or pinniped is sighted within 50 m of an underway vessel, that vessel must shift the engine to neutral, with an exception made for those that approach the vessel (e.g., bow-riding dolphins). Engines must not be engaged until the animal(s) has moved outside of the vessel's path and beyond 50 m;<br>xv) When a marine mammal(s) is sighted while a vessel is underway, the vessel must take action as necessary to avoid violating the relevant separation distances (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area). If a marine mammal(s) is sighted within the relevant separation distance, the vessel must reduce speed and shift the engine to neutral, not engaging the engine(s) until the animal(s) is clear of the area. This does not apply to any vessel towing gear or any situation where respecting the relevant separation distance would be unsafe (i.e., any situation where the vessel is navigationally constrained);<br>xvi) All vessels underway must not divert or alter course to approach any marine mammal. Any vessel underway must avoid speed over 10 kns or abrupt changes in course direction until the animal is out of an on a path away from the separation distances;<br>xvii) For in-water construction heavy machinery activities other than impact or vibratory pile driving, if a marine mammal is on a path towards or comes within 10 m of equipment, Revolution Wind must cease operations until the marine mammal has moved more than 10 m on a path away from the activity to avoid direct interaction with equipment; and<br>xviii) Revolution Wind must submit a North Atlantic right whale vessel strike avoidance plan 90 days prior to commencement of vessel use. The plan will, at minimum, describe how PAM, in combination with visual observations, will be conducted to ensure the transit corridor is clear of right whales. The plan will also provide details on the vessel-based observer protocols on transiting vessels. |
| Fisheries Monitoring Surveys | |
| 1 | Training<br>i) All crew undertaking the fishery survey activities must receive protected species identification training prior to activities occurring;<br>ii) [Reserved]. |
| 2 | During Vessel Use<br>i) Marine mammal monitoring must occur prior to, during, and after haul-back, and gear must not be deployed if a marine mammal is observed in the area;<br>ii) Trawl operations must only start after 15 minutes of no marine mammal sightings within 1 nautical mile (nmi) of the sampling station; and<br>iii) During daytime sampling for the research trawl surveys, Revolution Wind must maintain visual monitoring efforts during the entire period of time that trawl gear is in the water from deployment to retrieval. If a marine mammal is sighted before the gear is removed from the water, the vessel must slow its speed and steer away from the observed animal(s). |
| 3 | Gear-specific Best Management Practices (BMPs)<br>i) Research trawl bottom times must be limited to 20 minutes;<br>ii) Ventless trap surveys must utilize sinking ground lines and all lines will have breaking strength of less than 1,700 pounds and sinking groundlines. Sampling gear must be hauled at least once every 30 days, and the gear must be removed from the water at the end of each sampling season;<br>iii) The permit number must be written clearly on buoy and any lines that go missing must be reported to NOAA Fisheries' Greater Atlantic Regional Fisheries Office (GARFO) Protected Resources Division as soon as possible;<br>iv) If marine mammals are sighted near the proposed sampling location, trawl or ventless trap gear must be delayed until the marine mammal(s) has left the area;<br>v) If a marine mammal is determined to be at risk of interaction with the deployed gear, all gear must be immediately removed;<br>vi) Marine mammal monitoring must occur during daylight hours and begin prior to the deployment of any gear (e.g., trawls) and continue until all gear has been retrieved; and<br>vii) If marine mammals are sighted in the vicinity within 15 minutes prior to gear deployment and it is determined the risks of interaction are present regarding the research gear, the sampling station must either be moved to another location or activities must be suspended until there are no marine mammal sightings for 15 minutes within 1 nm. |

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| Wind Turbine Generator (WTG) and Offshore Substation (OSS) Foundation Installation | |
| 1 | Seasonal and Daily Restrictions:<br>i) Foundation impact pile driving activities may not occur January 1 through April 30;<br>ii) No more than three foundation monopiles may be installed per day;<br>iii) Revolution Wind must not initiate pile driving earlier than 1 hour after civil sunrise or later than 1.5 hours prior to civil sunset, unless Revolution Wind submits and NMFS approves an Alternative Monitoring Plan as part of the Pile Driving and Marine Mammal Monitoring Plan that reliably demonstrates the efficacy of their night vision devices; and<br>iv) Monopiles must be no larger than 15 m in diameter, representing the larger end of the tapered 7/15 m monopile design. The minimum amount of hammer energy necessary to effectively and safely install and maintain the integrity of the piles must be used. Maximum hammer energies must not exceed 4,000 kilojoules (kJ). |
| 2 | Noise Abatement Systems.<br>i) Revolution Wind must deploy dual noise abatement systems that are capable of achieving, at a minimum, 10-dB of sound attenuation, during all impact pile driving of foundation piles;<br>(A) A single big bubble curtain (BBC) must not be used unless paired with another noise attenuation device;<br>(B) A double big bubble curtain (dBBC) may be used without being paired with another noise attenuation device;<br>ii) The bubble curtain(s) must distribute air bubbles using an air flow rate of at least 0.5 m3/(min*m). The bubble curtain(s) must surround 100 percent of the piling perimeter throughout the full depth of the water column. In the unforeseen event of a single compressor malfunction, the offshore personnel operating the bubble curtain(s) must make appropriate adjustments to the air supply and operating pressure such that the maximum possible sound attenuation performance of the bubble curtain(s) is achieved;<br>iii) The lowest bubble ring must be in contact with the seafloor for the full circumference of the ring, and the weights attached to the bottom ring must ensure 100-percent seafloor contact;<br>iv) No parts of the ring or other objects may prevent full seafloor contact; and<br>v) Construction contractors must train personnel in the proper balancing of airflow to the ring. Construction contractors must submit an inspection/performance report for approval by Revolution Wind within 72 hours following the performance test. Corrections to the bubble ring(s) to meet the performance standards must occur prior to impact pile driving of monopiles. If Revolution Wind uses a noise mitigation device in addition to the BBC, Revolution Wind must maintain similar quality control measures as described here. |
| 3 | Sound Field Verification.<br>i) Revolution Wind must perform sound field verification (SFV) during all impact pile driving of the first three monopiles and must empirically determine source levels (peak and cumulative sound exposure level), the ranges to the isopleths corresponding to the Level A harassment (PTS) and Level B harassment thresholds, and estimated transmission loss coefficients;<br>ii) If a subsequent monopile installation location is selected that was not represented by previous three locations (i.e., substrate composition, water depth), SFV must be conducted;<br>iii) Revolution Wind may estimate ranges to the Level A harassment and Level B harassment isopleths by extrapolating from in situ measurements conducted at several distances from the monopiles, and must measure received levels at a standard distance of 750 m from the monopiles;<br>iv) If SFV measurements on any of the first three piles indicate that the ranges to Level A harassment and Level B harassment isopleths are larger than those modeled, assuming 10-dB attenuation, Revolution Wind must modify and/or apply additional noise attenuation measures (e.g., improve efficiency of bubble curtain(s), modify the piling schedule to reduce the source sound, install an additional noise attenuation device) before the second pile is installed. Until SFV confirms the ranges to Level A harassment and Level B harassment isopleths are less than or equal to those modeled, assuming 10-dB attenuation, the shutdown and clearance zones must be expanded to match the ranges to the Level A harassment and Level B harassment isopleths based on the SFV measurements. If the application/use of additional noise attenuation measures still does not achieve ranges less than or equal to those modeled, assuming 10-dB attenuation, and no other actions can further reduce sound levels, Revolution Wind must expand the clearance and shutdown zones according to those identified through SFV, in consultation with NMFS;<br>v) If harassment zones are expanded beyond an additional 1,500 m, additional PSOs must be deployed on additional platforms, with each observer responsible for maintaining watch in no more than 180° and of an area with a radius no greater than 1,500 m;<br>vi) If acoustic measurements indicate that ranges to isopleths corresponding to the Level A harassment and Level B harassment thresholds are less than the ranges predicted by modeling (assuming 10-dB attenuation), Revolution Wind may request a modification of the clearance and shutdown zones for impact pile driving of monopiles and UXO/MEC detonations. For a modification request to be considered by NMFS, Revolution Wind must have conducted SFV on three or more monopiles and on all detonated UXOs/MECs thus far to verify that zone sizes are consistently smaller than predicted by modeling (assuming 10-dB attenuation). Regardless of SFV measurements, the clearance and shutdown zones for North Atlantic right whales must not be decreased;<br>vii) If a subsequent monopile installation location is selected that was not represented by previous locations (i.e., substrate composition, water depth), SFV must be conducted. If a subsequent UXO/MEC charge weight is encountered and/or detonation location is selected that was not representative of the previous locations (i.e., substrate composition, water depth), SFV must be conducted;<br>viii) Revolution Wind must submit a SFV Plan at least 180 days prior to the planned start of impact pile driving and any UXO/MEC detonation activities. The plan must describe how Revolution Wind would ensure that the first three monopile foundation installation sites selected and each UXO/MEC detonation scenario (i.e., charge weight, location) selected for SFV are representative of the rest of the monopile installation sites and UXO/MEC scenarios. In the case that these sites/scenarios are not determined to be representative of all other monopile installation sites and UXO/MEC detonations, Revolution Wind must include information on how additional sites/scenarios would be selected for SFV. The plan must also include methodology for collecting, analyzing, and preparing SFV data for submission to NMFS. The plan must describe how the effectiveness of the |

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| | sound attenuation methodology would be evaluated based on the results. Revolution Wind must also provide, as soon as they are available but no later than 48 hours after each installation, the initial results of the SFV measurements to NMFS in an interim report after each monopile for the first three piles and after each UXO/MEC detonation; and<br>ix) The SFV plan must also include how operational noise would be monitored. Revolution Wind must estimate source levels (at 10 m from the operating foundation) based on received levels measured at 50 m, 100 m, and 250 m from the pile foundation. These data must be used to identify estimated transmission loss rates. Operational parameters (e.g., direct drive/gearbox information, turbine rotation rate) as well as sea state conditions and information on nearby anthropogenic activities (e.g., vessels transiting or operating in the area) must be reported. |
| 4 | Protected Species Observer and Passive Acoustic Monitoring Use.<br>i) Revolution Wind must have a minimum of four PSOs actively observing marine mammals before, during, and after (specific times described below) the installation of monopiles. At least four PSOs must be actively observing for marine mammals. At least two PSOs must be actively observing on the pile driving vessel while at least two PSOs must be actively observing on a secondary, PSO-dedicated vessel. At least one active PSO on each platform must have a minimum of 90 days at-sea experience working in those roles in offshore environments with no more than eighteen months elapsed since the conclusion of the at-sea experience. Concurrently, at least one acoustic PSO (i.e., passive acoustic monitoring (PAM) operator) must be actively monitoring for marine mammals before, during and after impact pile driving with PAM; and<br>ii) All visual PSOs and PAM operators used for the Revolution Wind project must meet the requirements and qualifications described in § 217.275 (a) and (b), and (c), respectively and as applicable to the specified activity. |
| 5 | Clearance and Shutdown Zones.<br>i) Revolution Wind must establish and implement clearance and shutdown zones (all distances to the perimeter are the radii from the center of the pile being driven) as described in the LOA for all WTG and OSS foundation installation;<br>ii) Revolution Wind must use visual PSOs and PAM operators to monitor the area around each foundation pile before, during and after pile driving. PSOs must visually monitor clearance zones for marine mammals for a minimum of 60 minutes prior to commencing pile driving. At least one PAM operator must review data from at least 24 hours prior to pile driving and actively monitor hydrophones for 60 minutes prior to pile driving. Prior to initiating soft-start procedures, all clearance zones must be visually confirmed to be free of marine mammals for 30 minutes immediately prior to starting a soft-start of pile driving;<br>iii) PSOs must be able to visually clear (i.e., confirm no marine mammals are present) an area that extends around the pile being driven as described in the LOA. The entire minimum visibility zone must be visible (i.e., not obscured by dark, rain, fog, etc.) for a full 30 minutes immediately prior to commencing impact pile driving (minimum visibility zone size dependent on season);<br>iv) If a marine mammal is observed entering or within the relevant clearance zone prior to the initiation of impact pile driving activities, pile driving must be delayed and must not begin until either the marine mammal(s) has voluntarily left the specific clearance zones and have been visually or acoustically confirmed beyond that clearance zone, or, when specific time periods have elapsed with no further sightings or acoustic detections. The specific time periods are 15 minutes for small odontocetes and 30 minutes for all other marine mammal species;<br>v) The clearance zone may only be declared clear if no confirmed North Atlantic right whale acoustic detections (in addition to visual) have occurred within the PAM clearance zone during the 60-minute monitoring period. Any large whale sighting by a PSO or detected by a PAM operator that cannot be identified by species must be treated as if it were a North Atlantic right whale;<br>vi) If a marine mammal is observed entering or within the respective shutdown zone, as defined in the LOA, after impact pile driving has begun, the PSO must call for a temporary shutdown of impact pile driving;<br>vii) Revolution Wind must immediately cease pile driving if a PSO calls for shutdown, unless shutdown is not practicable due to imminent risk of injury or loss of life to an individual, pile refusal, or pile instability. In this situation, Revolution Wind must reduce hammer energy to the lowest level practicable;<br>viii) Pile driving must not restart until either the marine mammal(s) has voluntarily left the specific clearance zones and has been visually or acoustically confirmed beyond that clearance zone, or, when specific time periods have elapsed with no further sightings or acoustic detections have occurred. The specific time periods are 15 minutes for small odontocetes and 30 minutes for all other marine mammal species. In cases where these criteria are not met, pile driving may restart only if necessary to maintain pile stability at which time Revolution Wind must use the lowest hammer energy practicable to maintain stability;<br>ix) If impact pile driving has been shut down due to the presence of a North Atlantic right whale, pile driving may not restart until the North Atlantic right whale is no longer observed or 30 minutes has elapsed since the last detection;<br>x) Upon re-starting pile driving, soft start protocols must be followed. |
| 6 | Soft Start.<br>i) Revolution Wind must utilize a soft start protocol for impact pile driving of monopiles by performing 4-6 strikes per minute at 10 to 20 percent of the maximum hammer energy, for a minimum of 20 minutes;<br>ii) Soft start must occur at the beginning of monopile installation and at any time following a cessation of impact pile driving of 30 minutes or longer; and<br>iii) If a marine mammal is detected within or about to enter the applicable clearance zones, prior to the beginning of soft-start procedures, impact pile driving must be delayed until the animal has been visually observed exiting the clearance zone or until a specific time period has elapsed with no further sightings. The specific time periods are 15 minutes for small odontocetes and 30 minutes for all other species. |
| Cofferdam or Casing Pipe Installation | |
| 1 | Daily Restrictions<br>i) Revolution Wind must conduct vibratory pile driving or pneumatic hammering during daylight hours only;<br>ii) [Reserved]. |
| 2 | PSO Use.<br>i) All visual PSOs used for the Revolution Wind project must meet the requirements and qualifications described in § 217.275 (a) and (b), as applicable to the specified activity; and |

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| | ii) Revolution Wind must have a minimum of two PSOs on active duty during any installation and removal of the temporary cofferdams, or casing pipes and goal posts. These PSOs would always be located at the best vantage point(s) on the vibratory pile driving platform or secondary platform in the immediate vicinity of the vibratory pile driving platform, in order to ensure that appropriate visual coverage is available for the entire visual clearance zone and as much of the Level B harassment zone, as possible. |
| 3 | Clearance and Shutdown Zones<br>i) Revolution Wind must establish and implement clearance and shutdown zones as described in the LOA;<br>ii) Prior to the start of pneumatic hammering or vibratory pile driving activities, at least two PSOs must monitor the clearance zone for 30 minutes, continue monitoring during pile driving and for 30 minutes post pile driving;<br>iii) If a marine mammal is observed entering or is observed within the clearance zones, piling and hammering must not commence until the animal has exited the zone or a specific amount of time has elapsed since the last sighting. The specific amount of time is 30 minutes for large whales and 15 minutes for dolphins, porpoises, and pinnipeds;<br>iv) If a marine mammal is observed entering or within the respective shutdown zone, as defined in the LOA, after vibratory pile driving or hammering has begun, the PSO must call for a temporary shutdown of vibratory pile driving or hammering;<br>v) Revolution Wind must immediately cease pile driving or pneumatic hammering if a PSO calls for shutdown, unless shutdown is not practicable due to imminent risk of injury or loss of life to an individual, pile refusal, or pile instability; and<br>vi) Pile driving must not restart until either the marine mammal(s) has voluntarily left the specific clearance zones and have been visually or acoustically confirmed beyond that clearance zone, or, when specific time periods have elapsed with no further sightings or acoustic detections have occurred. The specific time periods are 15 minutes for small odontocetes and 30 minutes for all other marine mammal species. |
| UXO/MEC Detonation | |
| 1 | General.<br>i) Revolution Wind shall only detonate a maximum of 13 UXO/MECs, of varying sizes;<br>ii) Upon encountering a UXO/MEC of concern, Revolution Wind may only resort to high-order removal (i.e., detonation) if all other means of removal are impracticable;<br>iii) Revolution Wind must utilize a noise abatement system (e.g., bubble curtain or similar noise abatement device) around all UXO/MEC detonations and operate that system in a manner that achieves the maximum noise attenuation levels practicable. |
| 2 | Seasonal and Daily Restrictions.<br>i) Revolution Wind must not detonate UXOs/MECs from December 1 through April 31, annually; and<br>ii) Revolution Wind must only detonate UXO/MECs during daylight hours. |
| 3 | PSO and PAM Use.<br>i) All visual PSOs and PAM operators used for the Revolution Wind project must meet the requirements and qualifications described in § 217.265 (a) and (b), and (c), respectively and as applicable to the specified activity; and<br>ii) Revolution Wind must use at least 2 visual PSOs on each platform (i.e., vessels, plane) and one acoustic PSO to monitor for marine mammals in the clearance zones prior to detonation. If the clearance zone is larger than 2 km (based on charge weight), Revolution Wind must deploy a secondary PSO vessel. If the clearance is larger than 5 km (based on charge weight), an aerial survey must be conducted. |
| 4 | Clearance Zones.<br>i) Revolution Wind must establish and implement clearance zones using both visual and acoustic monitoring, as described in the LOA;<br>ii) Clearance zones must be fully visible for at least 60 minutes and all marine mammal(s) must be confirmed to be outside of the clearance zone for at least 30 minutes prior to detonation. PAM must also be conducted for at least 60 minutes prior to detonation and the zone must be acoustically cleared during this time; and<br>iii) If a marine mammal is observed entering or within the clearance zone prior to denotation, the activity must be delayed. Detonation may only commence if all marine mammals have been confirmed to have voluntarily left the clearance zones and been visually confirmed to be beyond the clearance zone, or when 60 minutes have elapsed without any redetections for whales (including the North Atlantic right whale) or 15 minutes have elapsed without any redetections of delphinids, harbor porpoises, or seals. |
| 5 | Sound Field Verification.<br>i) During each UXO/MEC detonation, Revolution Wind must empirically determine source levels (peak and cumulative sound exposure level), the ranges to the isopleths corresponding to the Level A harassment and Level B harassment thresholds, and estimated transmission loss coefficient(s); and<br>ii) If SFV measurements on any of the detonations indicate that the ranges to Level A harassment and Level B harassment thresholds are larger than those modeled, assuming 10-dB attenuation, Revolution Wind must modify the ranges, with approval from NMFS, and/or apply additional noise attenuation measures (e.g., improve efficiency of bubble curtain(s), install an additional noise attenuation device) before the next detonation event. |
| HRG Surveys | |
| 1 | General. |

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| | i) All personnel with responsibilities for marine mammal monitoring must participate in joint, onboard briefings that would be led by the vessel operator and the Lead PSO, prior to the beginning of survey activities. The briefing must be repeated whenever new relevant personnel (e.g., new PSOs, acoustic source operators, relevant crew) join the survey operation before work commences;<br>ii) Revolution Wind must deactivate acoustic sources during periods where no data is being collected, except as determined to be necessary for testing. Unnecessary use of the acoustic source(s) is prohibited; and<br>iii) Any large whale sighted by a PSO within 1 km of the boomer, sparker, or CHIRP that cannot be identified by species must be treated as if it were a North Atlantic right whale. |
| 2 | PSO Use.<br>i) Revolution Wind must use at least one PSO during daylight hours and two PSOs during nighttime operations, per vessel;<br>ii) PSOs must establish and monitor the appropriate clearance and shutdown zones (i.e., radial distances from the acoustic source in-use and not from the vessel); and<br>iii) PSOs must begin visually monitoring 30 minutes prior to the initiation of the specified acoustic source (i.e., ramp-up, if applicable), through 30 minutes after the use of the specified acoustic source has ceased. |
| 3 | Ramp-up.<br>i) Any ramp-up activities of boomers, sparkers, and CHIRPs must only commence when visual clearance zones are fully visible (e.g., not obscured by darkness, rain, fog, etc.) and clear of marine mammals, as determined by the Lead PSO, for at least 30 minutes immediately prior to the initiation of survey activities using a specified acoustic source;<br>ii) Prior to a ramp-up procedure starting, the operator must notify the Lead PSO of the planned start of the ramp-up. This notification time must not be less than 60 minutes prior to the planned ramp-up activities as all relevant PSOs must monitor the clearance zone for 30 minutes prior to the initiation of ramp-up; and<br>iii) Prior to starting the survey and after receiving confirmation from the PSOs that the clearance zone is clear of any marine mammals, Revolution Wind must ramp-up sources to half power for 5 minutes and then proceed to full power, unless the source operates on a binary on/off switch in which case ramp-up is not feasible. Ramp-up activities would be delayed if a marine mammal(s) enters its respective shutdown zone. Ramp-up would only be reinitiated if the animal(s) has been observed exiting its respective shutdown zone or until additional time has elapsed with no further sighting. The specific time periods are 15 minutes for small odontocetes and seals, and 30 minutes for all other species. |
| 4 | Clearance and Shutdown Zones.<br>i) Revolution Wind must establish and implement clearance zones as described in the LOA;<br>ii) Revolution Wind must implement a 30 minute clearance period of the clearance zones immediately prior to the commencing of the survey or when there is more than a 30 minute break in survey activities and PSOs are not actively monitoring;<br>iii) If a marine mammal is observed within a clearance zone during the clearance period, ramp-up would not be allowed to begin until the animal(s) has been observed voluntarily exiting its respective clearance zone or until a specific time period has elapsed with no further sighting. The specific time period is 15 minutes for small odontocetes and seals, and 30 minutes for all other species;<br>iv) In any case when the clearance process has begun in conditions with good visibility, including via the use of night vision equipment (IR/thermal camera), and the Lead PSO has determined that the clearance zones are clear of marine mammals, survey operations would be allowed to commence (i.e., no delay is required) despite periods of inclement weather and/or loss of daylight;<br>v) Once the survey has commenced, Revolution Wind must shut down boomers, sparkers, and CHIRPs if a marine mammal enters a respective shutdown zone;<br>vi) In cases when the shutdown zones become obscured for brief periods due to inclement weather, survey operations would be allowed to continue (i.e., no shutdown is required) so long as no marine mammals have been detected;<br>vii) The use of boomers, and sparkers, and CHIRPS would not be allowed to commence or resume until the animal(s) has been confirmed to have left the Level B harassment zone or until a full 15 minutes (for small odontocetes and seals) or 30 minutes (for all other marine mammals) have elapsed with no further sighting;<br>viii) Revolution Wind must immediately shutdown any boomer, sparker, or CHIRP acoustic source if a marine mammal is sighted entering or within its respective shutdown zones. The shutdown requirement does not apply to small delphinids of the following genera: Delphinus, Stenella, Lagenorhynchus, and Tursiops. If there is uncertainty regarding the identification of a marine mammal species (i.e., whether the observed marine mammal belongs to one of the delphinid genera for which shutdown is waived), the PSOs must use their best professional judgment in making the decision to call for a shutdown. Shutdown is required if a delphinid that belongs to a genus other than those specified here is detected in the shutdown zone;<br>ix) If a boomer, sparker, or CHIRP is shut down for reasons other than mitigation (e.g., mechanical difficulty) for less than 30 minutes, it would be allowed to be activated again without ramp-up only if: (A) PSOs have maintained constant observation and (B) no additional detections of any marine mammal occurred within the respective shutdown zones; and (C) If a boomer, sparker, or CHIRP was shut down for a period longer than 30 minutes, then all clearance and ramp-up procedures must be initiated. |
| 5 | Autonomous surface vehicle (ASV) use<br>i) The ASV must remain with 800 m (2,635 ft) of the primary vessel while conducting survey operations;<br>ii) Two PSOs must be stationed on the mother vessel at the best vantage points to monitor the clearance and shutdown zones around the ASV;<br>iii) At least one PSO must monitor the output of a thermal.high-definition camera installed on the mother vessel to monitor the field-of-view around the ASV using a hand-held tablet; and<br>iv) During periods of reduced visibility (e.g., darkness, rain, or fog), PSOs must use night-vision goggles with thermal clip-ons and a hand-held spotlight to monitor the clearance and shutdown zones around the ASV. |
| Section 217.275 Requirements for monitoring and reporting | |

| Measure Number | Description of Measures that may be Required by Other Authorizations and Permits Issued to the Lessee |
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| 1 | PSO Qualifications. Revolution Wind must employ qualified, trained visual and acoustic PSOs to conduct marine mammal monitoring during activities associated with construction. PSO requirements are as follows:<br>1) Revolution Wind must use independent, dedicated, qualified PSOs, meaning that the PSOs must be employed by a third-party observer provider, must have no tasks other than to conduct observational effort, collect data, and communicate with and instruct relevant vessel crew with regard to the presence of protected species and mitigation requirements;<br>2) All PSOs must be approved by NMFS. Revolution Wind must submit PSO resumes for NMFS' review and approval at least 60 days prior to commencement of in-water construction activities requiring PSOs. Resumes must include dates of training and any prior NMFS approval, as well as dates and description of last experience, and must be accompanied by information documenting successful completion of an acceptable training course. NMFS shall be allowed three weeks to approve PSOs from the time that the necessary information is received by NMFS, after which PSOs meeting the minimum requirements will automatically be considered approved;<br>3) PSOs must have visual acuity in both eyes (with correction of vision being permissible) sufficient enough to discern moving targets on the water's surface with the ability to estimate the target size and distance (binocular use is allowable);<br>4) All PSOs must be trained in marine mammal identification and behaviors and must be able to conduct field observations and collect data according to assigned protocols. Additionally, PSOs must have the ability to work with a.ll required and relevant software and equipment necessary during observations.<br>5) PSOs must have sufficient writing skills to document all observations, including but not limited to:<br>i) The number and species of marine mammals observed;<br>ii) The dates and times of when in-water construction activities were conducted;<br>iii) The dates and time when in-water construction activities were suspended to avoid potential incidental injury of marine mammals from construction noise within a defined shutdown zone; and<br>iv) Marine mammal behavior.<br>6) All PSOs must be able to communicate orally, by radio, or in-person with Revolution Wind project personnel;<br>7) PSOs must have sufficient training, orientation, or experience with construction operations to provide for their own personal safety during observations;<br>i) All PSOs must complete a Permits and Environmental Compliance Plan training and a two-day refresher session that will be held with the PSO provider and Project compliance representative(s) prior to the start of construction activities;<br>ii) [Reserved];<br>8) At least one PSO must have prior experience working as an observer. Other PSOs may substitute education (i.e., degree in biological science or related field) or training for experience;<br>9) One PSO for each activity (i.e., foundation installation, cofferdam or casing pipe installation and removal, HRG surveys, UXO/MEC detonation) must be designated as the "Lead PSO". The Lead PSO must have a minimum of 90 days of at-sea experience working in an offshore environment and would be required to have no more than eighteen months elapsed since the conclusion of their last at-sea experience;<br>10) At a minimum, at least one PSO located on each observation platform (either vessel-based or aerial-based) must have a minimum of 90 days of at-sea experience working in an offshore environment and would be required to have no more than eighteen months elapsed since the conclusion of their last at-sea experiences. Any new and/or inexperienced PSOs would be paired with an experienced PSO;<br>11) PSOs must monitor all clearance and shutdown zones prior to, during, and following impact pile driving, vibratory pile driving, pneumatic hammering, UXO/MEC detonations, and during HRG surveys that use boomers, sparkers, and CHIRPs (with specific monitoring durations described in § 217.275(b)(2)(iii), § 217.275(b)(3)(iv), § 217.275(b)(4)(ii), and § 217.275(b)(5)(iii). PSOs must also monitor the Level B harassment zones and document any marine mammals observed within these zones, to the extent practicable;<br>12) PSOs must be located on the best available vantage point(s) on the primary vessel(s) (i.e., pile driving vessel, UXO/MEC vessel, HRG survey vessel) and on other dedicated PSO vessels (e.g., additional UXO/MEC vessels) or aerial platforms, as applicable and necessary, to allow them appropriate coverage of the entire visual shutdown zone(s), clearance zone(s), and as much of the Level B harassment zone as possible. These vantage points must maintain a safe work environment; and<br>13) Acoustic PSOs must complete specialized training for operating passive acoustic monitoring (PAM) systems and must demonstrate familiarity with the PAM system on which they must be working. PSOs may act as both acoustic and visual observers (but not simultaneously), so long as they demonstrate that their training and experience are sufficient to perform each task. |
| 2 | PSO Requirements.<br>1) General.<br>i) All PSOs must be located at the best vantage point(s) on the primary vessel, dedicated PSO vessels, and aerial platform in order to ensure 360° visual coverage of the entire clearance and shutdown zones around the vessels, and as much of the Level B harassment zone as possible;<br>ii) During all observation periods, PSOs must use high magnification (25x) binoculars, standard handheld (7x) binoculars, and the naked eye to search continuously for marine mammals. During impact pile driving and UXO/MEC detonation events, at least one PSO on the primary pile driving or UXO/MEC vessels must be equipped with Big Eye binoculars (e.g., 25 x 150; 2.7 view angle; individual ocular focus; height control) of appropriate quality. These must be pedestal mounted on the deck at the most appropriate vantage point that provides for optimal sea surface observation and PSO safety; and<br>iii) PSOs must not exceed four consecutive watch hours on duty at any time, must have a two-hour (minimum) break between watches, and must not exceed a combined watch schedule of more than 12 hours in a 24-hour period.<br>2) WTG and OSS Foundation Installation. |

| Measure Number | Description of Measures that may be Required by Other Authorizations and Permits Issued to the Lessee |
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| | i) At least four PSOs must be actively observing marine mammals before, during, and after installation of foundation piles (monopiles). At least two PSOs must be stationed and observing on the pile driving vessel and at least two PSOs must be stationed on a secondary, PSO-dedicated vessel. Concurrently, at least one acoustic PSO (i.e., passive acoustic monitoring (PAM) operator) must be actively monitoring for marine mammals with PAM before, during and after impact pile driving;<br>ii) If PSOs cannot visually monitor the minimum visibility zone at all times using the equipment described in § 217.275(b)(1)(ii), impact pile driving operations must not commence or must shutdown if they are currently active;<br>iii) All PSOs, including PAM operators, must begin monitoring 60 minutes prior to pile driving, during, and for 30 minutes after an activity. The impact pile driving of monopiles must only commence when the minimum visibility zone is fully visible (e.g., not obscured by darkness, rain, fog, etc.) and the clearance zones are clear of marine mammals for at least 30 minutes, as determined by the Lead PSO, immediately prior to the initiation of impact pile driving;<br>iv) For North Atlantic right whales, any visual or acoustic detection must trigger a delay to the commencement of pile driving. In the event that a large whale is sighted or acoustically detected that cannot be confirmed by species, it must be treated as if it were a North Atlantic right whale; and<br>v) Following a shutdown, monopile installation must not recommence until the minimum visibility zone is fully visible and clear of marine mammals for 30 minutes.<br>3) Cofferdam or Casing Pipe Installation and Removal.<br>i) At least two PSOs must be on active duty during all activities related to the installation and removal of cofferdams or casing pipes and goal post sheet piles;<br>ii) These PSOs must be located at appropriate vantage points on the vibratory pile driving or pneumatic hammering platform or secondary platform in the immediate vicinity of the vibratory pile driving or pneumatic hammering platforms;<br>iii) PSOs must ensure that there is appropriate visual coverage for the entire clearance zone and as much of the Level B harassment zone as possible; and<br>iv) PSOs must monitor the clearance zone for the presence of marine mammals for 30 minutes before, throughout the installation of the sheet piles and casing pipes, and for 30 minutes after all vibratory pile driving or pneumatic hammering activities have ceased. Sheet pile or casing pipe installation shall only commence when visual clearance zones are fully visible (e.g., not obscured by darkness, rain, fog, etc.) and clear of marine mammals, as determined by the Lead PSO, for at least 30 minutes immediately prior to initiation of vibratory pile driving or pneumatic hammering.<br>4) UXO/MEC Detonations.<br>i) At least two PSOs must be on active duty on each observing platform (i.e., vessel, plane) prior to, during, and after UXO/MEC detonations. Concurrently, at least one acoustic PSO (i.e., passive acoustic monitoring (PAM) operator) must be actively monitoring for marine mammals with PAM before, during and after UXO/MEC detonations;<br>ii) All PSOs, including PAM operators, must begin monitoring 60 minutes prior to UXO/MEC detonation, during detonation, and for 30 minutes after detonation; and<br>iii) Revolution Wind must ensure that clearance zones are fully (100 percent) monitored.<br>5) HRG Surveys.<br>i) Between 4 and 6 PSOs must be present on every 24-hour survey vessel and 2 to 3 PSOs must be present on every 12-hour survey vessel. At least one PSO must be on active duty during HRG surveys conducted during daylight and at least two PSOs must be on activity duty during HRG surveys conducted at night;<br>ii) During periods of low visibility (e.g., darkness, rain, fog, etc.), PSOs must use alternative technology (i.e., infrared/thermal camera) to monitor the clearance and shutdown zones;<br>iii) PSOs on HRG vessels must begin monitoring 30 minutes prior to activating boomers, sparkers, or CHIRPs, during use of these acoustic sources, and for 30 minutes after use of these acoustic sources has ceased;<br>iv) Any observations of marine mammals must be communicated to PSOs on all nearby survey vessels during concurrent HRG surveys; and<br>v) During daylight hours when survey equipment is not operating, Revolution Wind must ensure that visual PSOs conduct, as rotation schedules allow, observations for comparison of sighting rates and behavior with and without use of the specified acoustic sources. Off-effort PSO monitoring must be reflected in the monthly PSO monitoring reports. |
| 3 | PAM Operator Requirements.<br>1) General.<br>i) PAM operators must have completed specialized training for operating PAM systems prior to the start of monitoring activities, including identification of species-specific mysticete vocalizations (e.g., North Atlantic right whales);<br>ii) During use of any real-time PAM system, at least one PAM operator must be designated to monitor each system by viewing data or data products that would be streamed in real-time or in near real-time to a computer workstation and monitor;<br>iii) PAM operators may be located on a vessel or remotely on-shore but must have the appropriate equipment (i.e., computer station equipped with a data collection software system (i.e., Mysticetus or similar system) and acoustic data analysis software) available wherever they are stationed;<br>iv) Visual PSOs must remain in contact with the PAM operator currently on duty regarding any animal detection that would be approaching or found within the applicable zones no matter where the PAM operator is stationed (i.e., onshore or on a vessel);<br>v) The PAM operator must inform the Lead PSO on duty of animal detections approaching or within applicable ranges of interest to the pile driving activity via the data collection software system (i.e., Mysticetus or similar system) who will be responsible for requesting that the designated crewmember implement the necessary mitigation procedures (i.e., delay or shutdown);<br>vi) PAM operators must be on watch for a maximum of four consecutive hours, followed by a break of at least two hours between watches; and |

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| | vii) A Passive Acoustic Monitoring Plan must be submitted to NMFS for review and approval at least 180 days prior to the planned start of monopile installation. The authorization to take marine mammals would be contingent upon NMFS' approval of the PAM Plan.<br>2) WTG and OSS Foundation Installation.<br>i) Revolution Wind must use a minimum of one PAM operator before, during, and after impact pile driving activities. The PAM operator must assist visual PSOs in ensuring full coverage of the clearance and shutdown zones;<br>ii) PAM operators must assist the visual PSOs in monitoring by conducting PAM activities 60 minutes prior to any impact pile driving, during, and after for 30 minutes for the appropriate size PAM clearance zone (dependent on season). The entire minimum visibility zone must be clear for at least 30 minutes, with no marine mammal detections within the visual or PAM clearance zones prior to the start of impact pile driving;<br>iii) Any acoustic monitoring during low visibility conditions during the day would complement visual monitoring efforts and would cover an area of at least the Level B harassment zone around each monopile foundation;<br>iv) Any visual or acoustic detection within the clearance zones must trigger a delay to the commencement of pile driving. In the event that a large whale is sighted or acoustically detected that cannot be identified by species, it must be treated as if it were a North Atlantic right whale. Following a shutdown, monopile installation shall not recommence until the minimum visibility zone is fully visible and clear of marine mammals for 30 minutes and no marine mammals have been detected acoustically within the PAM clearance zone for 30 minutes; and<br>v) Revolution Wind must submit a Pile Driving and Marine Mammal Monitoring Plan to NMFS for review and approval at least 180 days before the start of any pile driving. The plan must include final project design related to pile driving (e.g., number and type of piles, hammer type, noise abatement systems, anticipated start date, etc.) and all information related to PAM PSO monitoring protocols for pile-driving and visual PSO protocols for all activities.<br>3) UXO/MEC Detonation(s).<br>i) Revolution Wind must use a minimum of one PAM operator before, during, and after UXO/MEC detonations. The PAM operator must assist visual PSOs in ensuring full coverage of the clearance and shutdown zones;<br>ii) PAM must be conducted for at least 60 minutes prior to detonation, during, and for 30 minutes after detonation;<br>iii) The PAM operator must monitor to and beyond the clearance zone for large whales; and<br>iv) Revolution Wind must prepare and submit a UXO/MEC and Marine Mammal Monitoring Plan to NMFS for review and approval at least 180 days before the start of any UXO/MEC detonations. The plan must include final project design and all information related to visual and PAM PSO monitoring protocols for UXO/MEC detonations. |
| 4 | Data Collection and Reporting.<br>1) Prior to initiation of project activities, Revolution Wind must demonstrate in a report submitted to NMFS (at itp.esch@noaa.gov and pr.itp.monitoringreports@noaa.gov) that all required training for Revolution Wind personnel (including the vessel crews, vessel captains, PSOs, and PAM operators) has been completed;<br>2) Revolution Wind must use a standardized reporting system during the effective period of the proposed regulations and LOA. All data collected related to the Revolution Wind project must be recorded using industry-standard softwares (e.g., Mysticetus or a similar software) that is installed on field laptops and/or tablets. For all monitoring efforts and marine mammal sightings, Revolution Wind must collect the following information and report it to NMFS:<br>i) Date and time that monitored activity begins or ends;<br>ii) Construction activities occurring during each observation period;<br>iii) Watch status (i.e., sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform);<br>iv) PSO who sighted the animal;<br>v) Time of sighting;<br>vi) Weather parameters (e.g., wind speed, percent cloud cover, visibility);<br>vii) Water conditions (e.g., sea state, tide state, water depth);<br>viii) All marine mammal sightings, regardless of distance from the construction activity;<br>ix) Species (or lowest possible taxonomic level possible);<br>x) Pace of the animal(s);<br>xi) Estimated number of animals (minimum/maximum/high/low/best);<br>xii) Estimated number of animals by cohort (e.g., adults, yearlings, juveniles, calves, group composition, etc.);<br>xiii) Description (i.e., as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics);<br>xiv) Description of any marine mammal behavioral observations (e.g., observed behaviors such as feeding or traveling) and observed changes in behavior, including an assessment of behavioral responses thought to have resulted from the specific activity;<br>xv) Animal's closest distance and bearing from the pile being driven, UXO/MEC, or specified HRG equipment and estimated time entered or spent within the Level A harassment and/or Level B harassment zones; |

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| | xvi) Construction activity at time of sighting (e.g., vibratory installation/removal, impact pile driving, UXO/MEC detonation, construction survey), use of any noise attenuation device(s), and specific phase of activity (e.g., ramp-up of HRG equipment, HRG acoustic source on/off, soft start for pile driving, active pile driving, post-UXO/MEC detonation, etc.);<br>xvii) Marine mammal occurrence in Level A harassment or Level B harassment zones;<br>xviii) Description of any mitigation-related action implemented, or mitigation-related actions called for but not implemented, in response to the sighting (e.g., delay, shutdown, etc.) and time and location of the action; and<br>xix) Other human activity in the area.<br>3) For all real-time acoustic detections of marine mammals, the following must be recorded and included in weekly, monthly, annual, and final reports:<br>i) Location of hydrophone (latitude & longitude; in Decimal Degrees) and site name;<br>ii) Bottom depth and depth of recording unit (in meters);<br>iii) Recorder (model & manufacturer) and platform type (i.e., bottom-mounted, electric glider, etc.), and instrument ID of the hydrophone and recording platform (if applicable);<br>iv) Time zone for sound files and recorded date/times in data and metadata (in relation to UTC. i.e., EST time zone is UTC-5);<br>v) Duration of recordings (start/end dates and times; in ISO 8601 format, yyyy-mm-ddTHH:MM:SS.sssZ);<br>vi) Deployment/retrieval dates and times (in ISO 8601 format);<br>vii) Recording schedule (must be continuous);<br>viii) Hydrophone and recorder sensitivity (in dB re. 1 µPa);<br>ix) Calibration curve for each recorder;<br>x) Bandwidth/sampling rate (in Hz);<br>xi) Sample bit-rate of recordings; and,<br>xii) Detection range of equipment for relevant frequency bands (in meters).<br>4) For each detection, the following information must be noted:<br>i) Species identification (if possible);<br>ii) Call type and number of calls (if known);<br>iii) Temporal aspects of vocalization (date, time, duration, etc.; date times in ISO 8601 format);<br>iv) Confidence of detection (detected, or possibly detected);<br>v) Comparison with any concurrent visual sightings;<br>vi) Location and/or directionality of call (if determined) relative to acoustic recorder or construction activities;<br>vii) Location of recorder and construction activities at time of call;<br>viii) Name and version of detection or sound analysis software used, with protocol reference;<br>ix) Minimum and maximum frequencies viewed/monitored/used in detection (in Hz); and<br>x) Name of PAM operator(s) on duty.<br>5) Weekly Reports.<br>i) Revolution Wind must compile and submit weekly PSO, PAM, and sound field verification (SFV) reports to NMFS (at itp.esch@noaa.gov and PR.ITP.monitoringreports@noaa.gov) that document the daily start and stop of all pile driving, HRG survey, or UXO/MEC detonation activities, the start and stop of associated observation periods by PSOs, details on the deployment of PSOs, a record of all detections of marine mammals (acoustic and visual), any mitigation actions (or if mitigation actions could not be taken, provide reasons why), and details on the noise abatement system(s) used and its performance. Weekly reports are due on Wednesday for the previous week (Sunday – Saturday) and must include the information required under this section. The weekly report will also identify which turbines become operational and when (a map must be provided). Once all foundation pile installation is completed, weekly reports are no longer required;<br>ii) [Reserved].<br>6) Monthly Reports.<br>i) Revolution Wind must compile and submit monthly reports to NMFS (at itp.esch@noaa.gov and PR.ITP.monitoringreports@noaa.gov) that include a summary of all information in the weekly reports, including project activities carried out in the previous month, vessel transits (number, type of vessel, and route), number of piles installed, number of UXO/MEC detonations, all detections of marine mammals, and any mitigative action taken. Monthly reports are due on the 15th of the month for the previous month. The monthly report must also identify which turbines become operational and when (a map must be provided). Once foundation installation is complete, monthly reports are no longer required;<br>ii) [Reserved].<br>7) Annual Reports. |

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| | i) Revolution Wind must submit an annual report to NMFS (at itp.esch@noaa.gov and PR.ITP.monitoringreports@noaa.gov) no later than 90 days following the end of a given calendar year. Revolution Wind must provide a final report within 30 days following resolution of comments on the draft report. The report must detail the following information and the information specified in § 217.275(d)(2)(i-xix), § 217.275(d)(3)(i-xii), and § 217.275(d)(4)(i-x):<br>(A) The total number of marine mammals of each species/stock detected and how many were within the designated Level A harassment and Level B harassment zones with comparison to authorized take of marine mammals for the associated activity type;<br>(B) Marine mammal detections and behavioral observations before, during, and after each activity;<br>(C) What mitigation measures were implemented (i.e., number of shutdowns or clearance zone delays, etc) or, if no mitigative actions was taken, why not;<br>(D) Operational details (i.e., days of impact and vibratory pile driving, days/amount of HRG survey effort, total number and charge weights related to UXO/MEC detonations, etc.);<br>(E) SFV results;<br>(F) Any PAM systems used;<br>(G) The results, effectiveness, and which noise abatement systems were used during relevant activities (i.e., impact pile driving, UXO/MEC detonation);<br>(H) Summarized information related to Situational Reporting; and<br>(I) Any other important information relevant to the Revolution Wind project, including additional information that may be identified through the adaptive management process.<br>ii) The final annual report must be prepared and submitted within 30 calendar days following the receipt of any comments from NMFS on the draft report. If no comments are received from NMFS within 60 calendar days of NMFS' receipt of the draft report, the report must be considered final.<br>8) Final Report.<br>i) Revolution Wind must submit its draft final report to NMFS (at itp.esch@noaa.gov and PR.ITP.monitoringreports@noaa.gov) on all visual and acoustic monitoring conducted under the LOA within 90 calendar days of the completion of activities occurring under the LOA. A final report must be prepared and submitted within 30 calendar days following receipt of any NMFS comments on the draft report. If no comments are received from NMFS within 30 calendar days of NMFS' receipt of the draft report, the report shall be considered final.<br>ii) [Reserved].<br>9) Sound Field Verification Reporting.<br>i) Revolution Wind must provide the initial results of the SFV measurements to NMFS in an interim report after each monopile foundation installation for the first three monopiles piles, and for each UXO/MEC detonation as soon as they are available, but no later than 48 hours after each installation or detonation. Revolution Wind must also provide interim reports on any subsequent SFV on foundation piles within 48 hours. The interim report must include hammer energies used during pile driving or UXO/MEC weight (including donor charge weight), peak sound pressure level (SPLpk) and (1) median, (2) mean, (3) maximum, and (4) minimum root-mean-square sound pressure level that contains 90 percent of the acoustic energy (SPLrms) and single strike sound exposure level (SELss);<br>ii) The final results of SFV of monopile installations must be submitted as soon as possible, but no later than within 90 days following completion of impact pile driving of monopiles and UXO/MEC detonations. The final report must include, at minimum, the following:<br>(A) Peak sound pressure level (SPLpk), root-mean-square sound pressure level that contains 90 percent of the acoustic energy (SPLrms), single strike sound exposure level (SELss), integration time for SPLrms, spectrum, and 24-hour cumulative SEL extrapolated from measurements at specified distances (e.g., 750 m). All these levels must be reported in the form of (1) median, (2) mean, (3) maximum, and (4) minimum. The SEL and SPL power spectral density and one-third octave band levels (usually calculated as decidecade band levels) at the receiver locations should be reported;<br>(B) The sound levels reported must be in median and linear average (i.e., average in linear space), and in dB;<br>(C) A description of depth and sediment type, as documented in the Construction and Operation Plan, at the recording and pile driving locations;<br>(D) Hammer energies required for pile installation and the number of strikes per pile;<br>(E) Hydrophone equipment and methods (i.e., recording device, bandwidth/sampling rate, distance from the pile where recordings were made; depth of recording device(s));<br>(F) Description of the SFV PAM hardware and software, including software version used, calibration data, bandwidth capability and sensitivity of hydrophone(s), any filters used in hardware or software, any limitations with the equipment, and other relevant information;<br>(G) Description of UXO/MEC, weight, including donor charge weight, and why detonation was necessary;<br>(H) Local environmental conditions, such as wind speed, transmission loss data collected on-site (or the sound velocity profile), baseline pre- and post-activity ambient sound levels (broadband and/or within frequencies of concern);<br>(I) Spatial configuration of the noise attenuation device(s) relative to the pile;<br>(J) The extents of the Level A harassment and Level B harassment zones; and<br>(K) A description of the noise abatement system and operational parameters (e.g., bubble flow rate, distance deployed from the pile, etc.) and any action taken to adjust the noise abatement system.<br>10) Situational Reporting. Specific situations encountered during the development of Revolution Wind shall require immediate reporting to be undertaken. These situations and the relevant procedures are described below. |

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| | i) If a North Atlantic right whale is observed at any time by PSOs or personnel on or in the vicinity of any project vessel, or during vessel transit, Revolution Wind must immediately report sighting information to the NMFS North Atlantic Right Whale Sighting Advisory System (866) 755-6622, through the WhaleAlert app (http://www.whalealert/org/), and to the U.S. Coast Guard via channel 16, as soon as feasible but no longer than 24 hours after the sighting. Information reported must include, at a minimum: time of sighting, location, and number of North Atlantic right whales observed.<br>ii) When an observation of a marine mammal occurs during vessel transit, the following information must be recorded:<br>(A) Time, date, and location;<br>(B) The vessel's activity, heading, and speed;<br>(C) Sea state, water depth, and visibility;<br>(D) Marine mammal identification to the best of the observer's ability (e.g., North Atlantic right whale, whale, dolphin, seal);<br>(E) Initial distance and bearing to marine mammal from vessel and closest point of approach; and<br>(F) Any avoidance measures taken in response to the marine mammal sighting.<br>iii) If a North Atlantic right whale is detected via PAM, the date, time, location (i.e., latitude and longitude of recorder) of the detection as well as the recording platform that had the detection must be reported to nmfs.pacmdata@noaa.gov as soon as feasible, but no longer than 24 hours after the detection. Full detection data and metadata must be submitted monthly on the 15th of every month for the previous month via the webform on the NMFS North Atlantic right whale Passive Acoustic Reporting System website (https://www.fisheries.noaa.gov/resource/document/passive-acoustic-reporting-system-templates);<br>iv) In the event that the personnel involved in the activities defined in § 217.270(a) discover a stranded, entangled, injured, or dead marine mammal, Revolution Wind must immediately report the observation to the NMFS Office of Protected Resources (OPR), the NMFS Greater Atlantic Stranding Coordinator for the New England/Mid-Atlantic area (866-755-6622), and the U.S. Coast Guard within 24 hours. If the injury or death was caused by a project activity, Revolution Wind must immediately cease all activities until NMFS OPR is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the LOA. NMFS may impose additional measures to minimize the likelihood of further prohibited take and ensure MMPA compliance. Revolution Wind may not resume their activities until notified by NMFS. The report must include the following information:<br>(A) Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);<br>(B) Species identification (if known) or description of the animal(s) involved;<br>(C) Condition of the animal(s) (including carcass condition if the animal is dead);<br>(D) Observed behaviors of the animal(s), if alive;<br>(E) If available, photographs or video footage of the animal(s); and<br>(F) General circumstances under which the animal was discovered.<br>v) In the event of a vessel strike of a marine mammal by any vessel associated with the Revolution Wind Offshore Wind Farm Project, Revolution Wind must immediately report the strike incident to the NMFS OPR and the GARFO within and no later than 24 hours. Revolution Wind must immediately cease all activities until NMFS OPR is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the LOA. NMFS may impose additional measures to minimize the likelihood of further prohibited take and ensure MMPA compliance. Revolution Wind may not resume their activities until notified by NMFS. The report must include the following information:<br>(A) Time, date, and location (latitude/longitude) of the incident;<br>(B) Species identification (if known) or description of the animal(s) involved;<br>(C) Vessel's speed leading up to and during the incident;<br>(D) Vessel's course/heading and what operations were being conducted (if applicable);<br>(E) Status of all sound sources in use;<br>(F) Description of avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike;<br>(G) Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, visibility) immediately preceding the strike;<br>(H) Estimated size and length of animal that was struck;<br>(I) Description of the behavior of the marine mammal immediately preceding and following the strike;<br>(J) If available, description of the presence and behavior of any other marine mammals immediately preceding the strike;<br>(K) Estimated fate of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and<br>(L) To the extent practicable, photographs or video footage of the animal(s). |

† Mitigation measures and description are taken directly from NMFS (2023) and have not been edited.

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# APPENDIX G

## Environmental and Physical Settings and Supplemental Information

Section 508 of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The Bureau of Ocean Energy Management has made every reasonable effort to ensure that the information in this document is accessible. If you have any problems accessing the information, please contact BOEM's Office of Public Affairs at boempublicaffairs@boem.gov or (202) 208-6474.

# Contents

# Figures

## Tables

# Introduction

This appendix provides information on the environmental and physical settings of the Lease Area and information by resource or topic, as applicable, that supplements the information provided in the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project environmental impact statement (EIS).

# Environmental and Physical Settings

This section addresses the physical, geological, and biological settings near the RWF and RWEC Project (the Project). As directed under Section 1501.12 of the Council on Environmental Quality's (CEQ's) revised National Environmental Policy Act (NEPA) regulations, this EIS incorporates, by reference, the detailed analysis provided in the Vineyard Wind final EIS in Appendix E (Bureau of Ocean Energy Management [BOEM] 2021).

For more specific environmental and physical setting information, the reader is referred to the following COP sections in the *Construction & Operations Plan Revolution Wind Farm* (COP) (VHB 2023):

- General regional setting: See Sections 4.6.7 and 4.3.1 of the COP, which describe current land uses and land cover types near the onshore Project components.
- Climate: See Section 4.2.1 of the COP, which describes current air quality near the RWF and RWEC.
- Physical oceanography and meteorology: See Section 4.2.4 of the COP, which provides detailed information on physical oceanographic conditions, including circulation, currents, and water column stratification by temperature and salinity, as well as meteorological conditions such as wind speed and direction, occurrence of storms and cyclones, and ice and fog. Few hurricanes pass through New England, but the area is subjected to frequent Nor'easters that form offshore between Georgia and New Jersey and typically reach maximum intensity in New England. These storms are usually characterized by winds from the northeast and can bring heavy precipitation, wind, storm surges, and rough seas. They primarily occur between September and April but can form any time of year. Although hurricanes are relatively infrequent in New England, wave heights up to 30 feet (9 meters [m]) were recorded south of Block Island (Scripps Buoy 44097) during Hurricane Sandy in 2012 (National Oceanic and Atmospheric Administration, National Weather Service 2012).
- Geological resources: See Section 4.2.3 of the COP, which describes the regional geological setting as well as specific marine geophysical and geotechnical site investigations conducted for the RWF in accordance with BOEM regulations at 30 Code of Federal Regulations (CFR) 585.
- Biological resources: See Sections 4.3.2 to 4.3.7 of the COP, which describe current types and status of terrestrial and marine resources near the RWF and RWEC.

Analysis of potential impacts to these resources from all offshore wind activities is provided in the EIS as part of each resource's No Action Alternative discussion. Discussion of impacts as a result of the Proposed Action references the No Action Alternative where possible to reduce replication and focus the analysis on the differences among alternatives. EPMs and any other measures that would be implemented to monitor or minimize resource impacts are discussed in EIS Appendix F.

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# Avian and Bat Postconstruction Monitoring Framework

Revolution Wind, LLC (Revolution Wind) has developed a draft avian and bat postconstruction monitoring plan for the Project that summarizes the approach to monitoring; describes overarching monitoring goals and objectives; identifies the key avian species, priority questions, and data gaps unique to the region and Lease Area that would be addressed through monitoring; and describes methods and time frames for data collection, analysis, and reporting (see COP Appendix AA [Biodiversity Research Institute 2023]). Postconstruction monitoring would assess impacts of the Project with the purpose of filling select information gaps and supporting validation of the Project's avian risk assessment. Focus may be placed on improving knowledge of Endangered Species Act (ESA)–listed species occurrence and movements offshore, avian collision risk, species/species group displacement, or similar topics. Where possible, monitoring conducted by Revolution Wind would build on and align with postconstruction monitoring conducted by the other Orsted/Eversource offshore wind projects in the Northeast region. Revolution Wind would engage with federal and state agencies and environmental groups to identify appropriate monitoring options and technologies and to facilitate acceptance of the final avian and bat postconstruction monitoring plan (see COP Appendix AA [Biodiversity Research Institute 2023]).

The content of the draft *Revolution Wind Avian and Bat Post-Construction Monitoring Framework* is provided below and is a direct excerpt from the *Assessment of the Potential Effects of the Revolution Offshore Wind Farm on Birds and Bats* (COP Appendix AA [Biodiversity Research Institute 2023:231–235]). Full references supporting this excerpt's author-year citations can be found in COP Appendix AA.

## Introduction

Revolution Wind LLC (Revolution Wind), a 50/50 joint venture between Orsted North America Inc. (Orsted NA) and Eversource Investment LLC (Eversource), proposes to construct and operate the RWF and the RWEC, collectively the Revolution Wind Farm Project (hereinafter referred to as the Project). The wind farm portion of the Project will be in Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0486 (Lease Area), southeast of Point Judith, Rhode Island, and east of Block Island, Rhode Island. The Project's generating capacity will range between 704 megawatts (MW) and 880 MW. This RWF Avian and Bat Post-Construction Monitoring Framework (hereafter the "Framework") focuses solely on the offshore footprint of the Project within the Lease Area, and does not apply to the offshore export cable, cable landfall, or onshore portions of the Project.

Revolution Wind has developed this Framework to outline an approach to post-construction monitoring that supports advancement of the understanding of bird and bat interactions with offshore wind farms, and other areas of uncertainty, such as the potential influence of weather conditions. The scope of monitoring is designed to meet federal requirements [30 CFR 585.626(b)(15) and 585.633(b)] and is scaled to the size and risk profile of the Project with a focus on species of conservation concern.

The intent of the Framework is to outline overarching monitoring objectives, monitoring questions, proposed monitoring elements, and reporting requirements. A detailed Avian and Bat Post-Construction Monitoring Plan (Monitoring Plan), based on this Framework, will be developed in coordination with BOEM, U.S. Fish and Wildlife Service (USFWS), and other relevant regulatory agencies prior to beginning monitoring. Where feasible, monitoring conducted at the RWF will be coordinated with monitoring at neighboring Orsted/Eversource offshore wind projects—South Fork Wind Farm (SFWF) and Sunrise Wind Farm (SRWF)—to facilitate integrated analyses across a broader geographic area.

Monitoring objectives, questions, and associated methods are summarized in Table G-AB1. Technical approaches were selected based on offshore logistical constraints, their ability to address monitoring objectives, and their effectiveness in the marine environment. Emerging technologies, such as multi-sensor radar/camera collision detection systems, are not proposed under this Framework because they have not yet been broadly deployed offshore or demonstrated to effectively reduce uncertainties related to potential impacts on birds and bats.

**Table G-AB1. Monitoring Objectives, Questions, General Approaches to be Used, and Duration**

| Taxa | Monitoring Objective | Primary Questions | Approach | Duration |
|---|---|---|---|---|
| Bats | Monitor occurrence of bats | What times of year and under what environmental conditions are bats detected in the wind farm? | Acoustics | 2 years |
| Birds | Monitor use by ESA listed birds | What times of year and under what conditions are ESA birds present in the wind farm? | Radio tags | up to 3 years |
| Birds | Monitor use by nocturnal migratory birds | What are the flux rates and flight heights of nocturnally migrating birds? | Radar | 1-2 years |
| Birds | Monitor movement of marine birds around the turbines | What are the avoidance rates of marine birds? | Radar | 1-2 years |
| Both | Document mortality | What dead or injured species are found incidentally? | Incidental observations | Project lifetime |

## Bat Acoustic Monitoring

The presence of bats in the marine environment has been documented in the U.S. (Hatch et al. 2013, Solick and Newman 2021). However, there remains uncertainty regarding the extent to which bats occur offshore, particularly within offshore wind farms. Acoustic detectors are commonly used to study bat movements and migration (Johnson et al. 2011). Following the approach taken at SFWF (Final Environmental Impact Statement Appendix F[1]), Orsted/Eversource would conduct bat acoustic monitoring to assess bat activity at RWF, targeting key data gaps related to species presence/composition, temporal patterns of activity, and correlation with weather and atmospheric conditions. The primary monitoring questions are: What times of year and under what environmental conditions are bats detected in the wind farm?

[1] https://www.boem.gov/renewable-energy/state-activities/south-fork

Acoustic monitoring of bat presence would be conducted for two years post-construction. A detector would first be tested onsite to determine if there is any sound interference. Contingent on a successful test, ultrasonic bat detector stations would be installed on the offshore convertor station, wind turbine platforms, and/or buoys. The specific number and location of detector stations would be selected to optimize study design goals, and would be determined in cooperation with BOEM, USFWS, and other relevant regulatory agencies. While specific timing would be dictated by logistics, detectors would likely be deployed in the early spring or late winter (March), and removed in the late fall or early winter (December) after migration, or the most appropriate period as determined in cooperation with BOEM, USFWS, and other relevant regulatory agencies. The detectors would record calls of both cave-hibernating bats, including the northern long-eared bat (Myotis septentrionalis), and migratory tree bats; the resulting information can be used to identify bats to species. All acoustic data recorded would be processed with approved software to filter out poor quality data and identify the presence of bat calls. Where information is insufficient to make a species identification, calls would be classified to one of two phonic groups: low frequency bats (LoF), or high frequency bats (HiF). The HiF group includes both migratory tree bats and cave hibernating bats. Since HiFi include the ESA-listed northern long-eared bat, they would then be manually vetted by an experienced acoustician to the highest resolution possible (e.g., species or genus).

All bat calls detected and identified would be analyzed to understand relationships with time of day, season, and weather/atmospheric conditions. The results would provide information on bat presence offshore and the conditions under which they may occur near offshore wind turbines.

### Motus Tracking Network and ESA Use Study

Tracking studies indicate that at least some individual ESA-listed Piping Plovers (*Charadrius melodus*), Red Knots (*Calidris canutus rufa*), and Roseate Terns, may pass through the Rhode Island and Massachusetts lease areas (Loring et al. 2018, 2019). However, due to limited coverage of onshore automated telemetry receiving stations and low probability of detecting tags (hereafter, Motus receivers and tags) in the offshore environment (Loring et al. 2019), there remains uncertainty related to offshore movements of ESA-listed birds in New England. Revolution Wind would install offshore Motus receiver stations and contribute funding to radio-tagging efforts to address this data gap. The exact species being studied would be determined in consultation with federal agencies and would be dependent on existing, ongoing field efforts. The Motus receivers would also provide opportunistic presence/absence data on other species carrying Motus tags, such as migratory songbirds and bats. The primary monitoring questions are: What times of year and under what environmental conditions are ESA birds present in the wind farm?

Movements of radio-tagged ESA-listed birds in the vicinity of the RWF would be monitored for up to three years post-construction, during the spring, summer, and fall. Motus receivers would be installed within the wind farm to determine the presence/absence of ESA-listed species. The specific number and location of offshore receiver stations would be selected to optimize study design goals, and would be determined using a design tool currently being developed through a New York State Energy Research and Development Authority (NYSERDA) funded project[2]. If there is a need identified by USFWS and in coordination with efforts at SFWF and RWF, existing Motus receiver stations at up to two onshore

[2] https://www.briloon.org/renewable/automatedvhfguidance

locations near the RWF would be refurbished or maintained to confirm the presence and movements of radio-tagged ESA-species in areas adjacent to RWF. Funding for up to 150 Motus tags per year would be provided to researchers working with ESA-listed birds for up to three consecutive years.

ESA-listed bird presence/absence in the wind farm would be analyzed by comparing detections within the wind farm to coastal receiver towers. All detections would be analyzed to understand relationships with time of day, season, and weather.

### Radar Monitoring: Nocturnal Migrants Flux and Flight Heights

Nocturnal migrants, including songbirds and shorebirds, are documented to fly offshore (Adams et al. 2015, Loring et al. 2020). Since nocturnal migration events are episodic and cannot be detected during daytime surveys, there is uncertainty on the timing and intensity of migration offshore. Radar, oriented vertically, has been used at offshore wind farms in Europe to study nocturnal migration events (Hill et al. 2014). Orsted/Eversource is considering conducting a one-to-two-year radar study across SRWF, SFWF, and RWF to record the passage rates (flux) of migrants and flight heights. The primary monitoring questions are: What are the flux rates and flight heights of nocturnally migrating birds?

Since radar approaches to monitoring birds are actively evolving and feasibility would need to be determined, a specific system and methods would be identified closer to when the projects begin operating. The results would be related to time of year and weather conditions, to increase the understanding on when nocturnal migrants may have higher collision risk.

### Radar Monitoring: Marine Bird Avoidance

Marine birds, particularly loons, sea ducks, auks, and the Northern Gannet (Morus bassanus), have been documented to avoid offshore wind farms, potentially leading to displacement from habitat (Goodale and Milman 2016). However, there remains uncertainty on how birds would respond to Orsted/Eversource’s large turbines that would be spaced one nautical mile apart. Based on methods used by Desholm and Kahlert (2005), Skov et al. (2018), and others, Orsted/Eversource is considering conducting a one-to-two-year cross-project (SRWF, SFWF, and RWF) radar study to collect data on macro (and potentially meso—i.e., flying between turbines) avoidance rates. These data on avoidance would support understanding of both displacement and collision vulnerability. The primary monitoring questions is: What are the avoidance rates of marine birds?

### Documentation of Dead and Injured Birds and Bats

Revolution Wind, or its designated operator, would implement a reporting system to document dead or injured birds or bats found incidentally on vessels and project structures during construction, operation, and decommissioning. The location would be marked using GPS, an Incident Reporting Form would be filled out, and digital photographs taken. Any animals detected that could be ESA-listed, would have their identity confirmed by consulting biologists, and a report would be submitted to the designated staff at Revolution Wind who would then report it to BOEM, USFWS, and other relevant regulatory agencies. Carcasses with federal or research bands or tags would be reported to the U.S. Geological Survey (USGS) Bird Band Laboratory, BOEM, and USFWS.

### Adaptive Monitoring

Adaptive monitoring is an important principle underlying Revolution Wind's post-construction monitoring Framework. Over the course of monitoring, Revolution Wind would work with BOEM, USFWS, and other relevant regulatory agencies, to determine the need for adjustments to monitoring approaches, consideration of new monitoring technologies, and/or additional periods of monitoring, based on an ongoing assessment of monitoring results. Potential triggers for adaptive monitoring may include, but not be limited to, equipment failure, an unexpected impact to birds or bats identified through monitoring, or new opportunities to collaborate with other projects in the region. The Monitoring Plan would include a series of potential adaptive monitoring actions, developed in coordination with BOEM, USFWS, and other relevant regulatory agencies, to be considered as appropriate.

### Reporting

Revolution Wind would submit an annual report to BOEM and USFWS summarizing post-construction monitoring activities, preliminary results as available, and any proposed changes in the monitoring program. Revolution Wind would participate in an annual meeting with BOEM and USFWS to discuss the report. Data from these monitoring studies would ultimately be submitted to relevant regional databases and archives (e.g., NABat), as feasible and appropriate (Biodiversity Research Institute 2023:231–235)

## Literature Cited

Biodiversity Research Institute (BRI). 2023. *Assessment of the Potential Effects of the Revolution Wind Offshore Wind Farm on Birds and Bats*. *Lease Area OCS-A-0486*. Appendix AA in *Construction and Operations Plan Revolution Wind Farm*. Portland, Maine: bri. February.

# Commercial Fisheries and For-Hire Recreational Fishing

This section provides an overview of the commercial fisheries data used in EIS Section 3.9. It also provides a description of the methodological approach used to describe the dependency of fishermen on the Lease Area.

## Overview of Commercial Fisheries Data Used in the Environmental Impact Statement Section 3.9

The primary source of data used for this resource was summarized vessel trip report (VTR) data provided by the National Marine Fisheries Service (NMFS) (2021a, 2022a, 2023). These data comprise annual VTR data (2008–2019) for specific geographic areas relevant to the Project showing commercial fishing revenue, trips, and number of unique vessels for each fishery management plan (FMP) fishery, species, gear, and port of landing.[3] These data were also used to analyze the distribution of commercial fishing revenue from the Lease Area across fishing vessels. In addition, the VTR data provided by NMFS (2021a) describe the activities of for-hire recreational fishing vessels, including landings by species and the number of angler trips by port.

A second source of data was the website at NMFS (2022b), which summarizes commercial fisheries data for each proposed WEA along the U.S. Atlantic Coast. These data were downloaded and used to summarize revenue at risk across all proposed offshore wind projects under the No Action Alternative.

In addition, polar histograms (Figure 3.9-3 through Figure 3.9-6) developed by BOEM based on NMFS vessel monitoring system (VMS) data provided by NMFS (2019) are included in Section 3.9.[4] From January 2014 through August 2019, VMS coverage levels ranged between 90% and 100% for the following FMP fisheries: Atlantic Herring, Bluefish, Mackerel/Squid/Butterfish, Monkfish, Northeast Multispecies (large-mesh), Northeast Multispecies (small-mesh), Atlantic Sea Scallop, Spiny Dogfish, Summer Flounder/Scup/Black Sea Bass, and Surfclam/Ocean Quahog. Average VMS coverage levels were lower for the following FMP fisheries: Northeast Skate Complex (75%), Highly Migratory Species (48%), Jonah Crab (14%), and American Lobster (11%) (NMFS 2019).

[3] NMFS requires all federally permitted commercial fishing vessels (with the exception of those vessels that only have a lobster permit) to submit a VTR for every fishing trip (50 CFR 648.7). The VTR data provide a broad census of fishing activity that encompasses the majority of commercial fisheries active near the RWF and offshore RWEC. VTRs include a single fishing location (reported in latitude and longitude coordinates) for each trip. VTR location information is only an approximation of fishing activity, particularly with respect to the use of mobile gear, because fishermen self-report only one set of coordinates for a fishing trip, despite the fact that one trip may include multiple gear tows that take place in many different locations across a much wider area. VTR instructions require that fishermen record the haulback position where most of the fishing occurred (Livermore 2017; NMFS 2020a).

A fisherman with a vessel with a federal lobster permit is only required to fill out a VTR if he or she has another federal permit. Approximately 63% of the lobster fleet fishing in statistical area 537, which encompasses most of the RI/MA WEAs, reports through VTRs (Atlantic States Marine Fisheries Commission 2018).

[4] VMS data are generated from automated transmissions from transponders that are required to be on board and operating whenever permitted vessels are fishing or transiting with the intent to harvest fish or shellfish. Data are transmitted once every 60 minutes for all FMPs except sea scallops, which are transmitted once every 30 minutes. Each transmission includes the current directional bearing and vessel speed as well as the average bearing and vessel speed since the last transmission. Using the average vessel speed, NMFS uses an algorithm to assign an assumed activity (either fishing or transiting) to each transmission.

## Average Annual Revenues and Non-Disclosure Issues

In general, Section 3.9 provides information on the average annual revenue over the 2008–2019 period. However, annual data were provided only for the years for which data could be disclosed. If an annual datapoint for a given FMP, gear, or port within a given geographic area could not be disclosed because there was an insufficient number of vessels or dealers, then NMFS added the datapoint to a “non-disclosed” category. By combining all the datapoints that could not be disclosed, NMFS was able to report the annual total revenue for every year. However, this methodology for reporting non-disclosed datapoints hampers accurate estimation of average annual revenue because there were often non-disclosed data for 1 or more years, particularly if the geographic area was small or if there were relatively low levels of participation. Table G-CF1 demonstrates these issues and shows the annual data for gears as provided by NMFS for the RWEC from 2008 to 2019. It is not possible to infer whether numbers shown as zero (with a “–”) denote zero revenue for the gear, or if the data were not disclosed and assigned to the “all other gear” category.

## Commercial Fisheries Revenue Intensity Figures

The revenue intensity figures for commercial fisheries shown in Figures G-CF1 through G-CF13 have been developed to provide a visual representation of harvesting locations across FMP fisheries. These figures are reproduced from the Fishing Footprints webpage (NMFS 2020b) with the addition of the Lease Area and the RWEC superimposed. The figures are generally limited to those that are available for the 2016–2018 period, although an exception is made for Figure G-CF13, which summarizes the revenue intensity of all fisheries combined and which is provided for the 2013–2015 (the most recent data available on the webpage).

**Table G-CF1. National Marine Fisheries Service-Greater Atlantic Regional Fisheries Office Commercial Fishing Annual Revenue ($1,000s) Data for the Lease Area**

| Gear | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | Non-Zero Years |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dredge-clam | – | $7.8 | – | – | – | $0.9 | – | – | – | – | – | – | 2 |
| Dredge-scallop | $10.8 | $5.6 | $2.8 | $14.4 | – | $5.3 | $8.3 | $17.8 | $20.6 | $6.1 | $4.8 | $11.0 | 11 |
| Dredge-scallop | $10.8 | $5.6 | $2.8 | $14.4 | – | $5.3 | $8.3 | $17.8 | $20.6 | $6.1 | $4.8 | $11.0 | 11 |
| Gillnet-sink | $35.3 | $38.7 | $49.3 | $38.3 | $24.3 | $22.9 | $24.7 | $20.8 | $25.8 | $25.8 | $15.5 | $15.9 | 12 |
| Handline | $1.4 | $1.1 | $0.8 | $0.8 | $0.7 | $0.5 | $1.3 | $0.5 | $1.1 | $1.7 | $1.4 | $1.4 | 12 |
| Longline-bottom | – | – | – | – | – | $0.1 | $0.1 | – | – | – | – | – | 2 |
| Pot-lobster | $139.3 | $105.5 | $91.8 | $70.1 | $79.0 | $50.8 | $52.8 | $55.6 | $55.3 | $49.8 | $65.1 | $89.3 | 12 |
| Pot-other | $2.0 | $3.2 | $17.5 | $21.2 | $12.9 | $10.5 | $5.1 | $6.5 | $11.0 | $9.5 | $20.1 | $15.0 | 12 |
| Trawl-bottom | $115.5 | $114.2 | $139.7 | $185.9 | $263.6 | $237.5 | $191.6 | $205.3 | $187.3 | $150.4 | $155.1 | $182.8 | 12 |
| Trawl-midwater | $8.3 | $43.9 | $7.9 | $37.9 | $131.8 | $100.3 | $125.6 | $51.6 | $36.9 | $0.7 | – | – | 10 |
| All other gear* | $17.8 | $10.6 | $13.0 | $12.0 | $7.3 | $0.1 | $3.8 | $27.6 | $16.3 | $6.5 | $3.2 | $19.6 | 12 |
| **All gear types** | $341.3 | $336.3 | $325.5 | $395.0 | $519.7 | $434.1 | $421.7 | $403.5 | $374.7 | $256.5 | $270.0 | $345.8 | $0.1 |

Source: NMFS (2021b).

Notes: Revenue is adjusted for inflation to thousands of 2019 dollars using the GDP Implicit Price Deflator. ND = not disclosed. A "–" indicates a value equal to zero, while $0.0 indicates a value greater than zero, but less than $500.

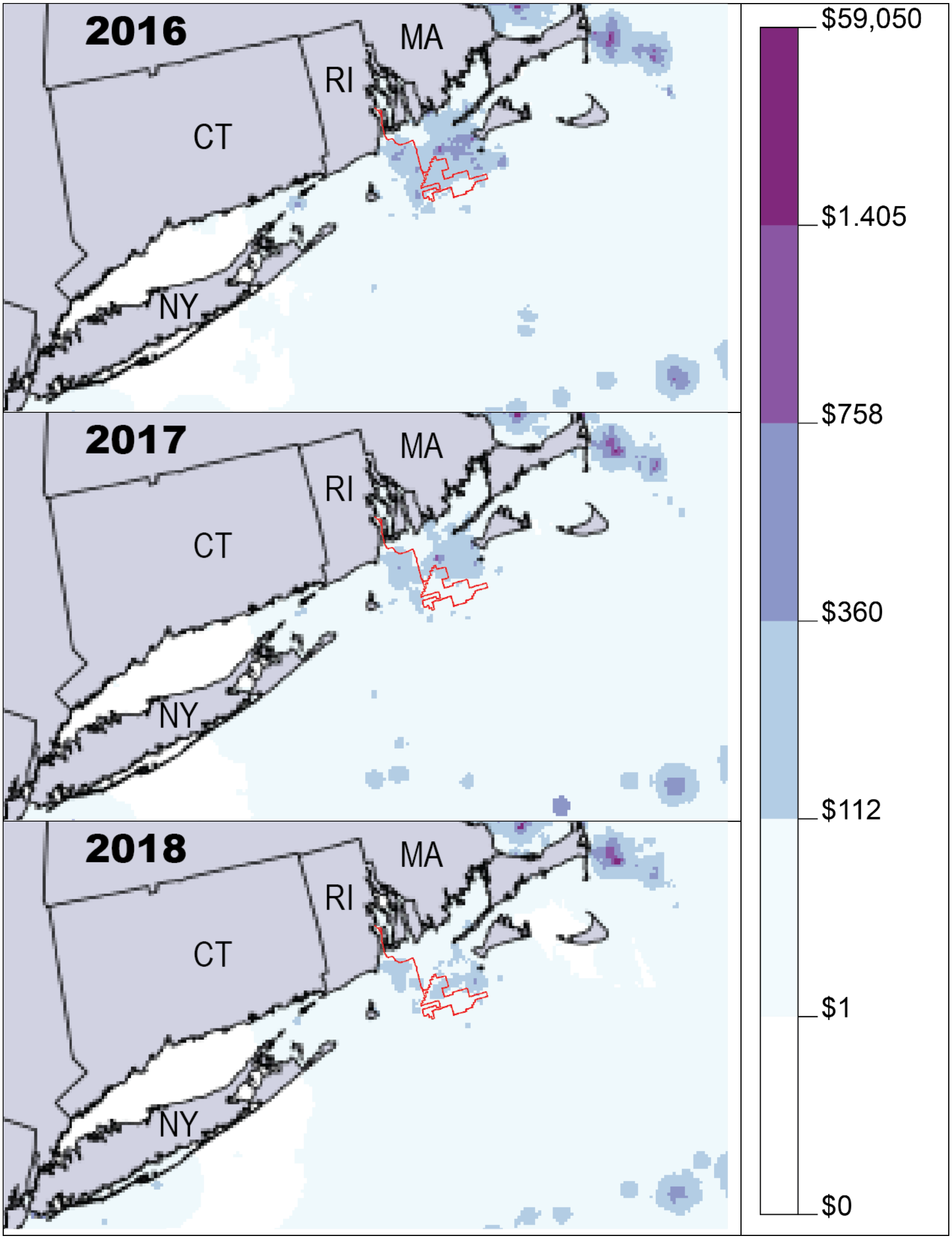


**Figure G-CF1. Revenue intensity for the American Lobster FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

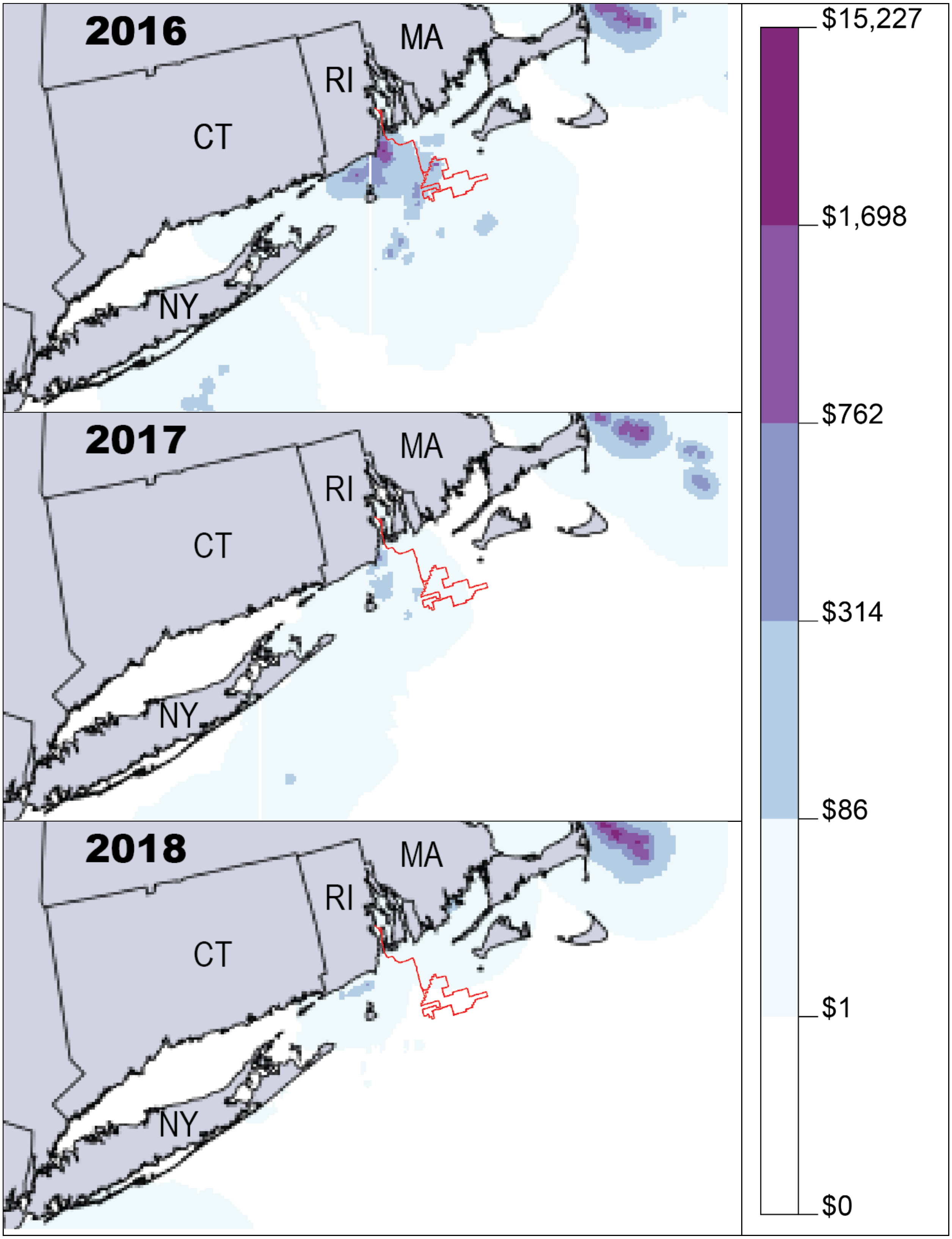


**Figure G-CF2. Revenue intensity for the Atlantic Herring FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

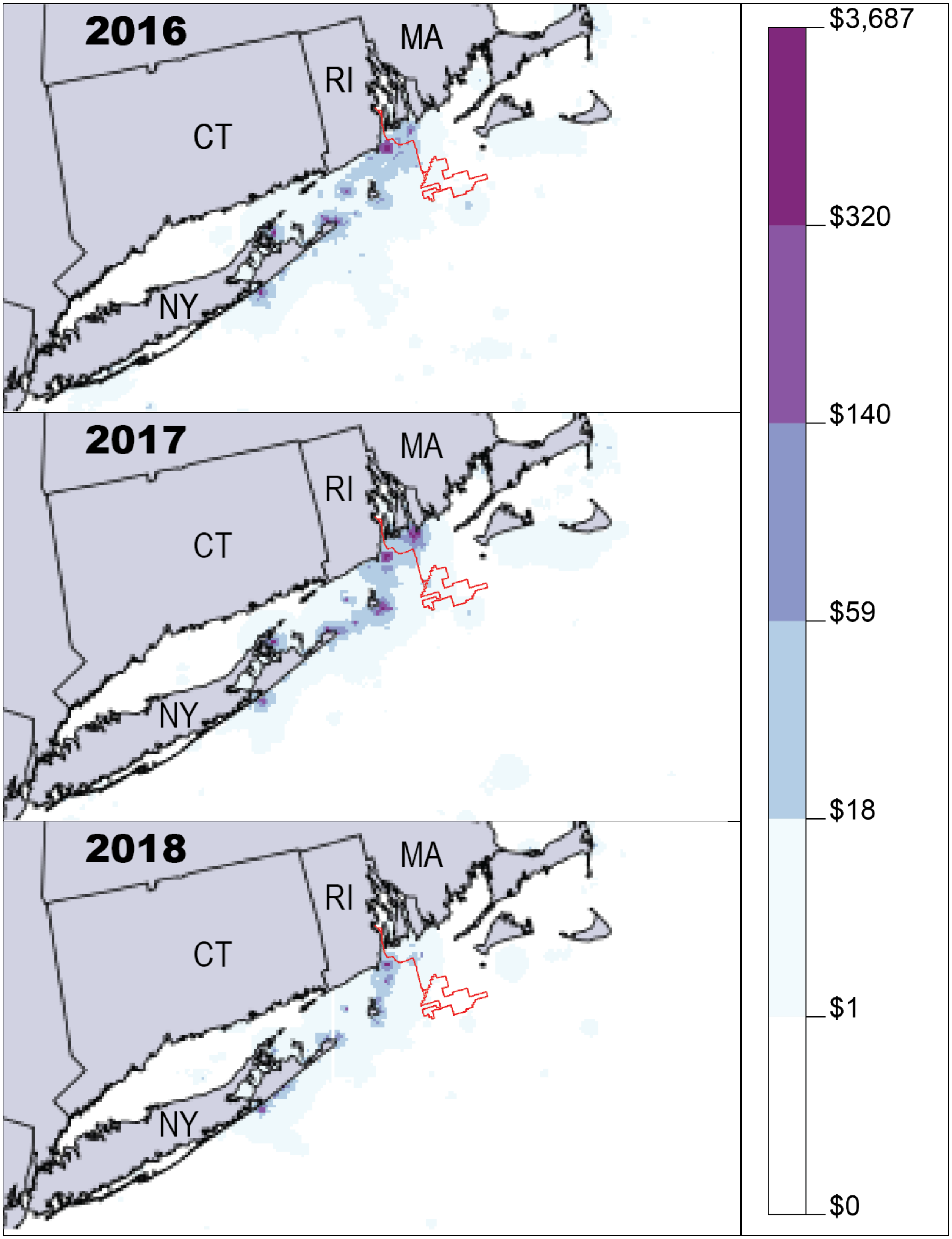


**Figure G-CF3. Revenue intensity for the Bluefish FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

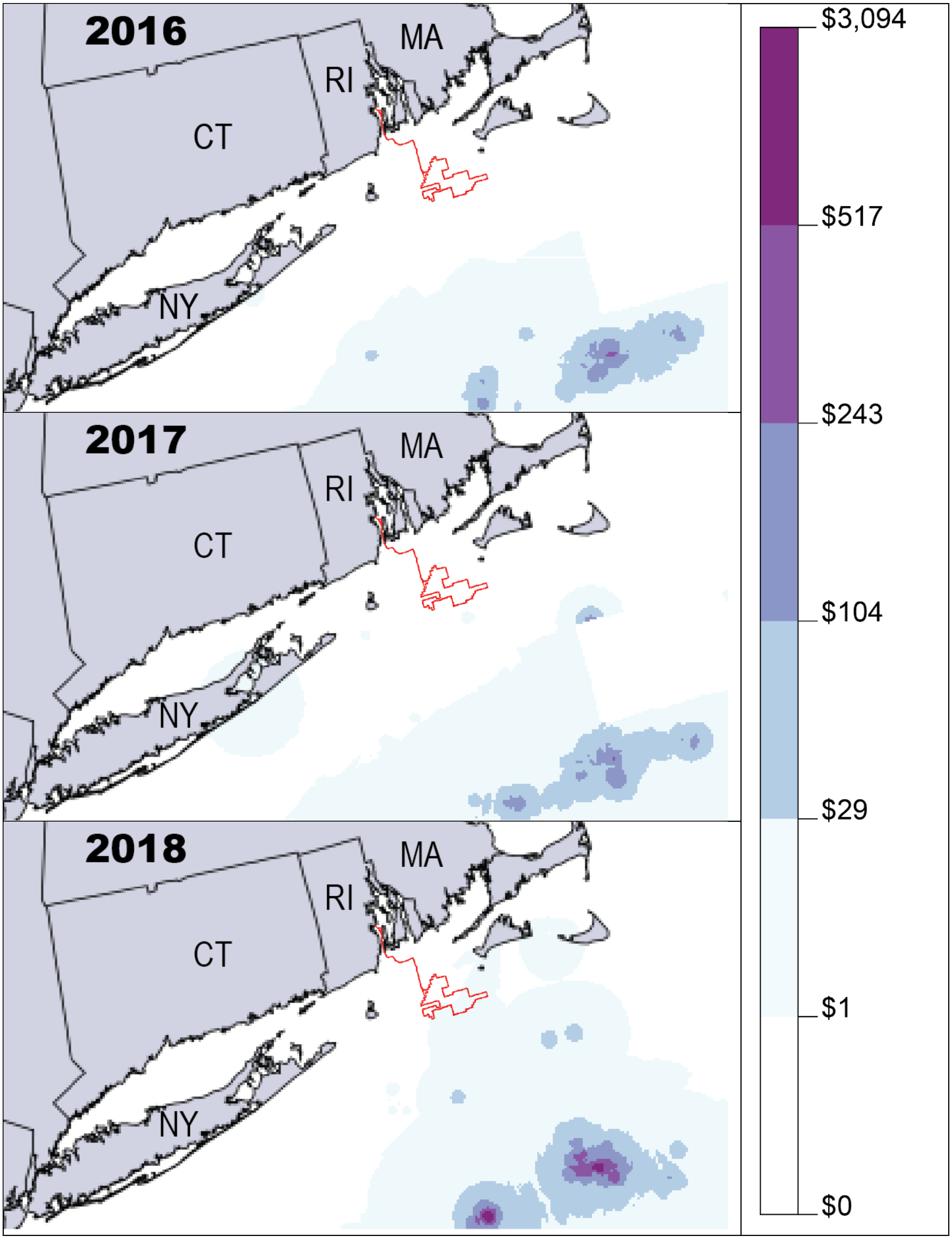


**Figure G-CF4. Revenue intensity for the Golden Tilefish FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

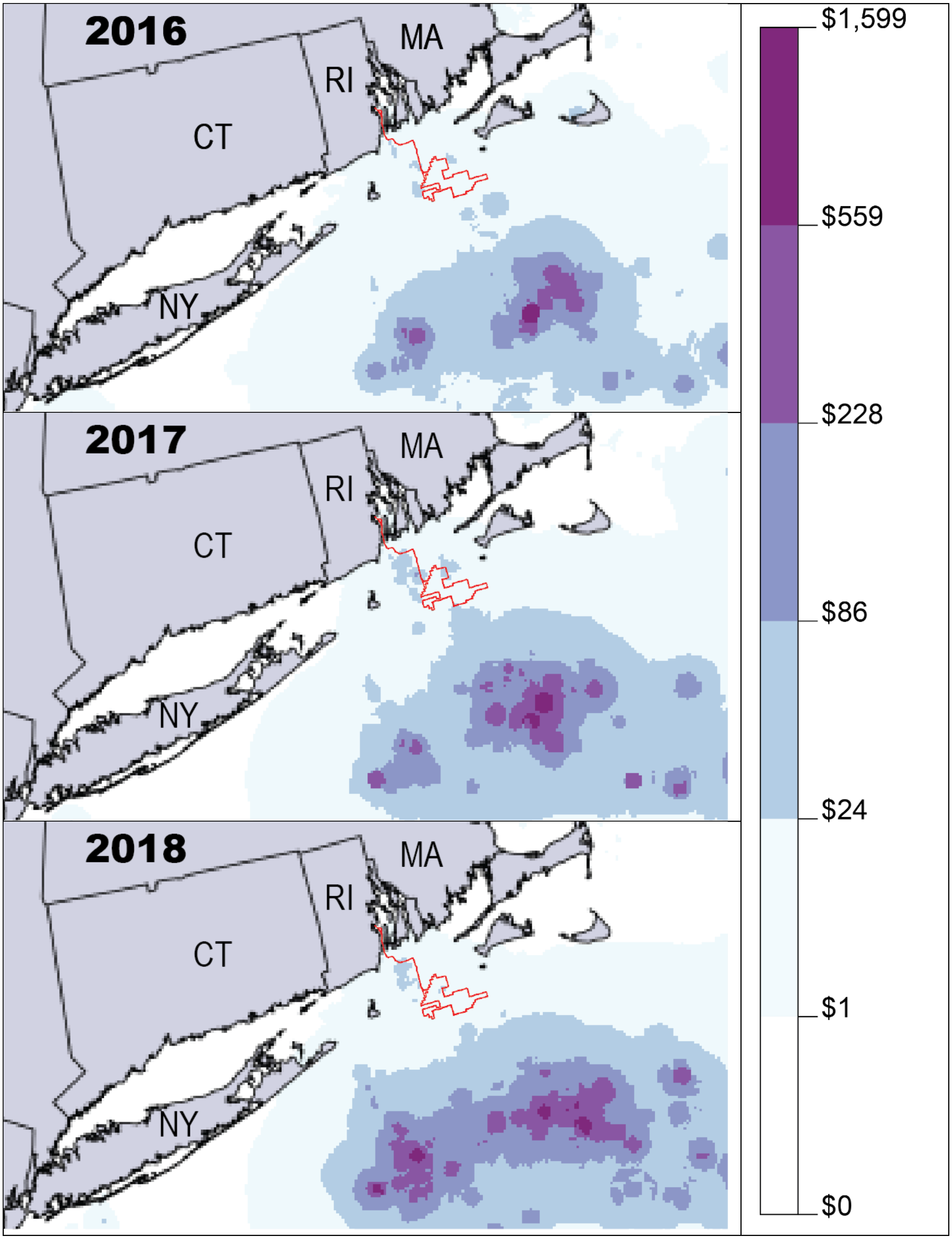


**Figure G-CF5. Revenue intensity for the Jonah Crab FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

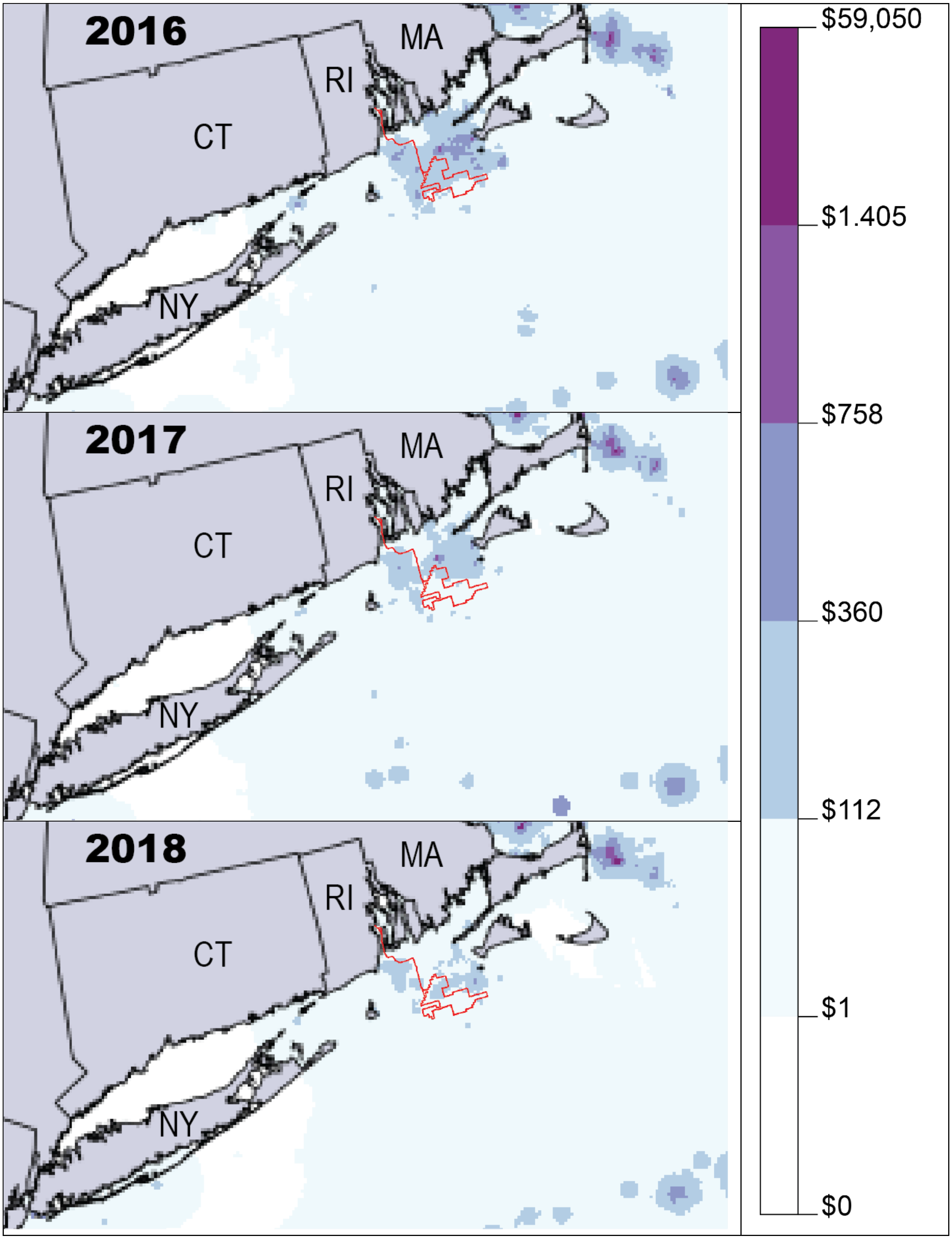


**Figure G-CF6. Revenue intensity for the Mackerel/Squid/Butterfish FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

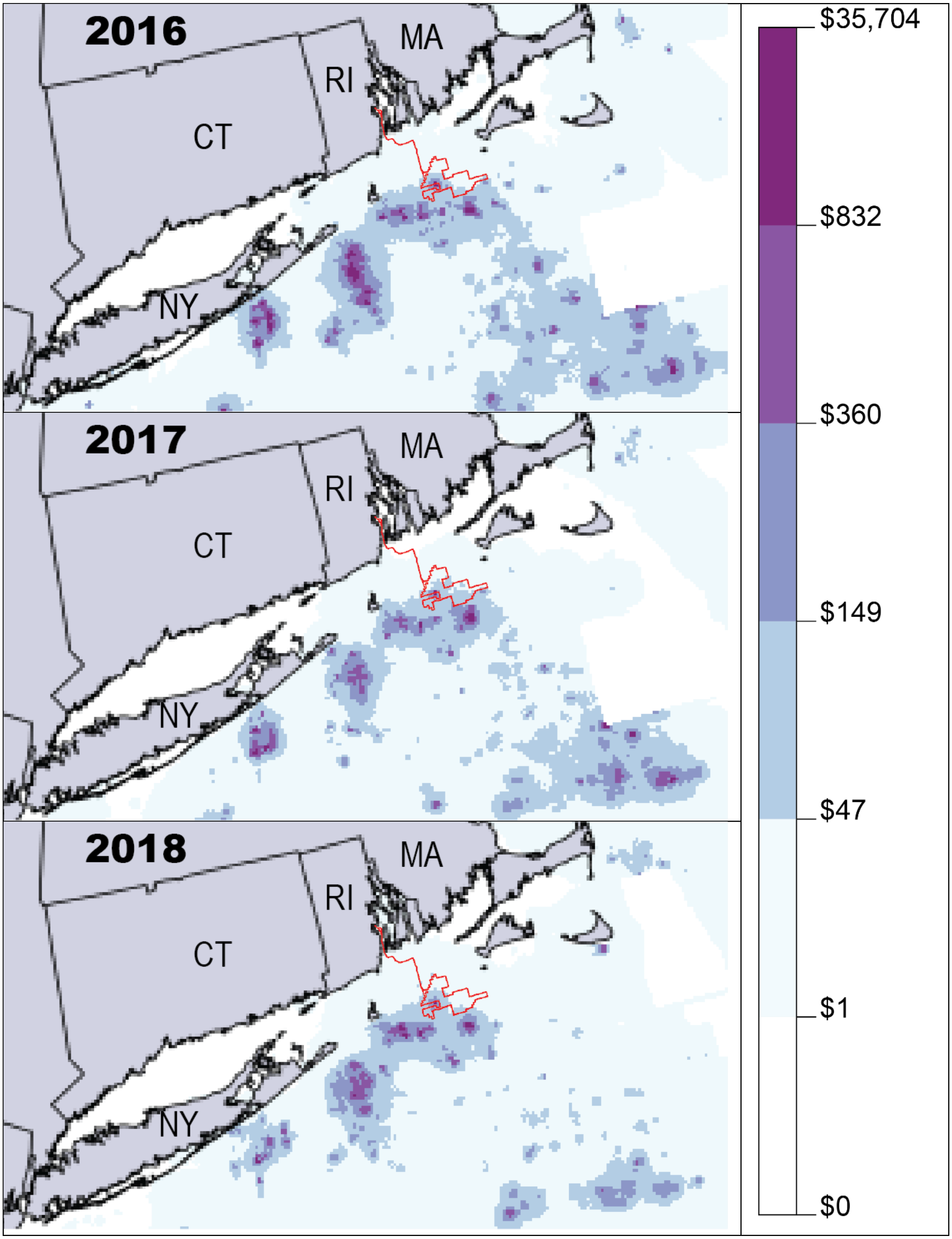


**Figure G-CF7. Revenue intensity for the Monkfish FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

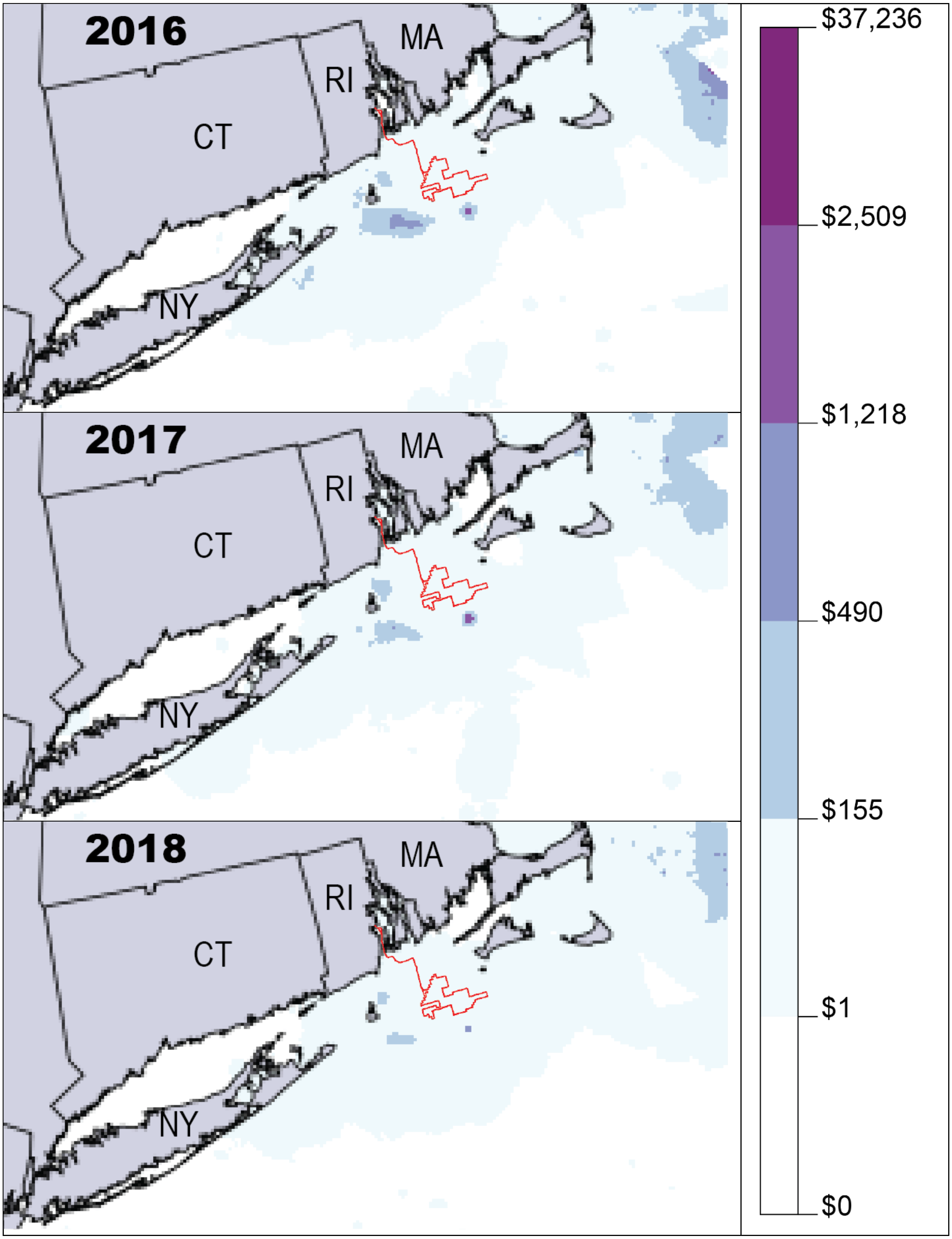


**Figure G-CF8. Revenue intensity for the Northeast Multispecies (large-mesh) FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

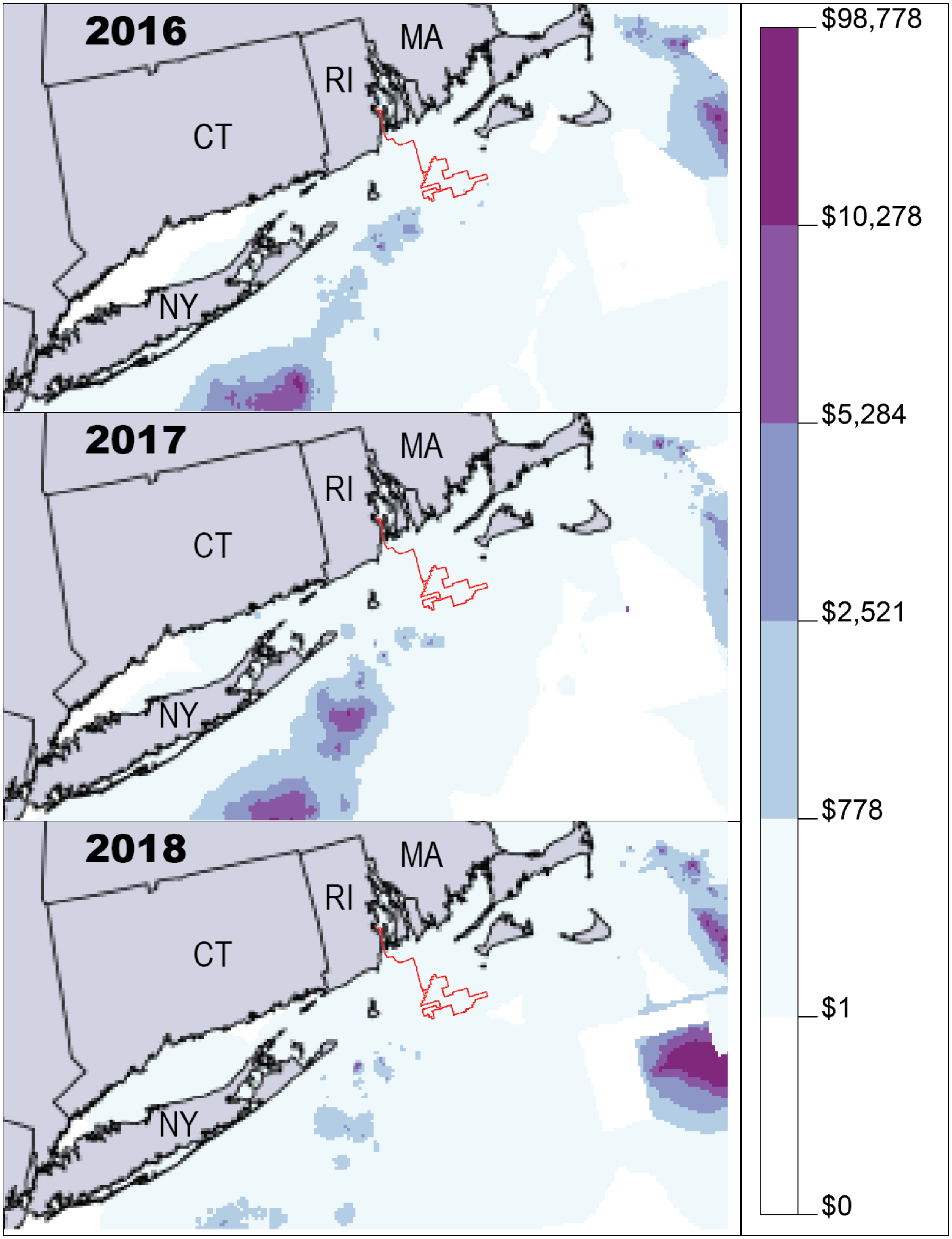


**Figure G-CF9. Revenue intensity for the Atlantic Sea Scallop FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

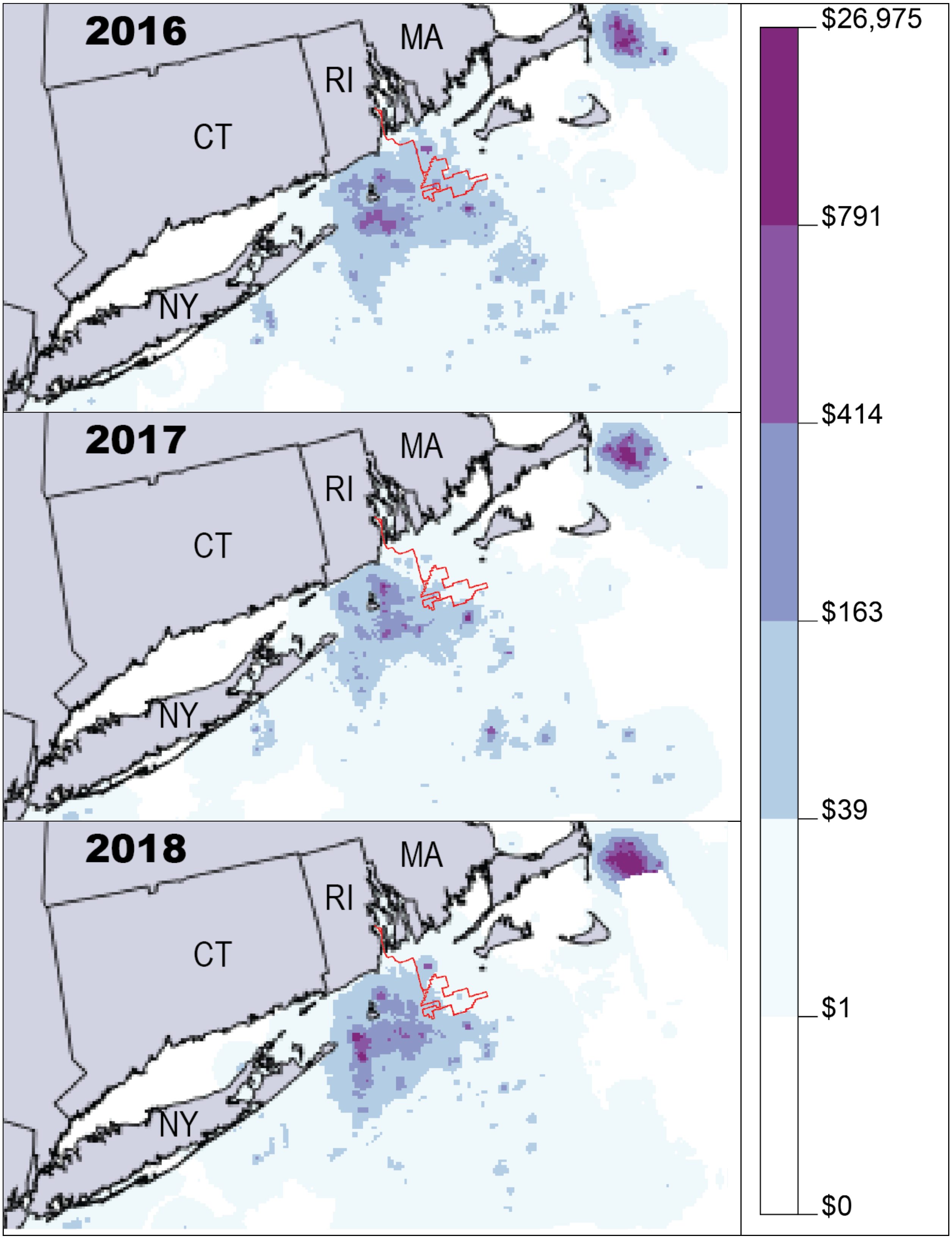


**Figure G-CF10. Revenue intensity for the Northeast Skate Complex FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

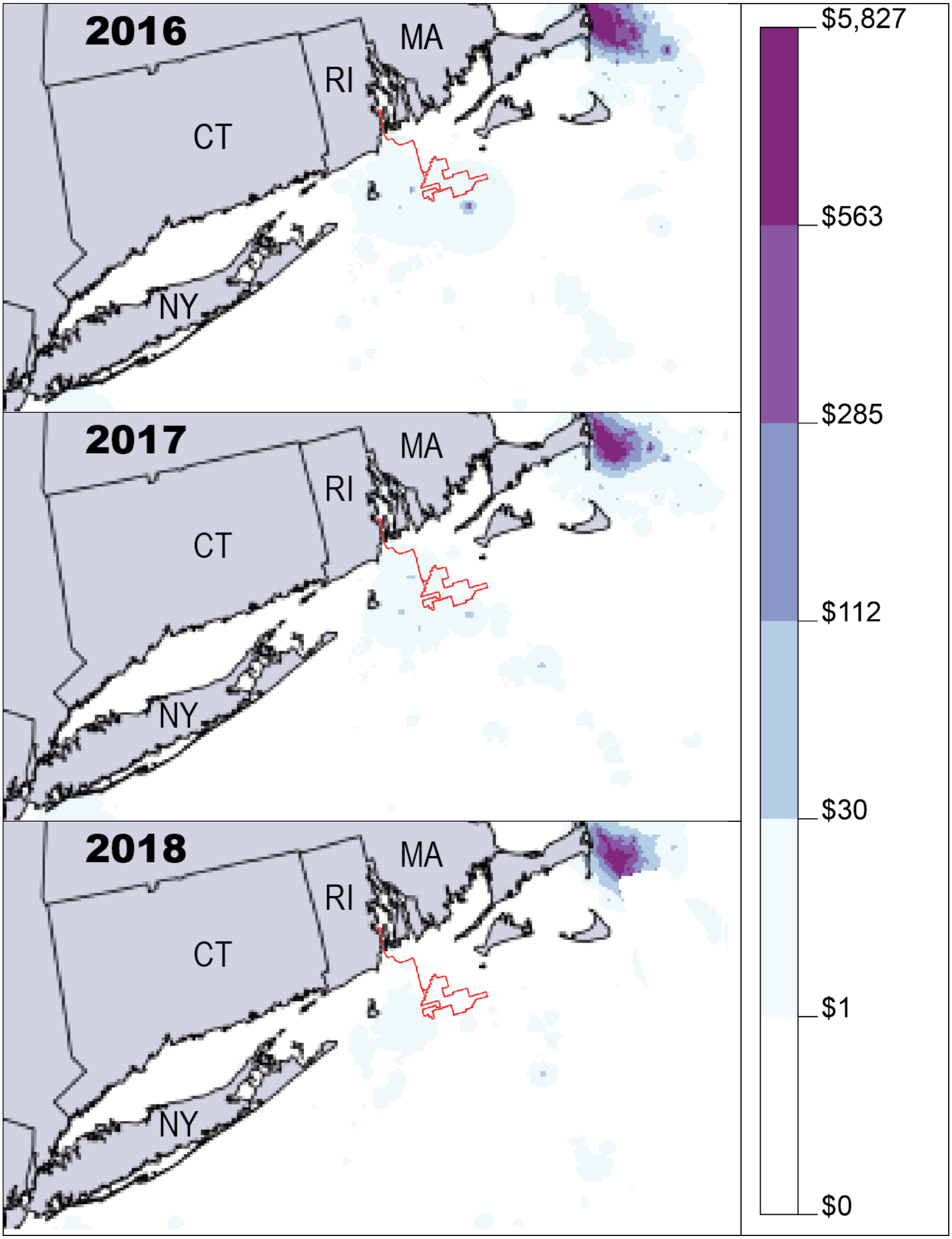


**Figure G-CF11. Revenue intensity for the Spiny Dogfish FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

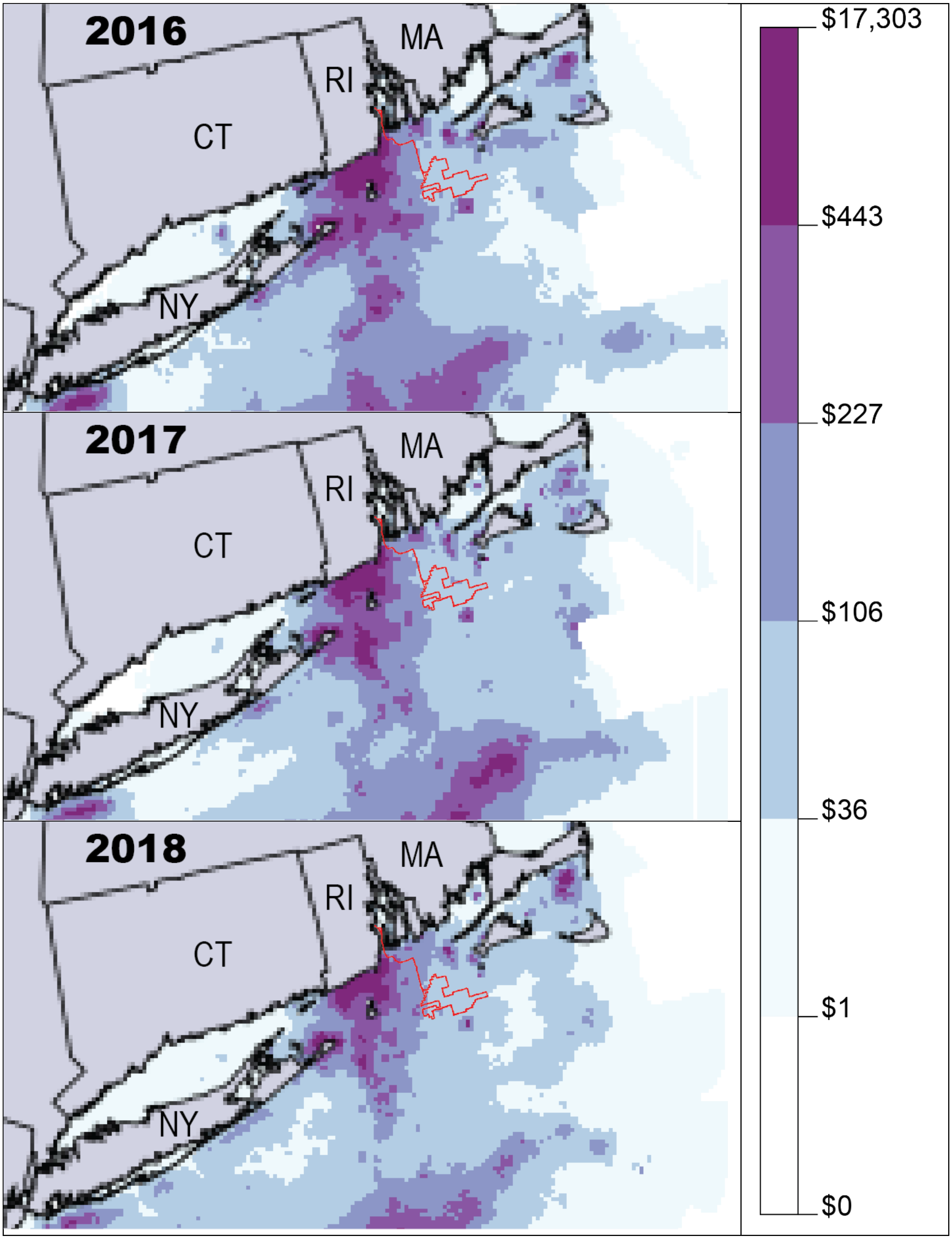


**Figure G-CF12. Revenue intensity for the Summer Flounder/Scup/Black Sea Bass FMP Fishery near the Lease Area, 2016–2018 (NMFS 2020b).**

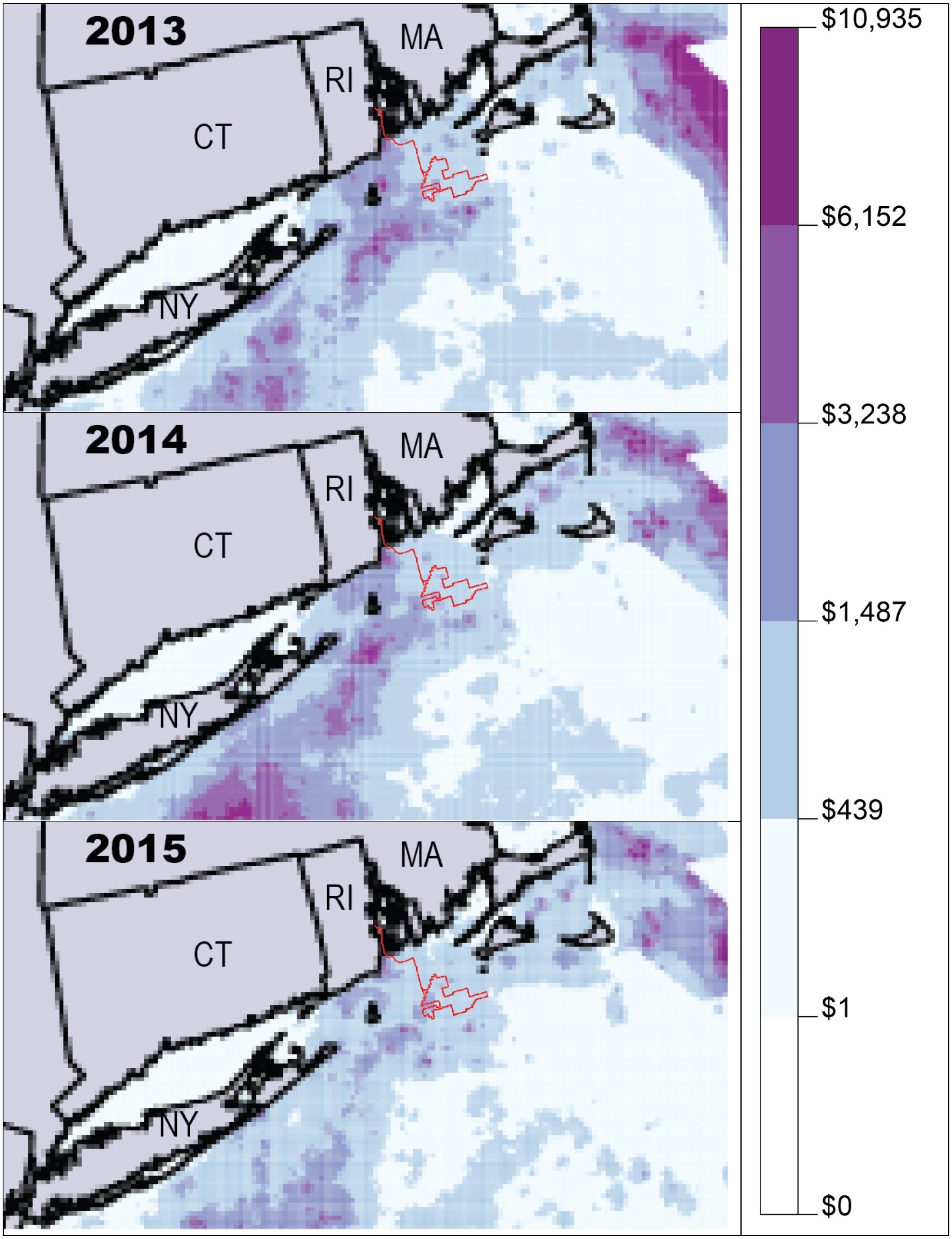


**Figure G-CF13. Revenue intensity for All Fisheries Combined near the Lease Area, 2013–2015 (NMFS 2020b).**

## Methodology Used to Estimate Annual Future Revenue at Risk as Reported in Table 3.9-27

This section explains the methodology used to develop EIS Table 3.9-27, which estimates the annual future revenue at risk by FMP for the 2022–2030 period for offshore wind projects that have already been completed (i.e., Coastal Virginia Offshore Wind), for offshore wind projects for which construction has started (South Fork and Vineyard Wind 1), and for offshore wind projects currently scheduled to begin construction in 2023 or later. The primary data source for each offshore wind energy project is *Landing and Revenue Data for Wind Energy Lease Areas, 2008-2021* (NMFS 2022b). Using these data, annual average revenue by FMP is estimated for each lease area after adjusting for inflation to 2019 dollars using the GDP Implicit Price Deflator embedded in the data.

Each future offshore wind project is then assigned a construction start year and a construction end year based on information in Table E-1 in Appendix E (Planned Activities Scenario and Reasonably Foreseeable Future Activities and Projects) augmented with the assumption that the six lease areas in the New York Bight (i.e. OCS-A_0537, OCS-A_0538, OCS-A_0539, OCS-A_0541, OCS-A_0542, OCS-A_0544) would begin a phased-in construction process over 4 years from 2026 to 2029 and would be operational in 2030.

If the construction start year and construction end year are the same years, then it is assumed that construction begins and ends in that year and that operation begins in the following year.

## Analysis of the Economic Dependency on Fishing Grounds in the Lease Area among Commercial Fishing Vessels

To analyze differences in the economic importance of fishing grounds in the Lease Area across the commercial fishing fleet, information was obtained from NMFS (2021b) on the number of federally permitted commercial fishing vessels that fished annually in the Lease Area over the 2008–2019 period, together with box plot figure summarizing the relative dependence of these vessels during that period.

The vessel-level annual revenue percentages were divided into quartiles, which were created by ordering the data from lowest to highest percentage value and then dividing the data into four groups of equal size. The first quartile represents the lowest 25% of ranked percentages while the fourth quartile represents the highest 25%. NMFS (2021b) reported the number of "outlier" vessels in the revenue distribution as a percentage of revenue. In the context of this analysis, an outlier is a vessel that derived an exceptionally high proportion of its annual revenue from the Lease Area in comparison to other vessels that fished in the area.[5]

As shown in Table G-CF2, from 2008 through 2019, an average of 288 vessels per year fished in the Lease Area, with a high of 331 vessels in 2008 and a low of 251 vessels in 2018. The average annual number of outliers was 40.5 (14% of all vessels), with a high of 47 outliers in 2016 (14.6% of all vessels) and a low of 31 outliers in 2019 (11.8% of all vessels).

[5] Technically, an outlier in a box plot distribution is an observation that is more than 1.5 times the length of the box away from either the first quartile (Q1) or third quartile (Q3). Specifically, if an observation is less than Q1 – (1.5 × IQR) or greater than Q3 + (1.5 × IQR), it is an outlier; where IQR = interquartile range = Q3 – Q1.

**Table G-CF2. Number of Federally Permitted Vessels in the Lease Area (2008–2019)**

| Year | Number of Vessels | Number of Outliers | Number of Outliers as a Percentage of Total Vessels |
|---|---|---|---|
| 2008 | 331 | 46 | 13.9% |
| 2009 | 308 | 43 | 14.0% |
| 2010 | 253 | 35 | 13.8% |
| 2011 | 262 | 31 | 11.8% |
| 2012 | 282 | 40 | 14.2% |
| 2013 | 308 | 41 | 13.3% |
| 2014 | 308 | 46 | 14.9% |
| 2015 | 296 | 40 | 13.5% |
| 2016 | 322 | 47 | 14.6% |
| 2017 | 284 | 40 | 14.1% |
| 2018 | 251 | 35 | 13.9% |
| 2019 | 261 | 42 | 16.1% |
| Average | 288 | 40 | 14.0% |

Source: NMFS (2021b).

More detailed information about the distribution of the vessel-level annual revenue percentages is provided in the boxplot in Figure G-CF14. The box plot begins at the first quartile, or the value beneath which 25% of all vessel-level revenue percentages fall. A thick line within the box identifies the median, the observation at which 50% of vessel-level revenue percentages are above or beneath. The box ends at the third quartile, or the vessel-level revenue percentage beneath which 75% of observations fall. Nonparametric estimates of the minimum and maximum values are also indicated by the "whiskers" (dashed line terminating in a vertical line) that jut out from each side of the box. Any points outside of these whiskers are vessel-level revenue percentages that are considered outliers.

From 2008 through 2019, the vessel ranked as the seventy-fifth percentile vessel (i.e., the vessel in the third quartile with the greatest dependence on the Lease Area over the 12-year period) derived 0.88% of its total revenue from the Lease Area (NMFS 2021b). Of the outliers, the vessel with the greatest dependence on the Lease Area derived 38% of its total revenue from the area. Looking at individual years shown in the box plot, in 2008, one vessel derived nearly 60% of its total revenue from the Lease Area. In that same year, the vessel with the greatest percentage of dependence in the third quartile generated approximately 2.2% of its revenue from the Lease Area. Figure G-CF14 shows that in any given year the revenue percentage for the majority of outliers were below 10%.

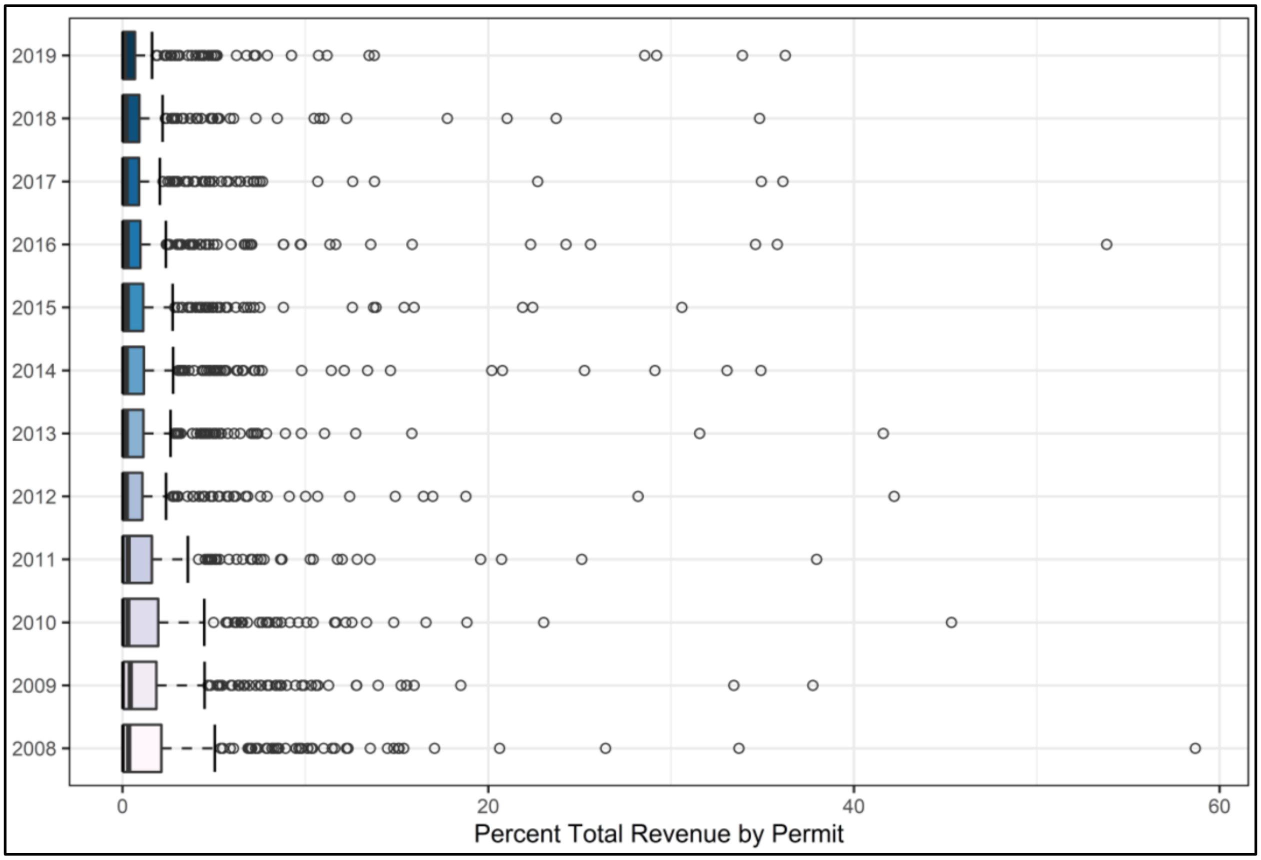


**Figure G-CF14. Percentage of Total Commercial Fishing Revenue of Federally Permitted Vessels Derived from the Lease Area by Vessel, 2008–2019 (NMFS 2021b).**

It is important to note that the box plot data do not provide any information about total revenues, or if there are correlations between the relative dependence on the Lease Area and total revenue of the individual vessel. To undertake this additional analysis, data would need to be requested from NMFS that would indicate the total revenue for each quartile/outlier group from within the Lease Area (i.e., the average numerator) as well as the total revenue from all areas fished (i.e., average denominator) for each quartile/outlier group.

### State Vessel Trip Report Data

This section reports the landings of Rhode Island state-only permitted vessels that fished in Greater Atlantic Region Statistical Area 539, which is the statistical area most relevant to the RWEC. Landings data are reported by species, gear type, and port of landing.

**Table G-CF3. Commercial Fishing Landings of Rhode Island State-only Permitted Vessels in Statistical Area 539 by Species (2009–2018)**

| Species | Average Annual Landings (pounds) |
|---|---|
| American lobster | 33,533 |
| Atlantic bonito | 5,042 |

| **Species** | **Average Annual Landings (pounds)** |
|---|---|
| Atlantic herring | 8,839 |
| Atlantic mackerel | 1,255 |
| Black sea bass | 78,100 |
| Bluefish | 37,926 |
| Butterfish | 27,976 |
| Cod | 3,892 |
| Conchs and welks | 355,805 |
| Conger eel | 6,258 |
| Jonah crab | 6,072 |
| *Loligo* squid | 26,792 |
| Menhaden | 200,245 |
| Monkfish (goosefish) | 1,672 |
| Other crab | 43,442 |
| Red hake | 1,361 |
| Rock crab | 21,194 |
| Scup | 781,887 |
| Sea robins (all species) | 47,177 |
| Silver hake | 2,378 |
| Skates (all species) | 120,571 |
| Spiny dogfish | 4,144 |
| Striped bass | 119,233 |
| Summer flounder | 223,629 |
| Tautog | 26,099 |
| Tuna, little tunny | 9,347 |
| Winter flounder | 5,354 |
| Yellowtail flounder | 16 |
| All other species | 21,907 |
| **Total** | **2,221,145** |

Source: Developed using data from INSPIRE Environmental (2021).

Notes: Original source of data was the Atlantic Coastal Cooperative Statistics Program. Confidential information was redacted from this dataset.

**Table G-CF4. Commercial Fishing Landings of Rhode Island State-only Permitted Vessels in Statistical Area 539 by Gear (2009–2018)**

| Gear Type | Average Annual Landings (pounds) |
|---|---|
| By hand, diving gear | 4,276 |
| By hand, no diving gear | 36,608 |
| Dip nets | 6,293 |
| Dredge | 52 |
| Gill nets | 162,310 |
| Hand line | 1,794 |
| Hook and line | 388,116 |
| Long lines | 1,316 |
| Other fixed nets | 432,516 |
| Other trawls | 19,593 |
| Otter trawls | 259,353 |
| Pots and traps, lobster | 52,645 |
| Pots and traps, other | 12,824 |
| Pots and traps | 681,343 |
| Rakes | 3,241 |
| Spears | 2,574 |
| **Total** | **2,064,851** |

Source: Developed using data from INSPIRE Environmental (2021).

Notes: Original source of data was the Atlantic Coastal Cooperative Statistics Program. Confidential information was redacted from this dataset.

**Table G-CF5. Commercial Fishing Landings of Rhode Island State-only Permitted Vessels in Statistical Area 539 by Port (2009–2018)**

| Port | Total Active Fishing Permits with Landings | Average Annual Landings (pounds) |
|---|---|---|
| Barrington | 5,251 | 12 |
| Bristol | 196,716 | 61 |
| Bristol (County) | 329 | 5 |
| Charlestown | 26,190 | 38 |
| Davisville | 248 | 6 |
| East Greenwich | 7,056 | 35 |
| Jamestown | 24,367 | 32 |

| Port | Total Active Fishing Permits with Landings | Average Annual Landings (pounds) |
|---|---|---|
| Little Compton | 605,416 | 51 |
| Middletown | 2,183 | 3 |
| Narragansett | 381 | 6 |
| New Shoreham | 2,170 | 9 |
| Newport | 426,256 | 80 |
| Newport (County) | 11,869 | 4 |
| North Kingstown | 145,080 | 97 |
| Point Judith | 672,982 | 459 |
| Portsmouth | 82,392 | 37 |
| Providence | 27,182 | 13 |
| Providence (County) | 2,289 | 10 |
| South Kingstown | 19,535 | 69 |
| Tiverton | 106,842 | 49 |
| Unknown | 35,798 | 64 |
| Wakefield | 3,306 | 21 |
| Warren | 26,374 | 38 |
| Warwick | 144,786 | 97 |
| Westerly | 57,985 | 78 |
| **Total** | **Not available** | **2,217,507** |

Source: Developed using data from INSPIRE Environmental (2021).

Notes: Original source of data was the Atlantic Coastal Cooperative Statistics Program. Confidential information was redacted from this dataset.

## Number of Affected Vessels and Trips in the Combined Lease Area and Offshore RWEC by FMP Fishery, Species, Port, and Gear under Alternatives B, C, E2, and G

This section provides estimates of the average annual number of vessels and trips in the combined Lease Area and area along the offshore RWEC that would be affected during construction under Alternatives B, C, E2, and G. Data are reported by FMP fishery, gear type, and port of landing. The estimates are based on 2008 through 2019 data from NMFS (2021a, 2022a, 2023). Vessel and trip data for all design configurations of Alternative D and for Alternative E1 could not be provided because the data were provided separately for the Lease Area and RWEC. Combining data for the two areas could result in double counting. Vessel and trip data for Alternative F could not be provided because which WTG positions would be omitted under this alternative is unknown.

## Alternative B

### *FMP Fishery*

**Table G-CF6. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by FMP Fishery under Alternative B**

| FMP Fishery | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| American Lobster | 113 | 2,862 | 38% | 51% |
| Atlantic Herring | 24 | 172 | 40% | 36% |
| Bluefish | 132 | 1,806 | 36% | 30% |
| Highly Migratory Species | 34 | 248 | 26% | 14% |
| Jonah Crab | 52 | 996 | 52% | 51% |
| Mackerel/Squid/ Butterfish | 120 | 2,638 | 43% | 33% |
| Monkfish | 163 | 2,134 | 32% | 25% |
| Northeast Multispecies (large-mesh) | 103 | 1,177 | 38% | 38% |
| Northeast Multispecies (small-mesh) | 102 | 1,668 | 47% | 34% |
| Atlantic Sea Scallop | 58 | 407 | 16% | 14% |
| Southeast Regional Office FMPs | 184 | 3,731 | 40% | 33% |
| Northeast Skate Complex | 130 | 2,431 | 42% | 32% |
| Spiny Dogfish | 56 | 482 | 39% | 35% |
| Summer Flounder/Scup/ Black Sea Bass | 162 | 3,701 | 40% | 31% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Total over all FMP fisheries cannot be estimated with the available data.

### *Species*

**Table G-CF7. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Species under Alternative B**

| Species | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| American lobster | 113 | 2,862 | 38% | 51% |
| Atlantic herring | 24 | 172 | 40% | 36% |
| Atlantic mackerel | 60 | 316 | 40% | 29% |
| Black sea bass | 156 | 1,945 | 39% | 31% |
| Bluefish | 132 | 1,806 | 36% | 30% |
| Butterfish | 91 | 1,750 | 53% | 37% |
| Cod | 76 | 554 | 39% | 39% |
| Jonah crab | 52 | 996 | 52% | 51% |
| *Loligo* squid | 108 | 2,482 | 46% | 33% |
| Monkfish | 163 | 2,132 | 32% | 25% |
| Red hake | 82 | 1,170 | 52% | 36% |
| Rock crab | 22 | 447 | 56% | 74% |
| Scup | 156 | 3,140 | 42% | 36% |
| Sea scallops | 58 | 407 | 16% | 14% |
| Silver hake | 90 | 1,507 | 50% | 36% |
| Skates | 130 | 2,430 | 42% | 32% |
| Spiny dogfish | 56 | 482 | 39% | 35% |
| Summer flounder | 162 | 3,701 | 40% | 31% |
| Winter flounder | 65 | 846 | 46% | 47% |
| Yellowtail flounder | 59 | 502 | 45% | 45% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

### *Port*

**Table G-CF8. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Port under Alternative B**

| Port and State | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Beaufort, NC (5 of 12 years)* | *10.6* | *13* | *37%* | *28%* |
| Chilmark/Menemsha, MA | 13.4 | 359 | 88% | 89% |
| *Fairhaven, MA (10 of 12 years)* | *5.5* | *43* | *41%* | *26%* |
| *Fall River, MA (5 of 12 years)* | *5.2* | *57* | *92%* | *88%* |
| *Hampton, VA (6 of 12 years)* | *10.2* | *15* | *26%* | *18%* |
| Little Compton, RI | 16.5 | 874 | 93% | 86% |
| Montauk, NY | 26.8 | 161 | 24% | 3% |
| New Bedford, MA | 78.5 | 873 | 28% | 33% |
| *New London, CT (7 of 12 years)* | *4.9* | *39* | *29%* | *8%* |
| *Newport News, VA (5 of 12 years)* | *9.0* | *12* | *23%* | *16%* |
| Newport, RI | 15.5 | 580 | 75% | 80% |
| Point Judith, RI | 126.5 | 4,846 | 78% | 66% |
| *Point Pleasant Beach, NJ (7 of 12 years)* | *10.0* | *20* | *13%* | *2%* |
| Stonington, CT | 11.3 | 49 | 50% | 7% |
| *Tiverton, RI (10 of 12 years)* | *5.0* | *92* | *81%* | *52%* |
| Westport, MA | 12.6 | 255 | 77% | 63% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Rows using italicized font indicated that fewer the 12 years of data were available. State-level estimates for vessels and trips cannot be estimated with the available data.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

### Gear

**Table G-CF9. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Gear Type under Alternative B (2009–2018)**

| Gear | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Dredge-clam (7 of 12 years)* | *6* | *112* | *20%* | *8%* |
| Dredge-scallop | 34 | 260 | 11% | 16% |
| Gillnet-sink | 45 | 1,143 | 38% | 30% |
| Handline | 41 | 333 | 21% | 10% |
| *Longline-bottom (4 of 12 years)* | *3* | *9* | *16%* | *4%* |
| Pot-lobster† | 75 | 2,600 | 53% | 54% |
| Pot-other† | 31 | 653 | 43% | 28% |
| Trawl-bottom | 133 | 3,646 | 40% | 30% |
| *Trawl-midwater (10 of 12 years)* | *11* | *57* | *68%* | *37%* |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Rows using italicized font indicated that fewer the 12 years of data were available. Totals over all gears cannot be estimated with the available data.

†Pot gear has been disaggregated to Pot-Lobster and Pot-Other.

## Alternative C

### FMP Fishery

**Table G-CF10. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by FMP Fishery under Alternative C1**

| FMP Fishery | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| American Lobster | 113 | 2,862 | 38% | 51% |
| Atlantic Herring | 24 | 172 | 40% | 36% |
| Bluefish | 132 | 1,806 | 36% | 30% |
| Highly Migratory Species | 34 | 248 | 26% | 14% |
| Jonah Crab | 52 | 996 | 52% | 51% |

| FMP Fishery | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| Mackerel/Squid/ Butterfish | 120 | 2,637 | 43% | 33% |
| Monkfish | 163 | 2,133 | 32% | 25% |
| Northeast Multispecies (large-mesh) | 103 | 1,177 | 38% | 38% |
| Northeast Multispecies (small-mesh) | 102 | 1,667 | 47% | 34% |
| Atlantic Sea Scallop | 58 | 406 | 16% | 14% |
| Southeast Regional Office FMPs | 184 | 3,727 | 40% | 33% |
| Northeast Skate Complex | 130 | 2,429 | 42% | 32% |
| Spiny Dogfish | 56 | 480 | 39% | 35% |
| Summer Flounder/Scup/ Black Sea Bass | 162 | 3,695 | 40% | 31% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Total over all FMP fisheries cannot be estimated with the available data.

**Table G-Table G-CF11. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by FMP Fishery under Alternative C2**

| FMP Fishery | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| American Lobster | 113 | 2,862 | 38% | 51% |
| Atlantic Herring | 24 | 172 | 40% | 36% |
| Bluefish | 132 | 1,806 | 36% | 30% |
| Highly Migratory Species | 34 | 248 | 26% | 14% |
| Jonah Crab | 52 | 996 | 52% | 51% |
| Mackerel/Squid/ Butterfish | 120 | 2,637 | 43% | 33% |

| FMP Fishery | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| Monkfish | 163 | 2,133 | 32% | 25% |
| Northeast Multispecies (large-mesh) | 103 | 1,177 | 38% | 38% |
| Northeast Multispecies (small-mesh) | 102 | 1,667 | 47% | 34% |
| Atlantic Sea Scallop | 58 | 406 | 16% | 14% |
| Southeast Regional Office FMPs | 184 | 3,727 | 40% | 33% |
| Northeast Skate Complex | 130 | 2,429 | 42% | 32% |
| Spiny Dogfish | 56 | 480 | 39% | 35% |
| Summer Flounder/Scup/ Black Sea Bass | 162 | 3,695 | 40% | 31% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Total over all FMP fisheries cannot be estimated with the available data.

### *Species*

**Table G-CF12. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Species under Alternative C1**

| Species | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| American lobster | 113 | 2,862 | 38% | 51% |
| Atlantic herring | 24 | 172 | 40% | 36% |
| Atlantic mackerel | 60 | 316 | 40% | 29% |
| Black sea bass | 156 | 1,944 | 39% | 31% |
| Bluefish | 132 | 1,806 | 36% | 30% |
| Butterfish | 91 | 1,750 | 53% | 37% |
| Cod | 76 | 554 | 39% | 39% |
| Jonah crab | 52 | 996 | 52% | 51% |

| Species | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Loligo* squid | 108 | 2,481 | 46% | 33% |
| Monkfish | 163 | 2,131 | 32% | 25% |
| Red hake | 82 | 1,170 | 52% | 35% |
| Rock crab | 22 | 447 | 56% | 74% |
| Scup | 156 | 3,137 | 42% | 36% |
| Sea scallops | 58 | 406 | 16% | 14% |
| Silver hake | 90 | 1,506 | 50% | 36% |
| Skates | 130 | 2,428 | 42% | 32% |
| Spiny dogfish | 56 | 480 | 39% | 35% |
| Summer flounder | 162 | 3,695 | 40% | 31% |
| Winter flounder | 65 | 845 | 46% | 47% |
| Yellowtail flounder | 59 | 502 | 45% | 45% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

**Table G-CF13. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Species under Alternative C2**

| Species | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| American lobster | 113 | 2,862 | 38% | 51% |
| Atlantic herring | 24 | 172 | 40% | 36% |
| Atlantic mackerel | 60 | 316 | 40% | 29% |
| Black sea bass | 156 | 1,944 | 39% | 31% |
| Bluefish | 132 | 1,806 | 36% | 30% |
| Butterfish | 91 | 1,750 | 53% | 37% |
| Cod | 76 | 554 | 39% | 39% |
| Jonah crab | 52 | 996 | 52% | 51% |
| *Loligo* squid | 108 | 2,481 | 46% | 33% |
| Monkfish | 163 | 2,131 | 32% | 25% |
| Red hake | 82 | 1,170 | 52% | 35% |
| Rock crab | 22 | 447 | 56% | 74% |

| Species | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| Scup | 156 | 3,137 | 42% | 36% |
| Sea scallops | 58 | 406 | 16% | 14% |
| Silver hake | 90 | 1,506 | 50% | 36% |
| Skates | 130 | 2,428 | 42% | 32% |
| Spiny dogfish | 56 | 480 | 39% | 35% |
| Summer flounder | 162 | 3,695 | 40% | 31% |
| Winter flounder | 65 | 845 | 46% | 47% |
| Yellowtail flounder | 59 | 502 | 45% | 45% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

### *Port*

**Table G-CF14. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Port under Alternative C1**

| Port and State | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Beaufort, NC (5 of 12 years)* | *10.6* | *13* | *37%* | *28%* |
| Chilmark/Menemsha, MA | 13.4 | 356 | 88% | 88% |
| *Fairhaven, MA (10 of 12 years)* | *5.5* | *43* | *41%* | *26%* |
| *Fall River, MA (5 of 12 years)* | *5.2* | *57* | *92%* | *88%* |
| *Hampton, VA (6 of 12 years)* | *10.2* | *15* | *26%* | *18%* |
| Little Compton, RI | 16.5 | 874 | 93% | 86% |
| Montauk, NY | 26.8 | 161 | 24% | 3% |
| New Bedford, MA | 78.4 | 870 | 28% | 33% |
| *New London, CT (7 of 12 years)* | *4.9* | *39* | *29%* | *8%* |
| *Newport News, VA (5 of 12 years)* | *9.0* | *12* | *23%* | *16%* |

| Port and State | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| Newport, RI | 15.5 | 580 | 75% | 80% |
| Point Judith, RI | 126.4 | 4,845 | 78% | 66% |
| *Point Pleasant Beach, NJ (7 of 12 years)* | *10.0* | *20* | *13%* | *2%* |
| Stonington, CT | 11.3 | 49 | 50% | 7% |
| *Tiverton, RI (10 of 12 years)* | *5.0* | *92* | *81%* | *52%* |
| Westport, MA | 12.6 | 255 | 77% | 63% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Rows using italicized font indicated that fewer the 12 years of data were available. State-level estimates for vessels and trips cannot be estimated with the available data.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

**Table G-CF15. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Port under Alternative C2**

| Port and State | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Beaufort, NC (5 of 12 years)* | *10.6* | *13* | *37%* | *28%* |
| Chilmark/Menemsha, MA | 13.4 | 356 | 88% | 88% |
| *Fairhaven, MA (10 of 12 years)* | *5.5* | *43* | *41%* | *26%* |
| *Fall River, MA (5 of 12 years)* | *5.2* | *57* | *92%* | *88%* |
| *Hampton, VA (6 of 12 years)* | *10.2* | *15* | *26%* | *18%* |
| Little Compton, RI | 16.5 | 874 | 93% | 86% |
| Montauk, NY | 26.8 | 161 | 24% | 3% |
| New Bedford, MA | 78.4 | 870 | 28% | 33% |
| *New London, CT (7 of 12 years)* | *4.9* | *39* | *29%* | *8%* |
| *Newport News, VA (5 of 12 years)* | *9.0* | *12* | *23%* | *16%* |

| Port and State | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| Newport, RI | 15.5 | 580 | 75% | 80% |
| Point Judith, RI | 126.4 | 4,845 | 78% | 66% |
| *Point Pleasant Beach, NJ (7 of 12 years)* | *10.0* | *20* | *13%* | *2%* |
| Stonington, CT | 11.3 | 49 | 50% | 7% |
| *Tiverton, RI (10 of 12 years)* | *5.0* | *92* | *81%* | *52%* |
| Westport, MA | 12.6 | 255 | 77% | 63% |

Source: Developed using 2008 through 2019 data from NMFS (2021a,2022a).

Notes: Rows using italicized font indicated that fewer the 12 years of data were available. State-level estimates for vessels and trips cannot be estimated with the available data.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

### Gear

#### Table G-CF16. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Gear Type under Alternative C1

| Gear | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Dredge-clam (7 of 12 years)* | *6* | *112* | *19%* | *8%* |
| Dredge-scallop | 34 | 259 | 11% | 16% |
| Gillnet-sink | 45 | 1,141 | 38% | 30% |
| Handline | 41 | 333 | 21% | 10% |
| *Longline-bottom (4 of 12 years)* | *3* | *9* | *16%* | *4%* |
| Pot-lobster† | 75 | 2,599 | 53% | 54% |
| Pot-other† | 31 | 653 | 43% | 28% |
| Trawl-bottom | 133 | 3,640 | 40% | 30% |
| *Trawl-midwater (10 of 12 years)* | *11* | *57* | *68%* | *37%* |

Source: Developed using 2008 through 2019 data from NMFS (2021a,2022).

Notes: Rows using italicized font indicated that fewer the 12 years of data were available. Totals over all gears cannot be estimated with the available data.

†Pot gear has been disaggregated to Pot-Lobster and Pot-Other.

**Table G-CF17. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Gear Type under Alternative C2**

| Gear | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Dredge-clam (7 of 12 years)* | *6* | *112* | *19%* | *8%* |
| Dredge-scallop | 34 | 259 | 11% | 16% |
| Gillnet-sink | 45 | 1,141 | 38% | 30% |
| Handline | 41 | 333 | 21% | 10% |
| *Longline-bottom (4 of 12 years)* | *3* | *9* | *16%* | *4%* |
| Pot-other[†] | 31 | 653 | 43% | 28% |
| Pot-lobster[†] | 75 | 2,599 | 53% | 54% |
| Trawl-bottom | 133 | 3,640 | 40% | 30% |
| *Trawl-midwater (10 of 12 years)* | *11* | *57* | *68%* | *37%* |

Source: Developed using 2008 through 2019 data from NMFS (2021a2022a).

Notes: Rows using italicized font indicated that fewer the 12 years of data were available. Totals over all gears cannot be estimated with the available data.

[†]Pot gear has been disaggregated to Pot-Lobster and Pot-Other.

## Alternative E

### *FMP Fishery*

**Table G-CF18. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by FMP Fishery under Alternative E2**

| FMP Fishery | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| American Lobster | 113 | 2,856 | 38% | 50% |
| Atlantic Herring | 24 | 172 | 40% | 36% |
| Bluefish | 132 | 1,805 | 36% | 30% |
| Highly Migratory Species | 34 | 248 | 26% | 14% |
| Jonah Crab | 52 | 996 | 52% | 51% |
| Mackerel/Squid/ Butterfish | 120 | 2,637 | 43% | 33% |

| FMP Fishery | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| Monkfish | 163 | 2,133 | 32% | 25% |
| Northeast Multispecies (large-mesh) | 103 | 1,176 | 38% | 38% |
| Northeast Multispecies (small-mesh) | 102 | 1,668 | 47% | 34% |
| Atlantic Sea Scallop | 58 | 406 | 16% | 14% |
| Southeast Regional Office FMPs | 184 | 3,729 | 40% | 33% |
| Northeast Skate Complex | 130 | 2,429 | 42% | 32% |
| Spiny Dogfish | 56 | 480 | 39% | 35% |
| Summer Flounder/Scup/ Black Sea Bass | 162 | 3,698 | 40% | 31% |

Source: Developed using 2008 through 2019 data from NMFS (2021a,2022a).

Notes: Total over all FMP fisheries cannot be estimated with the available data.

### *Species*

**Table G-CF19. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Species under Alternative E2**

| Species | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| American lobster | 113 | 2,856 | 38% | 50% |
| Atlantic herring | 24 | 172 | 40% | 36% |
| Atlantic mackerel | 60 | 316 | 40% | 29% |
| Black sea bass | 156 | 1,944 | 39% | 31% |
| Bluefish | 132 | 1,805 | 36% | 30% |
| Butterfish | 91 | 1,750 | 53% | 37% |
| Cod | 76 | 554 | 39% | 39% |
| Jonah crab | 52 | 996 | 52% | 51% |

| Species | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Loligo* squid | 108 | 2,481 | 46% | 33% |
| Monkfish | 163 | 2,132 | 32% | 25% |
| Red hake | 82 | 1,170 | 52% | 36% |
| Rock crab | 22 | 447 | 56% | 74% |
| Scup | 156 | 3,138 | 42% | 36% |
| Sea scallops | 58 | 406 | 16% | 14% |
| Silver hake | 90 | 1,506 | 50% | 36% |
| Skates | 130 | 2,429 | 42% | 32% |
| Spiny dogfish | 56 | 480 | 39% | 35% |
| Summer flounder | 162 | 3,698 | 40% | 31% |
| Winter flounder | 65 | 845 | 46% | 47% |
| Yellowtail flounder | 59 | 502 | 45% | 45% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

### *Port*

**Table G-CF20. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Port under Alternative E2**

| Port and State | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Beaufort, NC (5 of 12 years)* | *10.6* | *13* | *37%* | *28%* |
| Chilmark/Menemsha, MA | 13.4 | 359 | 88% | 89% |
| *Fairhaven, MA (10 of 12 years)* | *5.5* | *43* | *41%* | *26%* |
| *Fall River, MA (5 of 12 years)* | *5.2* | *57* | *92%* | *88%* |
| *Hampton, VA (6 of 12 years)* | *10.2* | *15* | *26%* | *18%* |
| Little Compton, RI | 16.5 | 874 | 93% | 86% |
| Montauk, NY | 26.8 | 161 | 24% | 3% |
| New Bedford, MA | 78.3 | 864 | 28% | 33% |

| Port and State | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *New London, CT (7 of 12 years)* | *4.9* | *39* | *29%* | *8%* |
| *Newport News, VA (5 of 12 years)* | *9.0* | *12* | *23%* | *16%* |
| Newport, RI | 15.5 | 580 | 75% | 80% |
| Point Judith, RI | 126.4 | 4,844 | 78% | 66% |
| *Point Pleasant Beach, NJ (7 of 12 years)* | *10.0* | *20* | *13%* | *2%* |
| Stonington, CT | 11.3 | 49 | 50% | 7% |
| *Tiverton, RI (10 of 12 years)* | *5.0* | *92* | *81%* | *52%* |
| Westport, MA | 12.6 | 255 | 77% | 63% |

Source: Developed using 2008 through 2019 data from NMFS (2021a,2022a).

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

### *Gear*

**Table G-CF21. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Gear Type under Alternative E2**

| Gear | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Dredge-clam (7 of 12 years)* | *6* | *112* | *20%* | *8%* |
| Dredge-scallop | 33 | 259 | 11% | 16% |
| Gillnet-sink | 45 | 1,142 | 38% | 30% |
| Handline | 41 | 332 | 20% | 10% |
| *Longline-bottom (4 of 12 years)* | *3* | *9* | *16%* | *4%* |
| Pot-lobster† | 75 | 2,594 | 53% | 54% |
| Pot-other† | 31 | 650 | 43% | 28% |
| Trawl-bottom | 133 | 3,644 | 40% | 30% |
| *Trawl-midwater (10 of 12 years)* | *11* | *56* | *68%* | *37%* |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

†Pot gear has been disaggregated to Pot-Lobster and Pot-Other.

## Alternative G

### *FMP Fishery*

**Table G-CF22. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by FMP Fishery under Alternative G**

| FMP Fishery | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| American Lobster | 112 | 2,823 | 38% | 50% |
| Atlantic Herring | 24 | 173 | 40% | 36% |
| Bluefish | 131 | 1,775 | 35% | 30% |
| Highly Migratory Species | 33 | 244 | 26% | 14% |
| Jonah Crab | 52 | 988 | 51% | 50% |
| Mackerel/Squid/ Butterfish | 119 | 2,580 | 43% | 32% |
| Monkfish | 158 | 1,984 | 31% | 24% |
| Northeast Multispecies (large-mesh) | 100 | 1,102 | 37% | 36% |
| Northeast Multispecies (small-mesh) | 100 | 1,613 | 47% | 33% |
| Atlantic Sea Scallop | 54 | 337 | 14% | 12% |
| Southeast Regional Office FMPs | 31 | 110 | 7% | 1% |
| Northeast Skate Complex | 128 | 2,312 | 41% | 30% |
| Spiny Dogfish | 54 | 461 | 38% | 34% |
| Summer Flounder/Scup/ Black Sea Bass | 200 | 4,619 | 49% | 39% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2023).

Notes: Total over all FMP fisheries cannot be estimated with the available data.

## *Species*

**Table G-CF23. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Species under Alternative G**

| Species | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| American lobster | 112 | 2,823 | 38% | 50% |
| Atlantic herring | 24 | 173 | 40% | 36% |
| Atlantic mackerel | 59 | 307 | 39% | 28% |
| Black sea bass | 154 | 1,863 | 39% | 30% |
| Bluefish | 131 | 1,775 | 35% | 30% |
| Butterfish | 90 | 1,722 | 53% | 36% |
| Cod | 74 | 514 | 38% | 36% |
| Jonah crab | 52 | 988 | 51% | 50% |
| *Loligo* squid | 107 | 2,427 | 46% | 32% |
| Monkfish | 158 | 1,982 | 31% | 24% |
| Red hake | 81 | 1,132 | 51% | 34% |
| Rock crab | 21 | 445 | 54% | 73% |
| Scup | 154 | 3,031 | 41% | 34% |
| Sea scallops | 54 | 337 | 14% | 12% |
| Silver hake | 89 | 1,457 | 50% | 35% |
| Skates | 128 | 2,311 | 41% | 30% |
| Spiny dogfish | 54 | 461 | 38% | 34% |
| Summer flounder | 160 | 3,569 | 39% | 30% |
| Winter flounder | 64 | 796 | 45% | 44% |
| Yellowtail flounder | 58 | 448 | 44% | 40% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2023).

### *Port*

**Table G-CF24. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Port under Alternative G**

| Port and State | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Beaufort, NC* | *13.4* | *17* | *47%* | *37%* |
| Chilmark/Menemsha, MA | 15.5 | 417 | 101% | 103% |
| *Fairhaven, MA* | *5.5* | *51* | *41%* | *31%* |
| *Fall River, MA* | *4.6* | *67* | *80%* | *103%* |
| *Hampton, VA* | *14.4* | *20* | *38%* | *23%* |
| Little Compton, RI | 17.8 | 907 | 100% | 89% |
| Montauk, NY | 28.9 | 166 | 26% | 4% |
| New Bedford, MA | 87.5 | 918 | 32% | 35% |
| *New London, CT* | *4.9* | *39* | *29%* | *8%* |
| *Newport News, VA* | *12.8* | *17* | *32%* | *22%* |
| Newport, RI | 16.9 | 630 | 82% | 87% |
| Point Judith, RI | 144.2 | 5,300 | 89% | 72% |
| *Point Pleasant Beach, NJ* | *11.0* | *22* | *14%* | *2%* |
| Stonington, CT | 12.8 | 61 | 57% | 9% |
| *Tiverton, RI* | *4.9* | *79* | *79%* | *45%* |
| Westport, MA | 14.1 | 305 | 86% | 75% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2023).

Notes: State-level estimates for vessels and trips cannot be estimated with the available data.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

### *Gear*

**Table G-CF25. Annual Number of Vessels and Trips in the Lease Area and along the RWEC by Gear under Alternative G**

| Gear | Average Annual Number of Vessels | Average Annual Number of Trips | Average Annual Number of Vessels as a Percentage of Total Vessels in the RFA | Average Annual Number of Trips as a Percentage of Total Trips in the RFA |
|---|---|---|---|---|
| *Dredge-clam (7 of 12 years)* | *6* | *99* | *19%* | *7%* |
| Dredge-scallop | 30 | 212 | 10% | 13% |
| Gillnet-sink | 44 | 1,093 | 35% | 26% |
| Handline | 40 | 319 | 20% | 9% |
| *Longline-bottom (4 of 12 years)* | *3* | *9* | *16%* | *4%* |
| Pot-lobster† | 74 | 2,576 | 51% | 52% |
| Pot-other† | 31 | 572 | 42% | 25% |
| Trawl-bottom | 132 | 3,556 | 40% | 28% |
| *Trawl-midwater (10 of 12 years)* | *11* | *57* | *69%* | *38%* |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2023).

†Pot gear has been disaggregated to Pot-Lobster and Pot-Other.

## Estimated Annual Commercial Fishing Revenue Exposed in the Combined Lease Area and Offshore RWEC by FMP Fishery, Port, and Gear under Alternatives C, D, E, and G

This section provides estimates of the annual commercial fishing revenue at risk in the combined Lease Area and area along the offshore RWEC during construction under all design configurations of Alternatives C, D, E, and G. Data are reported by FMP fishery, gear type, and port of landing. The estimates are based on 2008 through 2019 data from NMFS (2021a, 2022a, 2023). Revenue at risk data for Alternative F could not be provided because which WTG positions would be omitted under this alternative is unknown.

## Alternative C

### *FMP Fishery*

**Table G-CF26. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative C1**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $462.9 | $261.8 | 0.28% | 3.36% |
| Atlantic Herring | $267.1 | $100.9 | 0.39% | 3.37% |
| Bluefish | $17.0 | $8.6 | 0.67% | 1.47% |
| Highly Migratory Species | $6.8 | $2.2 | 0.10% | 0.98% |
| Jonah Crab | $37.8 | $21.4 | 0.22% | 0.36% |
| Mackerel/Squid/ Butterfish | $296.6 | $136.4 | 0.26% | 0.88% |
| Monkfish | $179.0 | $97.9 | 0.48% | 1.30% |
| Northeast Multispecies (large-mesh) | $112.3 | $48.9 | 0.07% | 2.05% |
| Northeast Multispecies (small-mesh) | $189.0 | $71.1 | 0.63% | 2.52% |
| Atlantic Sea Scallop | $367.9 | $143.7 | 0.03% | 0.29% |
| Northeast Skate Complex | $160.5 | $102.1 | 1.37% | 2.85% |
| Spiny Dogfish | $35.2 | $15.2 | 0.51% | 6.22% |
| Summer Flounder/Scup/ Black Sea Bass | $126.3 | $80.5 | 0.20% | 0.73% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $550.4 | $235.4 | 0.25% | 0.70% |
| All FMP and non-FMP fisheries | $1,610.9 | $1,326.0 | 0.14% | 0.92% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The “Other FMPs, non-disclosed species, and non-FMP fisheries” category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

**Table G-CF27. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative C2**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $428.1 | $246.0 | 0.26% | 3.15% |
| Atlantic Herring | $261.1 | $99.2 | 0.38% | 3.31% |
| Bluefish | $16.8 | $8.5 | 0.67% | 1.46% |
| Highly Migratory Species | $6.6 | $2.1 | 0.09% | 0.95% |
| Jonah Crab | $36.0 | $20.3 | 0.21% | 0.35% |
| Mackerel/Squid/ Butterfish | $279.7 | $130.7 | 0.25% | 0.85% |
| Monkfish | $166.4 | $92.6 | 0.45% | 1.23% |
| Northeast Multispecies (large-mesh) | $109.3 | $47.1 | 0.06% | 1.97% |
| Northeast Multispecies (small-mesh) | $185.3 | $69.2 | 0.61% | 2.45% |
| Atlantic Sea Scallop | $354.5 | $138.1 | 0.03% | 0.28% |
| Northeast Skate Complex | $152.3 | $97.0 | 1.30% | 2.71% |
| Spiny Dogfish | $34.6 | $14.7 | 0.49% | 6.03% |
| Summer Flounder/Scup/ Black Sea Bass | $121.9 | $77.8 | 0.20% | 0.71% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $534.3 | $227.5 | 0.24% | 0.67% |
| All FMP and non-FMP fisheries | $1,546.5 | $1,270.8 | 0.13% | 0.88% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The "Other FMPs, non-disclosed species, and non-FMP fisheries" category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

### *Port*

**Table G-CF28. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative C1**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | *$5.0* | *$2.4* | *0.09%* | *0.28%* |
| Chilmark/Menemsha, MA | *$23.4* | *$14.3* | *3.04%* | *3.41%* |
| *Fairhaven, MA* | *$27.1* | *$14.4* | *0.13%* | *1.00%* |
| *Fall River, MA* | *$17.6* | *$8.9* | *0.78%* | *2.00%* |
| *Hampton, VA* | *$7.1* | *$3.5* | *0.02%* | *0.22%* |
| Little Compton, RI | $192.5 | $131.8 | 6.62% | 6.79% |
| Montauk, NY | $38.4 | $17.0 | 0.09% | 0.14% |
| New Bedford, MA | $566.0 | $340.1 | 0.09% | 0.70% |
| *New London, CT* | *$21.5* | *$9.8* | *0.15%* | *0.37%* |
| *Newport News, VA* | *$15.3* | *$3.8* | *0.01%* | *0.22%* |
| Newport, RI | $188.0 | $104.1 | 1.17% | 3.61% |
| Point Judith, RI | $712.4 | $547.3 | 1.19% | 1.99% |
| *Point Pleasant Beach, NJ* | *$15.6* | *$4.5* | *0.01%* | *0.05%* |
| Stonington, CT | $20.2 | $7.0 | 0.07% | 0.22% |
| *Tiverton, RI* | *$15.0* | *$6.4* | *0.56%* | *0.98%* |
| Westport, MA | $107.0 | $58.2 | 4.46% | 4.98% |
| **Revenues by Port State‡** | | | | |
| All Connecticut ports | $41.7 | $12.7 | 0.07% | 0.22% |
| All Massachusetts ports | $653.4 | $432.3 | 0.09% | 0.76% |
| *All New Jersey ports* | *$15.6* | *$6.5* | *0.00%* | *0.03%* |
| All New York ports | $38.4 | $17.0 | 0.05% | 0.09% |
| All Rhode Island ports | $935.5 | $790.0 | 1.15% | 2.34% |
| *Ports in all other states* | *$22.3* | *$7.6* | *0.01%* | *0.18%* |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| Confidential port data‡‡ | $141.2 | $65.2 | 0.14% | 1.17% |
| **Total** | **$1,610.9** | **$1,331.3** | **0.14%** | **0.93%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

† See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

‡ Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

**Table G-CF29. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative C2**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | *$4.7* | *$2.2* | *0.08%* | *0.26%* |
| Chilmark/Menemsha, MA | *$20.9* | *$12.6* | *2.67%* | *2.99%* |
| *Fairhaven, MA* | *$25.6* | *$13.7* | *0.12%* | *0.95%* |
| *Fall River, MA* | *$17.1* | *$8.7* | *0.77%* | *1.95%* |
| *Hampton, VA* | *$6.6* | *$3.2* | *0.02%* | *0.21%* |
| Little Compton, RI | $186.3 | $126.9 | 6.37% | 6.54% |
| Montauk, NY | $36.1 | $16.1 | 0.09% | 0.14% |
| New Bedford, MA | $549.2 | $325.4 | 0.09% | 0.67% |
| *New London, CT* | *$20.7* | *$9.5* | *0.14%* | *0.35%* |
| *Newport News, VA* | *$14.6* | *$3.6* | *0.01%* | *0.21%* |
| Newport, RI | $184.1 | $100.9 | 1.13% | 3.50% |
| Point Judith, RI | $691.4 | $531.0 | 1.15% | 1.93% |

| **Port and State** | **Peak Annual Revenue ($1,000s)** | **Average Annual Revenue ($1,000s)** | **Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*** | **Average Annual Revenue as a Percentage of Total Revenue in the RFA†** |
|---|---|---|---|---|
| *Point Pleasant Beach, NJ* | *$14.0* | *$4.1* | *0.01%* | *0.05%* |
| Stonington, CT | $19.4 | $6.6 | 0.06% | 0.21% |
| *Tiverton, RI* | *$14.3* | *$6.1* | *0.53%* | *0.94%* |
| Westport, MA | $87.8 | $49.5 | 3.79% | 4.23% |
| **Revenues by Port State‡** | | | | |
| All Connecticut ports | $40.0 | $12.2 | 0.07% | 0.21% |
| All Massachusetts ports | $626.2 | $406.3 | 0.08% | 0.72% |
| *All New Jersey ports* | *$15.3* | *$6.1* | *0.00%* | *0.03%* |
| All New York ports | $36.1 | $16.1 | 0.05% | 0.09% |
| All Rhode Island ports | $912.6 | $765.2 | 1.11% | 2.27% |
| *Ports in all other states* | *$21.2* | *$7.1* | *0.01%* | *0.16%* |
| Confidential port data‡‡ | $138.0 | $62.8 | 0.14% | 1.13% |
| **Total** | **$1,546.5** | **$1,275.9** | **0.13%** | **0.89%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

† See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

‡ Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

### Gear

**Table G-CF30. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative C1**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| Dredge-clam | $388.3 | $114.0 | 0.19% | 0.55% |
| Dredge-scallop | $370.1 | $144.2 | 0.03% | 0.30% |
| Gillnet-sink | $260.6 | $178.9 | 0.60% | 1.86% |
| Handline | $12.3 | $3.2 | 0.07% | 0.24% |
| Pot† | $482.2 | $319.1 | 0.28% | 1.98% |
| Trawl-bottom | $621.2 | $467.3 | 0.25% | 1.09% |
| Trawl-midwater | $187.1 | $96.0 | 0.51% | 4.09% |
| All other gear* | $282.2 | $66.7 | 0.14% | 2.50% |
| All gear types | $1,611.0 | $1,389.5 | 0.15% | 0.96% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

† Pot gear combines pot-lobster and pot-other.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

**Table G-CF31. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative C2**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| Dredge-clam | $381.6 | $111.3 | 0.18% | 0.53% |
| Dredge-scallop | $356.6 | $138.6 | 0.03% | 0.29% |
| Gillnet-sink | $241.8 | $170.2 | 0.57% | 1.77% |
| Handline | $11.3 | $3.1 | 0.07% | 0.23% |
| Pot† | $445.6 | $299.4 | 0.26% | 1.86% |
| Trawl-bottom | $596.7 | $451.2 | 0.24% | 1.05% |
| Trawl-midwater | $182.1 | $94.3 | 0.50% | 4.02% |

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| All other gear* | $275.9 | $64.8 | 0.14% | 2.43% |
| All gear types | $1,546.5 | $1,333.0 | 0.14% | 0.92% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

† Pot gear combines pot-lobster and pot-other.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

## Alternative D

### *FMP Fishery*

**Table G-CF32. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D1**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $492.7 | $274.2 | 0.29% | 3.52% |
| Atlantic Herring | $270.5 | $101.8 | 0.39% | 3.40% |
| Bluefish | $17.0 | $8.6 | 0.67% | 1.47% |
| Highly Migratory Species | $6.6 | $2.1 | 0.10% | 0.97% |
| Jonah Crab | $38.4 | $22.0 | 0.23% | 0.37% |
| Mackerel/Squid/ Butterfish | $306.4 | $139.7 | 0.27% | 0.91% |
| Monkfish | $186.9 | $98.4 | 0.48% | 1.31% |
| Northeast Multispecies (large-mesh) | $113.1 | $48.8 | 0.07% | 2.04% |
| Northeast Multispecies (small-mesh) | $190.7 | $71.6 | 0.64% | 2.53% |
| Atlantic Sea Scallop | $338.6 | $136.5 | 0.03% | 0.27% |
| Northeast Skate Complex | $166.5 | $104.5 | 1.40% | 2.92% |

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| Spiny Dogfish | $35.2 | $15.3 | 0.51% | 6.27% |
| Summer Flounder/Scup/ Black Sea Bass | $127.4 | $81.5 | 0.20% | 0.74% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $567.3 | $238.2 | 0.25% | 0.71% |
| All FMP and non-FMP Fisheries | $1,632.7 | $1,343.1 | 0.14% | 0.93% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The “Other FMPs, non-disclosed species, and non-FMP fisheries” category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

### Table G-CF33. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D2

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $496.8 | $272.5 | 0.29% | 3.49% |
| Atlantic Herring | $271.7 | $102.3 | 0.39% | 3.42% |
| Bluefish | $17.2 | $8.7 | 0.68% | 1.49% |
| Highly Migratory Species | $6.9 | $2.2 | 0.10% | 0.99% |
| Jonah Crab | $39.6 | $22.5 | 0.23% | 0.38% |
| Mackerel/Squid/ Butterfish | $305.4 | $140.2 | 0.27% | 0.91% |
| Monkfish | $201.8 | $104.1 | 0.51% | 1.38% |
| Northeast Multispecies (large-mesh) | $115.9 | $51.5 | 0.07% | 2.16% |

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| Northeast Multispecies (small-mesh) | $192.5 | $73.5 | 0.65% | 2.60% |
| Atlantic Sea Scallop | $371.8 | $147.5 | 0.03% | 0.30% |
| Northeast Skate Complex | $168.7 | $106.1 | 1.42% | 2.96% |
| Spiny Dogfish | $35.7 | $15.5 | 0.52% | 6.36% |
| Summer Flounder/Scup/ Black Sea Bass | $130.8 | $83.0 | 0.21% | 0.75% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $571.6 | $242.6 | 0.26% | 0.72% |
| All FMP and non-FMP Fisheries | $1,662.1 | $1,372.2 | 0.14% | 0.95% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The “Other FMPs, non-disclosed species, and non-FMP fisheries” category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

**Table G-CF34. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D3**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $479.9 | $268.5 | 0.29% | 3.44% |
| Atlantic Herring | $260.1 | $97.7 | 0.38% | 3.26% |
| Bluefish | $16.3 | $8.5 | 0.66% | 1.45% |
| Highly Migratory Species | $6.8 | $2.1 | 0.10% | 0.97% |
| Jonah Crab | $37.8 | $21.8 | 0.23% | 0.37% |
| Mackerel/Squid/ Butterfish | $308.8 | $138.1 | 0.27% | 0.90% |

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| Monkfish | $205.9 | $107.1 | 0.52% | 1.42% |
| Northeast Multispecies (large-mesh) | $112.5 | $50.0 | 0.07% | 2.09% |
| Northeast Multispecies (small-mesh) | $167.1 | $66.5 | 0.59% | 2.36% |
| Atlantic Sea Scallop | $405.1 | $152.1 | 0.03% | 0.31% |
| Northeast Skate Complex | $170.3 | $106.4 | 1.43% | 2.97% |
| Spiny Dogfish | $31.5 | $14.3 | 0.48% | 5.87% |
| Summer Flounder/Scup/ Black Sea Bass | $127.6 | $79.9 | 0.20% | 0.73% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $530.9 | $235.3 | 0.25% | 0.70% |
| All FMP and non-FMP Fisheries | $1,631.0 | $1,348.4 | 0.14% | 0.94% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The “Other FMPs, non-disclosed species, and non-FMP fisheries” category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

**Table G-CF35. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D1+D2**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $481.8 | $262.8 | 0.28% | 3.37% |
| Atlantic Herring | $268.8 | $101.2 | 0.39% | 3.38% |
| Bluefish | $17.0 | $8.6 | 0.67% | 1.47% |

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| Highly Migratory Species | $6.6 | $2.1 | 0.10% | 0.96% |
| Jonah Crab | $37.4 | $21.3 | 0.22% | 0.36% |
| Mackerel/Squid/ Butterfish | $287.3 | $134.6 | 0.26% | 0.87% |
| Monkfish | $178.6 | $92.5 | 0.45% | 1.23% |
| Northeast Multispecies (large-mesh) | $112.1 | $47.8 | 0.07% | 2.00% |
| Northeast Multispecies (small-mesh) | $189.9 | $70.8 | 0.63% | 2.51% |
| Atlantic Sea Scallop | $294.9 | $127.0 | 0.02% | 0.26% |
| Northeast Skate Complex | $159.3 | $99.8 | 1.34% | 2.79% |
| Spiny Dogfish | $35.1 | $15.1 | 0.51% | 6.19% |
| Summer Flounder/Scup/ Black Sea Bass | $124.8 | $80.3 | 0.20% | 0.73% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $564.3 | $232.8 | 0.25% | 0.69% |
| All FMP and non-FMP fisheries | $1,587.0 | $1,296.5 | 0.14% | 0.90% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The "Other FMPs, non-disclosed species, and non-FMP fisheries" category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

**Table G-CF36. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D1+D3**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $464.9 | $258.8 | 0.28% | 3.32% |
| Atlantic Herring | $257.1 | $96.6 | 0.37% | 3.23% |
| Bluefish | $16.2 | $8.3 | 0.65% | 1.43% |
| Highly Migratory Species | $6.4 | $2.1 | 0.09% | 0.93% |
| Jonah Crab | $35.5 | $20.7 | 0.22% | 0.35% |
| Mackerel/Squid/ Butterfish | $290.7 | $132.5 | 0.26% | 0.86% |
| Monkfish | $182.8 | $95.5 | 0.46% | 1.27% |
| Northeast Multispecies (large-mesh) | $108.7 | $46.2 | 0.06% | 1.94% |
| Northeast Multispecies (small-mesh) | $164.5 | $63.8 | 0.57% | 2.26% |
| Atlantic Sea Scallop | $328.3 | $131.5 | 0.03% | 0.26% |
| Northeast Skate Complex | $160.9 | $100.1 | 1.34% | 2.80% |
| Spiny Dogfish | $31.0 | $13.9 | 0.47% | 5.69% |
| Summer Flounder/Scup/ Black Sea Bass | $121.6 | $77.2 | 0.19% | 0.70% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $523.6 | $225.4 | 0.24% | 0.67% |
| All FMP and non-FMP Fisheries | $1,556.0 | $1,272.7 | 0.13% | 0.88% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The “Other FMPs, non-disclosed species, and non-FMP fisheries” category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

**Table G-CF37. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D2+D3**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $468.9 | $257.1 | 0.28% | 3.30% |
| Atlantic Herring | $258.3 | $97.1 | 0.37% | 3.24% |
| Bluefish | $16.3 | $8.4 | 0.66% | 1.44% |
| Highly Migratory Species | $6.7 | $2.1 | 0.10% | 0.96% |
| Jonah Crab | $36.8 | $21.1 | 0.22% | 0.36% |
| Mackerel/Squid/ Butterfish | $289.7 | $133.0 | 0.26% | 0.86% |
| Monkfish | $197.7 | $101.2 | 0.49% | 1.35% |
| Northeast Multispecies (large-mesh) | $111.4 | $49.0 | 0.07% | 2.05% |
| Northeast Multispecies (small-mesh) | $166.3 | $65.8 | 0.58% | 2.33% |
| Atlantic Sea Scallop | $367.0 | $142.5 | 0.03% | 0.29% |
| Northeast Skate Complex | $163.1 | $101.8 | 1.37% | 2.84% |
| Spiny Dogfish | $31.4 | $14.1 | 0.47% | 5.78% |
| Summer Flounder/Scup/ Black Sea Bass | $124.9 | $78.7 | 0.20% | 0.72% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $528.0 | $229.9 | 0.24% | 0.68% |
| All FMP and non-FMP Fisheries | $1,585.3 | $1,301.8 | 0.14% | 0.90% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The “Other FMPs, non-disclosed species, and non-FMP fisheries” category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

**Table G-CF38. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D1+D2+D3**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $454.0 | $247.4 | 0.27% | 3.17% |
| Atlantic Herring | $255.4 | $96.0 | 0.37% | 3.21% |
| Bluefish | $16.1 | $8.3 | 0.65% | 1.42% |
| Highly Migratory Species | $6.4 | $2.0 | 0.09% | 0.93% |
| Jonah Crab | $34.5 | $20.0 | 0.21% | 0.34% |
| Mackerel/Squid/ Butterfish | $271.7 | $127.4 | 0.25% | 0.83% |
| Monkfish | $174.6 | $89.7 | 0.44% | 1.19% |
| Northeast Multispecies (large-mesh) | $107.6 | $45.2 | 0.06% | 1.89% |
| Northeast Multispecies (small-mesh) | $163.7 | $63.1 | 0.56% | 2.24% |
| Atlantic Sea Scallop | $290.1 | $121.9 | 0.02% | 0.25% |
| Northeast Skate Complex | $153.7 | $95.5 | 1.28% | 2.67% |
| Spiny Dogfish | $30.9 | $13.7 | 0.46% | 5.60% |
| Summer Flounder/Scup/ Black Sea Bass | $118.9 | $75.9 | 0.19% | 0.69% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $520.7 | $220.0 | 0.23% | 0.65% |
| All FMP and non-FMP Fisheries | $1,510.3 | $1,226.1 | 0.13% | 0.85% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The "Other FMPs, non-disclosed species, and non-FMP fisheries" category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

### *Port*

**Table G-CF39. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D1**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | *$5.1* | *$2.5* | *0.09%* | *0.29%* |
| Chilmark/Menemsha, MA | $26.4 | $16.0 | 3.40% | 3.82% |
| *Fairhaven, MA* | *$27.7* | *$14.6* | *0.13%* | *1.01%* |
| *Fall River, MA* | *$18.0* | *$9.0* | *0.79%* | *2.02%* |
| *Hampton, VA* | *$7.2* | *$3.6* | *0.02%* | *0.23%* |
| Little Compton, RI | $203.7 | $135.0 | 6.78% | 6.96% |
| Montauk, NY | $39.6 | $17.2 | 0.09% | 0.15% |
| New Bedford, MA | $579.7 | $340.3 | 0.09% | 0.70% |
| *New London, CT* | *$21.9* | *$10.0* | *0.15%* | *0.37%* |
| *Newport News, VA* | *$15.5* | *$3.9* | *0.01%* | *0.23%* |
| Newport, RI | $188.3 | $105.1 | 1.18% | 3.65% |
| Point Judith, RI | $719.1 | $552.4 | 1.20% | 2.01% |
| *Point Pleasant Beach, NJ* | *$16.3* | *$4.6* | *0.01%* | *0.05%* |
| Stonington, CT | $20.4 | $7.0 | 0.07% | 0.22% |
| *Tiverton, RI* | *$14.0* | *$6.2* | *0.54%* | *0.95%* |
| Westport, MA | $115.5 | $62.3 | 4.77% | 5.33% |
| **Revenue by Port State‡** | | | | |
| All Connecticut ports | $42.3 | $12.8 | 0.08% | 0.22% |
| All Massachusetts ports | $666.7 | $438.4 | 0.09% | 0.77% |
| *All New Jersey ports* | $16.3 | $6.6 | 0.00% | 0.03% |
| All New York ports | $39.6 | $17.3 | 0.05% | 0.09% |
| All Rhode Island ports | $943.7 | $799.2 | 1.16% | 2.37% |
| *Ports in all other states* | *$22.7* | *$7.8* | *0.01%* | *0.18%* |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| Confidential port data‡‡ | *$143.4* | *$66.5* | *0.14%* | *1.19%* |
| **Total** | **$1,632.7** | **$1,348.6** | **0.14%** | **0.94%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

† See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

‡ Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

### Table G-CF40. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D2

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | *$5.1* | *$2.5* | *0.09%* | *0.29%* |
| Chilmark/Menemsha, MA | $26.1 | $13.9 | 2.95% | 3.31% |
| *Fairhaven, MA* | *$19.3* | *$8.9* | *0.08%* | *0.62%* |
| *Fall River, MA* | $18.0 | $9.1 | 0.80% | 2.03% |
| *Hampton, VA* | *$7.7* | *$3.7* | *0.03%* | *0.24%* |
| Little Compton, RI | $218.9 | $142.0 | 7.13% | 7.32% |
| Montauk, NY | $39.9 | $18.0 | 0.10% | 0.15% |
| New Bedford, MA | $574.6 | $346.6 | 0.09% | 0.71% |
| *New London, CT* | *$21.9* | *$10.1* | *0.15%* | *0.38%* |
| *Newport News, VA* | *$15.6* | *$3.9* | *0.01%* | *0.23%* |
| Newport, RI | $192.8 | $107.5 | 1.21% | 3.73% |
| Point Judith, RI | $734.9 | $567.4 | 1.23% | 2.06% |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Point Pleasant Beach, NJ* | *$16.4* | *$4.7* | *0.02%* | *0.05%* |
| **Revenue by Port State‡** | | | | |
| Stonington, CT | $21.1 | $7.3 | 0.07% | 0.23% |
| *Tiverton, RI* | *$17.0* | *$7.7* | *0.67%* | *1.18%* |
| Westport, MA | $117.3 | $65.9 | 5.05% | 5.63% |
| All Connecticut ports | $43.1 | $13.2 | 0.08% | 0.23% |
| All Massachusetts ports | $659.9 | $440.7 | 0.09% | 0.78% |
| *All New Jersey ports* | *$16.4* | *$6.7* | *0.00%* | *0.03%* |
| All New York ports | $39.9 | $18.0 | 0.06% | 0.10% |
| All Rhode Island ports | $987.7 | $824.1 | 1.20% | 2.44% |
| *Ports in all other states* | *$23.3* | *$8.0* | *0.01%* | *0.18%* |
| Confidential port data‡‡ | $144.3 | $67.1 | 0.15% | 1.21% |
| **Total** | **$1,662.1** | **$1,377.8** | **0.14%** | **0.96%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

† See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

‡ Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

**Table G-CF41. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D3**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | *$9.5* | *$4.7* | *0.18%* | *0.54%* |
| Chilmark/Menemsha, MA | $56.1 | $33.0 | 7.00% | 7.86% |
| *Fairhaven, MA* | *$56.4* | *$29.6* | *0.26%* | *2.06%* |
| *Fall River, MA* | *$24.0* | *$11.0* | *0.97%* | *2.47%* |
| *Hampton, VA* | *$14.9* | *$6.9* | *0.05%* | *0.44%* |
| Little Compton, RI | $373.4 | $243.2 | 12.21% | 12.53% |
| Montauk, NY | $75.3 | $32.8 | 0.18% | 0.28% |
| New Bedford, MA | $1,028.6 | $659.0 | 0.17% | 1.36% |
| *New London, CT* | *$37.7* | *$17.5* | *0.26%* | *0.65%* |
| *Newport News, VA* | *$27.5* | *$7.0* | *0.02%* | *0.41%* |
| Newport, RI | $282.5 | $158.6 | 1.78% | 5.51% |
| Point Judith, RI | $1,147.4 | $872.8 | 1.89% | 3.17% |
| *Point Pleasant Beach, NJ* | *$29.5* | *$7.2* | *0.02%* | *0.08%* |
| Stonington, CT | $37.5 | $13.0 | 0.13% | 0.41% |
| *Tiverton, RI* | *$33.6* | *$13.7* | *1.20%* | *2.11%* |
| Westport, MA | $221.6 | $123.4 | 9.45% | 10.55% |
| **Revenue by Port State‡** | | | | |
| All Connecticut ports | $75.2 | $23.2 | 0.14% | 0.40% |
| All Massachusetts ports | $1,211.6 | $852.7 | 0.17% | 1.50% |
| *All New Jersey ports* | *$31.7* | *$9.4* | *0.01%* | *0.05%* |
| All New York ports | $75.3 | $32.9 | 0.10% | 0.18% |
| All Rhode Island ports | $1,589.1 | $1,287.0 | 1.87% | 3.81% |
| *Ports in all other states* | *$42.4* | *$14.7* | *0.01%* | *0.34%* |
| Confidential port data‡‡ | $218.9 | $104.9 | 0.23% | 1.88% |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| **Total** | **$2,830.8** | **$2,324.7** | **0.24%** | **1.62%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

† See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

‡ Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers..

### Table G-CF42. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D1+D2

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | *$4.8* | *$2.3* | *0.09%* | *0.27%* |
| Chilmark/Menemsha, MA | $23.3 | $12.9 | 2.75% | 3.08% |
| *Fairhaven, MA* | *$17.2* | *$8.1* | *0.07%* | *0.56%* |
| *Fall River, MA* | *$17.8* | *$8.9* | *0.78%* | *2.00%* |
| *Hampton, VA* | *$6.7* | *$3.3* | *0.02%* | *0.21%* |
| Little Compton, RI | $202.8 | $133.7 | 6.71% | 6.89% |
| Montauk, NY | $36.7 | $16.4 | 0.09% | 0.14% |
| New Bedford, MA | $558.1 | $317.5 | 0.08% | 0.65% |
| *New London, CT* | *$21.1* | *$9.8* | *0.15%* | *0.36%* |
| *Newport News, VA* | *$14.9* | *$3.7* | *0.01%* | *0.22%* |
| Newport, RI | $187.1 | $103.7 | 1.17% | 3.60% |
| Point Judith, RI | $707.4 | $545.6 | 1.18% | 1.98% |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Point Pleasant Beach, NJ* | *$15.9* | *$4.5* | *0.01%* | *0.05%* |
| Stonington, CT | $20.0 | $6.7 | 0.07% | 0.21% |
| *Tiverton, RI* | *$13.6* | *$6.7* | *0.58%* | *1.02%* |
| Westport, MA | $111.8 | $61.0 | 4.68% | 5.22% |
| **Revenue by Port State‡** | | | | |
| All Connecticut ports | $41.1 | $12.4 | 0.07% | 0.21% |
| All Massachusetts ports | $631.2 | $404.8 | 0.08% | 0.71% |
| *All New Jersey ports* | *$15.9* | *$6.5* | *0.00%* | *0.03%* |
| All New York ports | $36.7 | $16.4 | 0.05% | 0.09% |
| All Rhode Island ports | $934.8 | $789.5 | 1.15% | 2.34% |
| *Ports in all other states* | *$21.7* | *$7.4* | *0.01%* | *0.17%* |
| Confidential port data‡‡ | $142.1 | $64.7 | 0.14% | 1.16% |
| **Total** | **$1,587.0** | **$1,301.8** | **0.14%** | **0.90%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

† See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

‡ Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

### Table G-CF43. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D1+D3

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | *$4.9* | *$2.4* | *0.09%* | *0.27%* |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| Chilmark/Menemsha, MA | $25.8 | $15.7 | 3.33% | 3.74% |
| *Fairhaven, MA* | *$27.1* | *$14.3* | *0.13%* | *0.99%* |
| *Fall River, MA* | *$17.3* | *$10.2* | *0.90%* | *2.30%* |
| *Hampton, VA* | *$6.9* | *$3.4* | *0.02%* | *0.22%* |
| Little Compton, RI | $196.9 | $128.4 | 6.45% | 6.62% |
| Montauk, NY | $37.6 | $16.3 | 0.09% | 0.14% |
| New Bedford, MA | $536.9 | $324.2 | 0.09% | 0.67% |
| *New London, CT* | *$20.2* | *$9.4* | *0.14%* | *0.35%* |
| *Newport News, VA* | *$14.0* | *$3.6* | *0.01%* | *0.21%* |
| Newport, RI | $180.8 | $101.2 | 1.14% | 3.51% |
| Point Judith, RI | $671.3 | $517.2 | 1.12% | 1.88% |
| *Point Pleasant Beach, NJ* | *$15.6* | *$4.3* | *0.01%* | *0.05%* |
| Stonington, CT | $19.2 | $6.5 | 0.06% | 0.21% |
| *Tiverton, RI* | *$13.6* | *$6.3* | *0.54%* | *0.96%* |
| Westport, MA | $110.7 | $60.4 | 4.63% | 5.17% |
| **Revenue by Port State‡** | | | | |
| All Connecticut ports | $39.5 | $12.0 | 0.07% | 0.21% |
| All Massachusetts ports | $620.7 | $419.4 | 0.08% | 0.74% |
| *All New Jersey ports* | *$15.6* | *$6.3* | *0.00%* | *0.03%* |
| All New York ports | $37.6 | $16.3 | 0.05% | 0.09% |
| All Rhode Island ports | $887.8 | $752.7 | 1.09% | 2.23% |
| *Ports in all other states* | *$21.0* | *$7.4* | *0.01%* | *0.17%* |
| Confidential port data‡‡ | $132.2 | $63.3 | 0.14% | 1.14% |
| **Total** | **$1,553.2** | **$1,277.4** | **0.13%** | **0.89%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

† See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

‡ Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

### Table G-CF44. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D2+D3

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | *$4.9* | *$2.4* | *0.09%* | *0.28%* |
| Chilmark/Menemsha, MA | $25.5 | $13.6 | 2.88% | 3.23% |
| *Fairhaven, MA* | *$18.7* | *$8.6* | *0.08%* | *0.60%* |
| *Fall River, MA* | *$17.4* | *$10.3* | *0.91%* | *2.31%* |
| *Hampton, VA* | *$7.5* | *$3.6* | *0.02%* | *0.23%* |
| Little Compton, RI | $212.0 | $135.4 | 6.79% | 6.98% |
| Montauk, NY | $37.9 | $17.0 | 0.09% | 0.14% |
| New Bedford, MA | $531.7 | $330.5 | 0.09% | 0.68% |
| *New London, CT* | *$20.2* | *$9.5* | *0.14%* | *0.35%* |
| *Newport News, VA* | *$14.1* | *$3.6* | *0.01%* | *0.21%* |
| Newport, RI | $185.3 | $103.6 | 1.16% | 3.60% |
| Point Judith, RI | $687.1 | $532.2 | 1.16% | 1.93% |
| *Point Pleasant Beach, NJ* | *$15.6* | *$4.4* | *0.01%* | *0.05%* |
| Stonington, CT | $20.0 | $6.9 | 0.07% | 0.22% |
| *Tiverton, RI* | *$16.6* | *$7.0* | *0.61%* | *1.08%* |
| Westport, MA | $112.5 | $63.9 | 4.90% | 5.47% |
| **Revenue by Port State‡** | | | | |
| All Connecticut ports | $40.2 | $12.4 | 0.07% | 0.21% |
| All Massachusetts ports | $613.9 | $421.7 | 0.08% | 0.74% |
| *All New Jersey ports* | *$15.6* | *$6.4* | *0.00%* | *0.03%* |
| All New York ports | $37.9 | $17.0 | 0.05% | 0.09% |
| All Rhode Island ports | $933.2 | $777.6 | 1.13% | 2.30% |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Ports in all other states* | *$21.6* | *$7.5* | *0.01%* | *0.17%* |
| Confidential port data‡‡ | $133.1 | $64.0 | 0.14% | 1.15% |
| **Total** | **$1,582.5** | **$1,306.6** | **0.14%** | **0.91%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

† See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

‡ Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers..

### Table G-CF45. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D1+D2+D3

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | *$4.6* | *$2.2* | *0.08%* | *0.26%* |
| Chilmark/Menemsha, MA | $22.7 | *$12.6* | *2.68%* | *3.00%* |
| *Fairhaven, MA* | *$16.6* | *$7.8* | *0.07%* | *0.54%* |
| *Fall River, MA* | *$17.1* | *$10.1* | *0.89%* | *2.26%* |
| *Hampton, VA* | *$6.5* | *$3.2* | *0.02%* | *0.21%* |
| Little Compton, RI | $195.9 | $127.1 | 6.38% | 6.55% |
| Montauk, NY | $34.7 | $15.5 | 0.08% | 0.13% |
| New Bedford, MA | $515.3 | $301.4 | 0.08% | 0.62% |
| *New London, CT* | *$19.4* | *$9.1* | *0.14%* | *0.34%* |
| *Newport News, VA* | *$13.5* | *$3.4* | *0.01%* | *0.20%* |
| Newport, RI | $179.5 | $99.7 | 1.12% | 3.46% |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| Point Judith, RI | $659.7 | $510.4 | 1.11% | 1.85% |
| *Point Pleasant Beach, NJ* | *$15.1* | *$4.2* | *0.01%* | *0.05%* |
| **Revenue by Port State‡** | | | | |
| Stonington, CT | $18.8 | $6.3 | 0.06% | 0.20% |
| *Tiverton, RI* | *$12.9* | *$6.0* | *0.52%* | *0.92%* |
| Westport, MA | $107.0 | $59.1 | 4.53% | 5.06% |
| All Connecticut ports | $38.2 | $11.6 | 0.07% | 0.20% |
| All Massachusetts ports | $585.2 | $385.8 | 0.08% | 0.68% |
| *All New Jersey ports* | *$15.3* | *$6.2* | *0.00%* | *0.03%* |
| All New York ports | $34.7 | $15.5 | 0.05% | 0.08% |
| All Rhode Island ports | $878.8 | $743.0 | 1.08% | 2.20% |
| *Ports in all other states* | *$20.0* | *$7.0* | *0.01%* | *0.16%* |
| Confidential port data‡‡ | $130.8 | $61.6 | 0.13% | 1.11% |
| **Total** | **$1,507.5** | **$1,230.6** | **0.13%** | **0.86%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

† See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

‡ Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

### Gear

**Table G-CF46. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D1**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| Dredge-clam | $369.2 | $94.1 | 0.15% | 0.45% |
| Dredge-scallop | $339.9 | $136.8 | 0.03% | 0.28% |
| Gillnet-sink | $268.6 | $180.1 | 0.60% | 1.87% |
| Handline | $14.8 | $3.4 | 0.07% | 0.25% |
| Pot | $514.2 | $333.0 | 0.29% | 2.07% |
| Trawl-bottom | $631.3 | $474.3 | 0.25% | 1.10% |
| Trawl-midwater | $189.8 | $97.1 | 0.51% | 4.13% |
| All other gear* | $283.8 | $79.6 | 0.17% | 2.99% |
| All gear types | $1,632.7 | $1,398.5 | 0.15% | 0.97% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row. Pot gear combines pot-lobster and pot-other.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

**Table G-CF47. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D2**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| Dredge-clam | $371.2 | $95.7 | 0.16% | 0.46% |
| Dredge-scallop | $378.4 | $148.0 | 0.03% | 0.31% |
| Gillnet-sink | $271.9 | $187.2 | 0.62% | 1.95% |
| Handline | $15.5 | $3.6 | 0.08% | 0.27% |
| Pot[†] | $518.8 | $332.6 | 0.29% | 2.07% |
| Trawl-bottom | $643.8 | $482.6 | 0.26% | 1.12% |
| Trawl-midwater | $190.6 | $97.5 | 0.51% | 4.15% |
| All other gear* | $287.8 | $81.1 | 0.17% | 3.04% |

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| All gear types | $1,662.1 | $1,428.3 | 0.15% | 0.99% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

† Pot gear combines pot-lobster and pot-other.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

### Table G-CF48. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D3

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| Dredge-clam | $335.5 | $102.8 | 0.17% | 0.49% |
| Dredge-scallop | $412.9 | $152.7 | 0.03% | 0.32% |
| Gillnet-sink | $282.2 | $191.9 | 0.64% | 2.00% |
| Handline | $15.6 | $3.7 | 0.08% | 0.27% |
| Pot† | $502.1 | $326.9 | 0.28% | 2.03% |
| Trawl-bottom | $620.6 | $463.4 | 0.25% | 1.08% |
| Trawl-midwater | $182.1 | $92.4 | 0.49% | 3.93% |
| All other gear* | $272.1 | $88.4 | 0.19% | 3.32% |
| All gear types | $1,631.0 | $1,422.2 | 0.15% | 0.98% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

†Pot gear combines pot-lobster and pot-other.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

**Table G-CF49. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC during Project Construction by Gear Type under Alternative D1+D2**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| Dredge-clam | $368.1 | $92.8 | 0.15% | 0.45% |
| Dredge-scallop | $299.9 | $127.1 | 0.03% | 0.26% |
| Gillnet-sink | $248.9 | $169.9 | 0.57% | 1.77% |
| Handline | $14.6 | $3.4 | 0.07% | 0.24% |
| Pot† | $501.8 | $320.3 | 0.28% | 1.99% |
| Trawl-bottom | $616.3 | $464.8 | 0.25% | 1.08% |
| Trawl-midwater | $188.6 | $96.5 | 0.51% | 4.11% |
| All other gear* | $283.3 | $76.5 | 0.16% | 2.87% |
| All gear types | $1,587.0 | $1,351.2 | 0.14% | 0.94% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

† Pot gear combines pot-lobster and pot-other.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

**Table G-CF50. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D1+D3**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| Dredge-clam | $332.4 | $99.4 | 0.16% | 0.48% |
| Dredge-scallop | $334.3 | $131.9 | 0.03% | 0.27% |
| Gillnet-sink | $259.2 | $174.7 | 0.58% | 1.82% |
| Handline | $14.8 | $3.4 | 0.07% | 0.25% |
| Pot† | $485.1 | $314.6 | 0.27% | 1.96% |
| Trawl-bottom | $590.9 | $445.6 | 0.24% | 1.04% |
| Trawl-midwater | $180.1 | $91.4 | 0.48% | 3.89% |
| All other gear* | $267.6 | $83.4 | 0.18% | 3.13% |

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| All gear types | $1,556.0 | $1,344.3 | 0.14% | 0.93% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

† Pot gear combines pot-lobster and pot-other.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

**Table G-CF51. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D2+D3**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| Dredge-clam | $334.4 | $101.2 | 0.17% | 0.49% |
| Dredge-scallop | $373.6 | $143.0 | 0.03% | 0.30% |
| Gillnet-sink | $263.5 | $181.7 | 0.61% | 1.89% |
| Handline | $15.4 | $3.6 | 0.08% | 0.26% |
| Pot† | $489.7 | $314.2 | 0.27% | 1.95% |
| Trawl-bottom | $603.4 | $453.9 | 0.24% | 1.05% |
| Trawl-midwater | $180.9 | $91.8 | 0.48% | 3.91% |
| All other gear* | $271.6 | $85.1 | 0.18% | 3.19% |
| All gear types | $1,585.3 | $1,374.5 | 0.14% | 0.95% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

† Pot gear combines pot-lobster and pot-other.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

**Table G-CF52. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D1+D2+D3**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| Dredge-clam | $331.3 | $97.8 | 0.16% | 0.47% |
| Dredge-scallop | $295.1 | $122.1 | 0.02% | 0.25% |
| Gillnet-sink | $239.5 | $164.5 | 0.55% | 1.71% |
| Handline | $14.5 | $3.3 | 0.07% | 0.24% |
| Pot† | $472.7 | $301.9 | 0.26% | 1.88% |
| Trawl-bottom | $575.9 | $436.1 | 0.23% | 1.01% |
| Trawl-midwater | $178.9 | $90.8 | 0.48% | 3.87% |
| All other gear* | $267.1 | $80.1 | 0.17% | 3.00% |
| All gear types | $1,510.3 | $1,296.6 | 0.14% | 0.90% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

† Pot gear combines pot-lobster and pot-other.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

## Alternative E

### *FMP Fishery*

**Table G-CF53. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative E1**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $344.9 | $189.3 | 0.20% | 2.43% |
| Atlantic Herring | $206.4 | $83.9 | 0.32% | 2.80% |
| Bluefish | $15.8 | $8.0 | 0.63% | 1.37% |
| Highly Migratory Species | $5.9 | $1.9 | 0.08% | 0.86% |
| Jonah Crab | $26.2 | $15.4 | 0.16% | 0.26% |
| Mackerel/Squid/Butterfish | $236.6 | $111.8 | 0.22% | 0.72% |

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| Monkfish | $173.3 | $89.0 | 0.43% | 1.18% |
| Northeast Multispecies (large-mesh) | $100.6 | $42.9 | 0.06% | 1.80% |
| Northeast Multispecies (small-mesh) | $124.4 | $55.2 | 0.49% | 1.95% |
| Atlantic Sea Scallop | $373.4 | $134.1 | 0.03% | 0.27% |
| Northeast Skate Complex | $131.9 | $82.9 | 1.11% | 2.32% |
| Spiny Dogfish | $26.2 | $11.5 | 0.39% | 4.70% |
| Summer Flounder/Scup/Black Sea Bass | $103.2 | $65.3 | 0.16% | 0.59% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $356.0 | $169.3 | 0.18% | 0.50% |
| All FMP and non-FMP Fisheries | $1,309.5 | $1,060.5 | 0.11% | 0.74% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The “Other FMPs, non-disclosed species, and non-FMP fisheries” category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

**Table G-CF54. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative E2**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $413.9 | $225.9 | 0.24% | 2.90% |
| Atlantic Herring | $218.6 | $86.1 | 0.33% | 2.87% |
| Bluefish | $15.1 | $8.0 | 0.62% | 1.36% |
| Highly Migratory Species | $6.4 | $2.0 | 0.09% | 0.90% |
| Jonah Crab | $29.9 | $17.9 | 0.19% | 0.31% |

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| Mackerel/Squid/Butterfish | $265.8 | $120.7 | 0.23% | 0.78% |
| Monkfish | $194.6 | $99.7 | 0.48% | 1.33% |
| Northeast Multispecies (large-mesh) | $103.1 | $44.6 | 0.06% | 1.87% |
| Northeast Multispecies (small-mesh) | $112.0 | $51.2 | 0.45% | 1.81% |
| Atlantic Sea Scallop | $394.8 | $142.9 | 0.03% | 0.29% |
| Northeast Skate Complex | $155.8 | $94.9 | 1.27% | 2.65% |
| Spiny Dogfish | $25.7 | $11.9 | 0.40% | 4.89% |
| Summer Flounder/Scup/Black Sea Bass | $113.7 | $70.0 | 0.18% | 0.64% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $371.8 | $191.5 | 0.20% | 0.57% |
| All FMP and non-FMP Fisheries | $1,438.2 | $1,167.3 | 0.12% | 0.81% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The “Other FMPs, non-disclosed species, and non-FMP fisheries” category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

### *Port*

**Table G-CF55. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative E1**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA[†] |
|---|---|---|---|---|
| *Beaufort, NC* | *$4.0* | *$1.9* | *0.07%* | *0.22%* |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| Chilmark/Menemsha, MA | *$19.7* | *$11.2* | *2.37%* | *2.66%* |
| *Fairhaven, MA* | *$23.5* | *$12.2* | *0.11%* | *0.85%* |
| *Fall River, MA* | *$14.5* | *$6.9* | *0.60%* | *1.54%* |
| *Hampton, VA* | *$6.3* | *$2.9* | *0.02%* | *0.19%* |
| Little Compton, RI | $179.9 | $107.4 | 5.39% | 5.54% |
| Montauk, NY | $32.4 | $14.8 | 0.08% | 0.12% |
| New Bedford, MA | $372.5 | $261.0 | 0.07% | 0.54% |
| *New London, CT* | *$16.6* | *$7.8* | *0.12%* | *0.29%* |
| *Newport News, VA* | *$8.2* | *$2.3* | *0.01%* | *0.13%* |
| Newport, RI | $153.0 | $88.5 | 1.00% | 3.07% |
| Point Judith, RI | $573.4 | $445.1 | 0.97% | 1.62% |
| *Point Pleasant Beach, NJ* | *$9.2* | *$2.8* | *0.01%* | *0.03%* |
| Stonington, CT | $16.7 | $5.4 | 0.05% | 0.17% |
| *Tiverton, RI* | *$15.1* | *$5.5* | *0.48%* | *0.84%* |
| Westport, MA | $70.1 | $41.9 | 3.21% | 3.58% |
| **Revenues by Port State‡** | | | | |
| All Connecticut ports | $33.3 | $9.9 | 0.06% | 0.17% |
| All Massachusetts ports | $466.8 | $330.6 | 0.07% | 0.58% |
| *All New Jersey ports* | *$14.9* | *$4.8* | *0.00%* | *0.02%* |
| All New York ports | $32.4 | $14.8 | 0.05% | 0.08% |
| All Rhode Island ports | $808.5 | $646.9 | 0.94% | 1.92% |
| *Ports in all other states* | *$14.5* | *$5.7* | *0.00%* | *0.13%* |
| Confidential port data‡‡ | $101.4 | $51.7 | 0.11% | 0.93% |
| **Total** | **$1,309.5** | **$1,064.4** | **0.11%** | **0.74%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

† See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

‡ Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

‡‡ Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

**Table G-CF56. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative E2**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | *$4.6* | *$2.3* | *0.09%* | *0.26%* |
| Chilmark/Menemsha, MA‡ | *$26.4* | *$15.5* | *3.29%* | *3.69%* |
| *Fairhaven, MA* | *$26.7* | *$14.0* | *0.12%* | *0.97%* |
| *Fall River, MA* | *$15.7* | *$7.3* | *0.64%* | *1.64%* |
| *Hampton, VA* | *$7.3* | *$3.4* | *0.02%* | *0.22%* |
| Little Compton, RI | $197.6 | $120.7 | 6.06% | 6.22% |
| Montauk, NY | $35.9 | $16.0 | 0.09% | 0.13% |
| New Bedford, MA | $402.1 | $299.6 | 0.08% | 0.62% |
| *New London, CT* | *$17.3* | *$8.2* | *0.12%* | *0.31%* |
| *Newport News, VA* | *$11.1* | *$3.0* | *0.01%* | *0.18%* |
| Newport, RI | $166.7 | $95.6 | 1.07% | 3.32% |
| Point Judith, RI | $589.0 | $460.0 | 1.00% | 1.67% |
| *Point Pleasant Beach, NJ* | *$13.4* | *$3.6* | *0.01%* | *0.04%* |
| Stonington, CT | $17.4 | $6.0 | 0.06% | 0.19% |
| *Tiverton, RI* | *$16.5* | *$6.1* | *0.53%* | *0.94%* |
| Westport, MA | $101.4 | $58.8 | 4.51% | 5.03% |
| **Revenues by Port State‡** | | | | |
| All Connecticut ports | $34.7 | $10.8 | 0.06% | 0.18% |
| All Massachusetts ports | $532.5 | $392.4 | 0.08% | 0.69% |
| *All New Jersey ports* | *$15.3* | *$5.6* | *0.00%* | *0.03%* |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA[†] |
|---|---|---|---|---|
| All New York ports | $35.9 | $16.0 | 0.05% | 0.09% |
| All Rhode Island ports | $837.5 | $682.7 | 0.99% | 2.02% |
| *Ports in all other states* | *$18.4* | *$6.8* | *0.01%* | *0.16%* |
| Confidential port data[‡‡] | $109.6 | $57.7 | 0.12% | 1.04% |
| **Total** | **$1,438.2** | **$1,172.0** | **0.12%** | **0.81%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

[†] See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

[‡] Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

[‡‡] Includes data for all ports that were withheld by NMFS to protect the confidentiality of individual vessels and/or buyers.

### *Gear*

**Table G-CF57. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative E1**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| Dredge-clam | $189.3 | $55.9 | 0.09% | 0.27% |
| Dredge-scallop | $380.8 | $134.8 | 0.03% | 0.28% |
| Gillnet-sink | $236.5 | $161.4 | 0.54% | 1.68% |
| Handline | $13.7 | $3.3 | 0.07% | 0.24% |
| Pot[†] | $357.8 | $231.0 | 0.20% | 1.44% |
| Trawl-bottom | $494.3 | $380.3 | 0.20% | 0.88% |
| Trawl-midwater | $152.4 | $75.9 | 0.40% | 3.23% |
| All other gear* | $184.1 | $53.9 | 0.11% | 2.02% |

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| All gear types | $1,309.5 | $1,096.4 | 0.11% | 0.76% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

† Pot gear combines pot-lobster and pot-other.

Gear types shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

**Table G-CF58. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative E2**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| Dredge-clam | $207.3 | $78.1 | 0.13% | 0.37% |
| Dredge-scallop | $402.5 | $143.6 | 0.03% | 0.30% |
| Gillnet-sink | $264.0 | $178.9 | 0.60% | 1.86% |
| Handline | $15.3 | $3.6 | 0.08% | 0.26% |
| Pot† | $432.2 | $276.3 | 0.24% | 1.72% |
| Trawl-bottom | $541.9 | $398.6 | 0.21% | 0.93% |
| Trawl-midwater | $156.2 | $79.5 | 0.42% | 3.39% |
| All other gear* | $230.2 | $54.6 | 0.12% | 2.05% |
| All gear types | $1,438.2 | $1,213.1 | 0.13% | 0.84% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

† Pot gear combines pot-lobster and pot-other.

Gear types shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

## Alternative G

### *FMP Fishery*

**Table G-CF59. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative G**

| FMP Fishery | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions | Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA |
|---|---|---|---|---|
| American Lobster | $446.6 | $253.5 | 0.27% | 3.25% |
| Atlantic Herring | $269.8 | $104.3 | 0.40% | 3.48% |
| Bluefish | $17.8 | $8.9 | 0.69% | 1.52% |
| Highly Migratory Species | $5.1 | $1.8 | 0.08% | 0.83% |
| Jonah Crab | $35.5 | $20.8 | 0.22% | 0.35% |
| Mackerel/Squid/Butterfish | $289.6 | $135.5 | 0.26% | 0.88% |
| Monkfish | $155.3 | $88.1 | 0.43% | 1.17% |
| Northeast Multispecies (large-mesh) | $79.6 | $38.6 | 0.05% | 1.61% |
| Northeast Multispecies (small-mesh) | $174.4 | $62.0 | 0.55% | 2.20% |
| Atlantic Sea Scallop | $315.6 | $115.1 | 0.02% | 0.23% |
| Northeast Skate Complex | $150.7 | $96.6 | 1.30% | 2.70% |
| Spiny Dogfish | $32.2 | $14.1 | 0.48% | 5.79% |
| Summer Flounder/Scup/Black Sea Bass | $248.8 | $162.8 | 0.41% | 1.48% |
| Other FMPs, non-disclosed species and non-FMP fisheries | $188.5 | $38.9 | 0.04% | 0.12% |
| All FMP and non-FMP Fisheries | $1,503.1 | $1,141.0 | 0.12% | 0.79% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a, 2023).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

The “Other FMPs, non-disclosed species, and non-FMP fisheries” category includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

### *Port*

**Table G-CF60. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative G**

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Beaufort, NC* | *$9.7* | *$3.1* | *0.12%* | *0.36%* |
| Chilmark/Menemsha, MA‡ | $25.3 | $15.2 | 3.22% | 3.61% |
| *Fairhaven, MA* | *$27.5* | *$16.3* | *0.14%* | *1.13%* |
| *Fall River, MA* | *$24.2* | *$11.3* | *1.00%* | *2.54%* |
| *Hampton, VA* | *$6.8* | *$3.0* | *0.02%* | *0.19%* |
| Little Compton, RI | $184.1 | $124.0 | 6.22% | 6.39% |
| Montauk, NY | $36.6 | $15.4 | 0.08% | 0.13% |
| New Bedford, MA | $547.8 | $319.0 | 0.08% | 0.66% |
| *New London, CT* | *$20.0* | *$8.3* | *0.12%* | *0.31%* |
| *Newport News, VA* | *$14.6* | *$3.3* | *0.01%* | *0.19%* |
| Newport, RI | $181.5 | $99.5 | 1.12% | 3.45% |
| Point Judith, RI | $650.7 | $500.1 | 1.09% | 1.82% |
| *Point Pleasant Beach, NJ* | *$15.0* | *$3.3* | *0.01%* | *0.04%* |
| Stonington, CT | $18.5 | $6.8 | 0.07% | 0.21% |
| *Tiverton, RI* | *$14.2* | *$6.1* | *0.53%* | *0.93%* |
| Westport, MA | $104.0 | $59.7 | 4.57% | 5.10% |
| **Revenues by Port State‡** | | | | |
| All Connecticut ports | $38.5 | $12.9 | 0.08% | 0.22% |
| All Massachusetts ports | $686.1 | $443.7 | 0.09% | 0.78% |
| *All New Jersey ports* | $18.0 | $4.9 | 0.00% | 0.03% |
| All New York ports | $37.9 | $15.7 | 0.05% | 0.09% |
| All Rhode Island ports | $942.4 | $753.5 | 1.09% | 2.23% |

| Port and State | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions* | Average Annual Revenue as a Percentage of Total Revenue in the RFA† |
|---|---|---|---|---|
| *Ports in all other states* | *$44.4* | *$13.6* | *0.01%* | *0.31%* |
| **Total** | **$1,503.7** | **$1,244.3** | **0.13%** | **0.86%** |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a, 2023).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* See Table 3.9-4 in Section 3.9 for Mid-Atlantic and New England fisheries data by port and state.

† See Table 3.9-8 in Section 3.9 for RFA fisheries data by port state.

‡ Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

### *Gear*

**Table G-CF61. Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative G**

| Gear Type | Peak Annual Revenue ($1,000s) | Average Annual Revenue ($1,000s) | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions | Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA |
|---|---|---|---|---|
| *Dredge-clam* | *$167.2* | *$62.5* | *0.13%* | *0.38%* |
| Dredge-scallop | $306.4 | $106.6 | 0.03% | 0.30% |
| Gillnet-sink | $247.9 | $163.7 | 0.60% | 1.86% |
| Handline | $13.2 | $3.3 | 0.08% | 0.26% |
| Pot† | $465.8 | $306.0 | 0.24% | 1.72% |
| Trawl-bottom | $591.9 | $441.8 | 0.21% | 0.93% |
| *Trawl-midwater* | *$184.7* | *$95.6* | *0.42%* | *3.39%* |
| All other gear* | $407.3 | $116.1 | 0.12% | 2.05% |
| All gear types | $1,503.7 | $1,295.6 | 0.13% | 0.84% |

Source: Developed using 2008 through 2019 data from NMFS (2021a, 2022a, 2023).

Notes: Revenue is adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. Peak annual revenue is calculated independently for all rows including the total row.

† Pot gear combines pot-lobster and pot-other.

Gear types shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

## Comparison of Estimated Annual Commercial Fishing Revenue Exposed (2008–2019 and 2008–2021)

This section compares the estimated annual revenue at risk in the 1) Lease Area and 2) Lease Area and along the RWEC under Alternative G based on the data for two different time periods: 2008–2019 and 2008–2021.

**Table G-CF62. Comparison of Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative G Based on Data for 2008–2019 and 2008–2021**

| FMP Fishery | Average Annual Revenue from 2008–2019 ($1,000's) | Average Annual Revenue from 2008–2021 ($1,000s) | Absolute Difference ($1,000s) | Percentage Difference |
|---|---|---|---|---|
| American Lobster | $253.5 | $258.2 | $4.7 | 1.8% |
| Atlantic Herring | $104.3 | $89.7 | ($14.6) | -14.0% |
| Bluefish | $8.9 | $8.7 | ($0.1) | -1.3% |
| Highly Migratory Species | $1.8 | $1.7 | ($0.1) | -4.4% |
| Jonah Crab | $20.8 | $19.9 | ($0.9) | -4.4% |
| Mackerel/Squid/Butterfish | $135.5 | $136.1 | $0.6 | 0.5% |
| Monkfish | $88.1 | $80.4 | ($7.7) | -8.8% |
| Northeast Multispecies (large-mesh) | $38.6 | $34.1 | ($4.5) | -11.7% |
| Northeast Multispecies (small-mesh) | $62.0 | $84.1 | $22.1 | 35.7% |
| Atlantic Sea Scallop | $115.1 | $110.3 | ($4.8) | -4.1% |
| Northeast Skate Complex | $96.6 | $91.2 | ($5.3) | -5.5% |
| Spiny Dogfish | $14.1 | $12.3 | ($1.9) | -13.1% |
| Summer Flounder/Scup/Black Sea Bass | $162.8 | $169.5 | $6.7 | 4.1% |

| FMP Fishery | Average Annual Revenue from 2008–2019 ($1,000's) | Average Annual Revenue from 2008–2021 ($1,000s) | Absolute Difference ($1,000s) | Percentage Difference |
|---|---|---|---|---|
| Other FMPs, non-disclosed species and non-FMP fisheries | $38.9 | $40.3 | $1.4 | 3.5% |
| **All FMP and non-FMP Fisheries** | **$1,141.0** | **$1,136.5** | **($4.5)** | **-0.4%** |

Source: Developed using data from NMFS (2023).

Notes: Revenues are adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. *Absolute Difference* is calculated by subtracting the *Annual Average for 2008–2019* from *Annual Average for 2008–2021.* The percentage difference is calculated as *Absolute Difference ÷ Annual Average for 2008–2019.*

**Table G-CF63. Comparison of Average Annual Commercial Fishing Landings in the Lease Area and along the RWEC by Species under Alternative G Based on Data for 2008–2019 and 2008–2021**

| Species | Average Annual Landings from 2008–2019 (pounds) | Average Annual Revenue from 2008–2021 (pounds) | Absolute Difference (pounds) | Percentage Difference |
|---|---|---|---|---|
| American lobster | 48,245 | 48,508 | 263 | 0.5% |
| Atlantic herring | 842,128 | 777,828 | -64,300 | -7.6% |
| Atlantic mackerel | 77,828 | 72,325 | -5,502 | -7.1% |
| Black sea bass | 5,985 | 6,719 | 734 | 12.3% |
| Bluefish | 12,851 | 12,701 | -150 | -1.2% |
| Butterfish | 22,051 | 25,852 | 3,800 | 17.2% |
| Cod | 4,271 | 3,990 | -280 | -6.6% |
| Jonah crab | 28,192 | 27,251 | -941 | -3.3% |
| *Loligo* squid | 82,281 | 80,526 | -1,755 | -2.1% |
| Monkfish | 56,696 | 56,143 | -553 | -1.0% |
| Red hake | 20,120 | 20,622 | 501 | 2.5% |
| Rock crab | 5,442 | 5,203 | -239 | -4.4% |
| Scup | 88,003 | 91,133 | 3,130 | 3.6% |
| Sea scallops | 11,604 | 11,596 | -8 | -0.1% |
| Silver hake | 100,234 | 128,859 | 28,624 | 28.6% |
| Skates | 433,208 | 419,330 | -13,879 | -3.2% |
| Spiny dogfish | 60,495 | 56,646 | -3,850 | -6.4% |
| Summer flounder | 21,765 | 22,896 | 1,130 | 5.2% |

| Species | Average Annual Landings from 2008–2019 (pounds) | Average Annual Revenue from 2008–2021 (pounds) | Absolute Difference (pounds) | Percentage Difference |
|---|---|---|---|---|
| Winter flounder | 5,378 | 5,166 | -211 | -3.9% |
| Yellowtail flounder | 5,678 | 5,247 | -430 | -7.6% |

Source: Developed using data from NMFS (2023).

Notes: *Absolute Difference* is calculated by subtracting the *Annual Average for 2008–2019* from *Annual Average for 2008–2021.* The percentage difference is calculated as *Absolute Difference ÷ Annual Average for 2008–2019.*

**Table G-CF64. Comparison of Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative G Based on Data for 2008–2019 and 2008–2021**

| Port and State | Average Annual Revenue from 2008–2019 ($1,000s) | Average Annual Revenue from 2008–2021 ($1,000s) | Absolute Difference ($1,000s) | Percentage Difference |
|---|---|---|---|---|
| *Beaufort, NC* | *$3.1* | *$3.4* | *$0.4* | *11.8%* |
| Chilmark/Menemsha, MA | $15.2 | $15.0 | -$0.1 | -0.9% |
| *Fairhaven, MA* | $16.3 | $16.3 | – | – |
| *Fall River, MA* | *$11.3* | *$11.3* | – | – |
| *Hampton, VA* | *$3.0* | *$3.1* | *$0.1* | *3.4%* |
| Little Compton, RI | $124.0 | $118.0 | -$6.0 | -4.9% |
| Montauk, NY | $15.4 | $14.7 | -$0.7 | -4.3% |
| New Bedford, MA | $319.0 | $289.5 | -$29.5 | -9.2% |
| *New London, CT* | *$8.3* | *$7.8* | *-$0.5* | *-6.3%* |
| *Newport News, VA* | *$3.3* | *$3.5* | *$0.2* | *7.1%* |
| Newport, RI | $99.5 | $95.5 | -$4.0 | -4.1% |
| Point Judith, RI | $500.1 | $533.8 | $33.7 | 6.7% |
| *Point Pleasant Beach, NJ* | $3.3 | $2.9 | -$0.3 | -9.5% |
| Stonington, CT | $6.8 | $6.9 | $0.1 | 1.5% |
| *Tiverton, RI* | *$6.1* | *$6.1* | – | – |
| Westport, MA | $59.7 | $58.6 | -$1.1 | -1.8% |
| **Revenues by Port State*** | | | | |
| All Connecticut ports | $12.9 | $12.4 | -$0.5 | -3.8% |

| Port and State | Average Annual Revenue from 2008–2019 ($1,000s) | Average Annual Revenue from 2008–2021 ($1,000s) | Absolute Difference ($1,000s) | Percentage Difference |
|---|---|---|---|---|
| All Massachusetts ports | $443.6 | $407.8 | -$35.9 | -8.1% |
| All New Jersey ports | $4.9 | $4.5 | -$0.3 | -7.2% |
| All New York ports | $15.7 | $15.0 | -$0.7 | -4.5% |
| All Rhode Island ports | $753.6 | $773.6 | $20.1 | 2.7% |
| *Ports in all other states* | *$13.6* | *$15.3* | *$1.7* | *12.6%* |
| **Total** | **$1,244.3** | **$1,228.6** | **($15.7)** | **-1.3%** |

Source: Developed using data from NMFS (2023).

Notes: Revenues are adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. *Absolute Difference* is calculated by subtracting the *Annual Average for 2008–2019* from *Annual Average for 2008–2021.* The percentage difference is calculated as *Absolute Difference ÷ Annual Average for 2008–2019.* Revenues are adjusted for inflation to 2019 dollars.

Ports shown in *italics* indicate that landings did not occur in the port or state in all years. Averages are calculated based on the number of years landings were reported.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* Revenues by Port State includes all of the revenues by the ports listed above, as well as revenues of other ports within the state that were reported by NMFS, but which had 4 or fewer years of data and were not included in the table.

**Table G-CF65. Comparison of Estimated Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative G Based on Data for 2008–2019 and 2008–2021**

| Gear | Average Annual Revenue from 2008–2019 ($1,000s) | Average Annual Revenue from 2008–2021 ($1,000s) | Absolute Difference | Percentage Difference |
|---|---|---|---|---|
| *Dredge-clam* | *$68.3* | *$68.3* | – | – |
| Dredge-scallop | $122.3 | $119.2 | -$3.1 | -2.6% |
| Gillnet-sink | $175.6 | $163.4 | -$12.3 | -7.0% |
| Handline | $3.6 | $3.6 | -$0.1 | -2.0% |
| Pot gear[†] | $332.3 | $352.5 | $20.2 | 6.1% |
| Trawl-bottom | $487.9 | $519.6 | $31.7 | 6.5% |
| *Trawl-midwater* | $103.2 | $103.2 | – | – |
| *All other gear** | *$111.8* | *$100.7* | *-$11.2* | *-10.0%* |
| **All gear types** | **$1,405.0** | **$1,430.2** | **$25.2** | **1.8%** |

Source: Developed using data from NMFS (2023).

Notes: Revenues are adjusted for inflation to 2019 dollars using the GDP Implicit Price Deflator. *Absolute Difference* is calculated by subtracting the *Annual Average for 2008–2019* from *Annual Average for 2008–2021.* The percentage difference is calculated as *Absolute Difference ÷ Annual Average for 2008–2019.*

† Pot gear combines pot-lobster and pot-other.

Gear types shown in *italics* indicate there were multiple years for which data were not reported, and averages were calculated by summing all years and dividing by non-zero years. Otherwise, averages are based on all year of data.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when gears were not disclosed.

## Annual Commercial Fishing Revenue in the Entire Lease Area and Lease Area under Alternative G by State of Landing

This section shows the commercial fishing revenue in the entire Lease Area (Figure 1.1-2) and the Lease Area under Alternative G (Figure 2.1-22) by state of landing for each year from 2008 to 2021. In addition, the section compares the average annual commercial fishing revenue in the separate entire Lease Area and the Lease Area under Alternative G by state of landing based on the data for two different time periods: 2008–2019 and 2008–2021.

**Table G-CF66. Comparison of Average Annual Commercial Fishing Revenue in the Entire Lease Area by State Based on Data for 2008–2019 and 2008–2021**

| State of Landing | CT ($1,000s) | MA ($1,000s) | ME ($1,000s) | NC ($1,000s) | NJ ($1,000s) | NY ($1,000s) | RI ($1,000s) | VA ($1,000s) | All Other States ($1,000s) | All States ($1,000s) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2008 | $22.5 | $568.8 | – | – | – | $27.6 | $748.6 | – | $1.0 | $1,368.6 |
| 2009 | $4.2 | $628.5 | – | – | $0.9 | $10.4 | $689.6 | – | – | $1,333.7 |
| 2010 | $1.5 | $356.8 | – | – | $0.0 | $14.3 | $438.4 | – | $3.5 | $814.5 |
| 2011 | $6.6 | $511.2 | – | – | $1.2 | $13.7 | $554.9 | $0.3 | $0.1 | $1,088.0 |
| 2012 | $10.6 | $269.9 | – | $0.5 | $1.8 | $11.1 | $642.6 | $1.1 | – | $937.5 |
| 2013 | $12.9 | $397.9 | $10.9 | $1.8 | $0.9 | $12.6 | $580.9 | $24.7 | $0.1 | $1,042.6 |
| 2014 | $8.9 | $573.8 | – | $3.2 | $3.6 | $15.4 | $726.4 | $2.0 | $3.2 | $1,336.5 |
| 2015 | $23.8 | $673.7 | $1.6 | $0.9 | $8.5 | $16.1 | $603.5 | $3.7 | $0.1 | $1,331.9 |
| 2016 | $38.4 | $666.5 | $5.4 | $14.0 | $3.5 | $39.1 | $605.6 | $2.6 | – | $1,375.1 |
| 2017 | $11.3 | $264.3 | – | $2.8 | $17.6 | $20.3 | $408.3 | $8.4 | $0.4 | $733.4 |
| 2018 | $4.0 | $191.7 | – | $5.1 | $0.7 | $10.8 | $432.6 | $6.0 | – | $650.8 |
| 2019 | $11.5 | $409.4 | – | $5.5 | $3.0 | $10.8 | $647.7 | $3.4 | $0.6 | $1,091.9 |
| 2020 | $4.8 | $241.2 | – | $6.9 | $3.6 | $9.2 | $723.6 | $5.3 | $0.5 | $995.2 |
| 2021 | $12.9 | $195.3 | – | $9.2 | $1.1 | $13.1 | $728.2 | $12.7 | $0.0 | $972.5 |
| Average 2008–2019 | $13.0 | $459.4 | $6.0 | $4.2 | $3.8 | $16.9 | $589.9 | $5.8 | $1.1 | $1,092.0 |
| Average 2008–2021 | $12.4 | $424.9 | $6.0 | $5.0 | $3.6 | $16.0 | $609.4 | $6.4 | $1.0 | $1,076.6 |

Source: Developed using data from NMFS (2022b).

Notes: The column labeled *All Other States* includes data for listed states that could not be disclosed for confidentiality. Because data have been withheld for confidentiality, average annual revenues for each state are estimated by summing over all non-zero years and dividing by the number of non-zero years. Data are adjusted for inflation to 2019 dollars.

**Table G-CF67. Comparison of Average Annual Commercial Fishing Revenue in the Lease Area by State under Alternative G Based on Data for 2008–2019 and 2008–2021**

| State of Landing | CT ($1,000s) | MA ($1,000s) | ME ($1,000s) | NC ($1,000s) | NJ ($1,000s) | NY ($1,000s) | RI ($1,000s) | VA ($1,000s) | All Other States ($1,000s) | All States ($1,000s) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2008 | $18.8 | $469.5 | $0.0 | – | $0.8 | $17.8 | $529.2 | – | – | $1,036.1 |
| 2009 | $2.8 | $504.8 | – | – | $0.7 | $7.6 | $472.2 | – | – | $988.2 |
| 2010 | $1.1 | $289.7 | – | – | $0.0 | $10.5 | $300.7 | $2.3 | – | $604.3 |
| 2011 | $5.4 | $385.3 | – | $0.1 | $0.9 | $10.3 | $394.8 | $0.2 | – | $797.0 |
| 2012 | $7.9 | $228.1 | – | $0.4 | $1.3 | $8.2 | $494.0 | $0.8 | – | $740.7 |
| 2013 | $10.1 | $319.7 | $8.9 | $1.3 | $0.6 | $9.2 | $406.9 | $20.7 | $0.1 | $777.5 |
| 2014 | $6.6 | $467.0 | $2.0 | $2.6 | $2.6 | $12.0 | $551.8 | $1.6 | – | $1,046.3 |
| 2015 | $17.6 | $584.4 | $1.2 | $0.7 | $6.7 | $13.1 | $454.6 | $2.9 | $0.0 | $1,081.3 |
| 2016 | $31.1 | $552.2 | $4.3 | $11.9 | $2.5 | $31.3 | $476.9 | $2.0 | – | $1,112.2 |
| 2017 | $9.5 | $214.9 | – | $2.2 | $14.6 | $16.1 | $316.4 | $6.2 | $0.3 | $580.3 |
| 2018 | $3.1 | $160.9 | – | $3.8 | $0.6 | $8.1 | $336.7 | $4.8 | – | $518.0 |
| 2019 | $9.1 | $353.5 | – | $4.4 | $2.1 | $8.6 | $521.6 | $2.7 | $2.2 | $904.3 |
| 2020 | $3.7 | $183.5 | – | $5.7 | $2.7 | $7.3 | $582.6 | $4.3 | $1.0 | $790.8 |
| 2021 | $10.8 | $156.0 | – | $7.6 | $0.8 | $10.3 | $605.3 | $10.2 | $7.6 | $808.5 |
| Average 2008–2019 | $10.3 | $377.5 | $3.3 | $3.1 | $2.8 | $12.7 | $438.0 | $4.4 | $0.7 | $848.9 |
| Average 2008–2021 | $9.8 | $347.8 | $3.3 | $3.7 | $2.6 | $12.2 | $460.3 | $4.9 | $1.9 | $841.8 |

Source: Developed using data from NMFS (2023).

Notes: The column labeled *All Other States* includes data for listed states that could not be disclosed for confidentiality. Because data have been withheld for confidentiality, average annual revenues for each state are estimated by summing over all non-zero years and dividing by the number of non-zero years. Data are adjusted for inflation to 2019 dollars.

CT = Connecticut, MA = Massachusetts, ME = Maine, NC = North Carolina, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

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# Demographics, Employment, and Economics

This section provides a summary of the assumptions and methodologies used to generate estimates of the employment impacts of the Project under the alternatives assessed.

## Assumptions Regarding Local Hiring Practices and Local and U.S. Suppliers of Wind Farm Components

This section contains two subsections that describe a) the assumptions regarding the local hiring practices of Revolution Wind, and b) the ability of local and U.S. manufacturing industries to meet the demands of offshore wind projects.

### Local Hiring Practices

Revolution Wind documents many of its assumptions relating to local hiring practices in Table ES-1 of the COP and provides additional information in Section 4.6.1 of the COP (VHB 2023). These are summarized in the bulleted list below and provide guidance for the assessment of the economic impacts of the Project and alternatives:

- Where possible, local workers would be hired to meet labor needs for Project construction, operations and maintenance (O&M), and decommissioning.
- The onshore facilities construction schedule would be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day.
- The Project would be constructed using multiple ports for fabrication and pre-commissioning and could use locations in different states throughout the geographic analysis area.
- Revolution Wind would hire local workers to the extent practical for RWF, RWEC, and interconnection facility management, fabrication, and construction.
- Non-local construction personnel typically include mariners, export cable manufacturing personnel, and other specialists who may temporarily relocate during the construction and decommissioning.
- Population impacts to the communities in the geographic analysis area could result mainly from the short-term influx of construction personnel. The total population change is assumed to equal the total number of non-local construction workers plus any accompanying family members. Due to the short duration of construction activities,[6] however, it is unlikely that non-local workers would relocate families to the area.

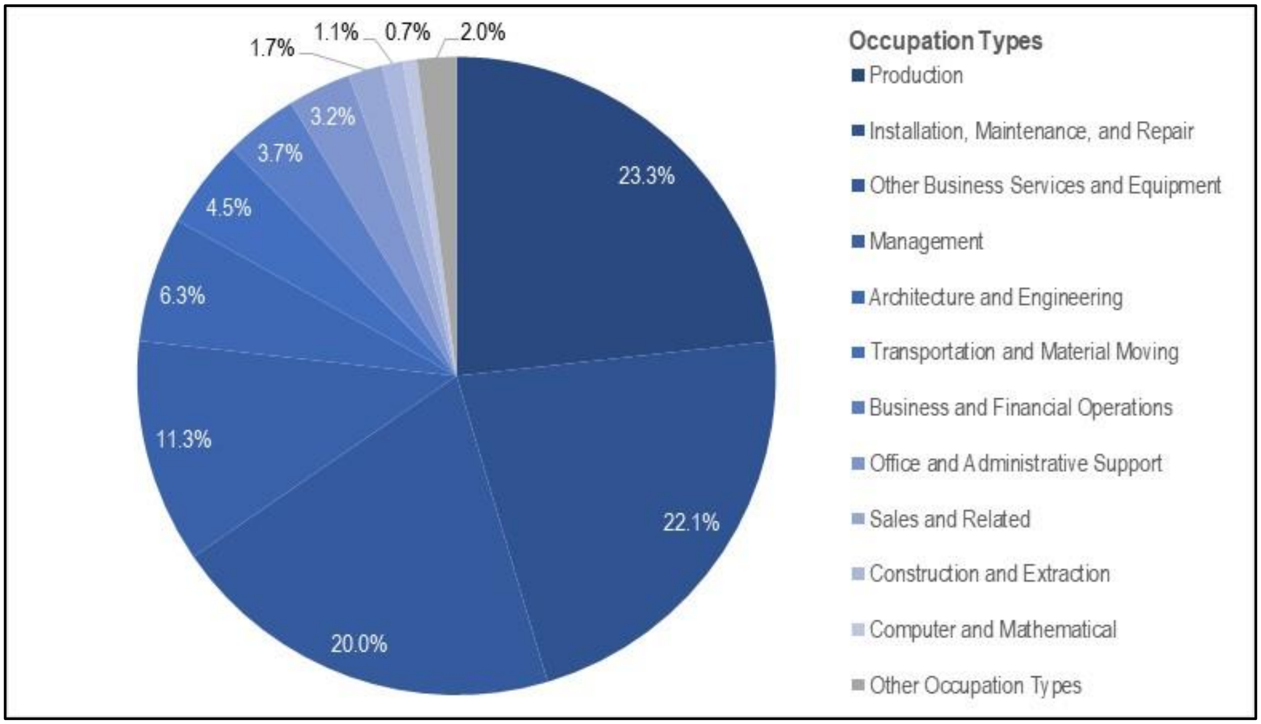
[6] Revolution Wind lists the expected duration of various components of construction, installation, and commissioning of the Project in Sections 3.3 and 3.4 of the COP (VHB 2023). It is assumed that the actual construction work on the Project would be completed within a 2-year window. Final engineering, design, and manufacturing of Project components would begin prior to actual construction and installation.

### Assumptions Regarding the Ability of "Local Suppliers" to Meet Project Demands for Specialized Project Components

Several recent studies describe the offshore wind industry in the United States as being in its early developmental stages, and that as it currently exists, a relatively large share of the capital expenditures (CapEx) of the Project and the resulting jobs and income for offshore wind projects are likely to leak out to economies outside both the geographic analysis area and the United States as a whole. In its study for the U.S. Department of Energy, Navigant Consulting, Inc. (2013:x) states that because of the lack of U.S. demand for offshore components, "no domestic manufacturing facilities are currently serving the offshore wind market." More recently, AECOM (2017:3-42) in its white paper, *Evaluating Benefits of Offshore Wind Energy Projects in NEPA*, developed for BOEM, states the following:

> At each phase of offshore wind energy development, there is the potential to generate economic benefits locally, regionally, nationally, and/or internationally, depending on the extent to which these geographic areas can deliver the materials and skills necessary to develop offshore wind energy. Imported materials and services into the particular region being assessed represent lost opportunities for local production and employment. As the offshore wind energy industry advances in the U.S., more opportunities for domestic value can be created along the value chain and for supporting services. Supporting services could include consulting services, financial services, education and training, and research and development.

From a more quantitative perspective, BVG Associates Limited (BVG) (2017) concludes that for offshore projects constructed before 2022, the United States as a whole can expect to realize a minimum of 35% of the total expected jobs needed to meet U.S. demand, including jobs in the supply chain, development, and construction. In addition, BVG concludes that there is a high probability that United States–based jobs could be between 50% and 63% of offshore wind–related jobs by 2022. The BVG report also estimates the numbers of jobs by occupational type that can be expected in the future with offshore wind development. Figure G-DEM1 summarizes the major occupational types that are expected to increase as a result of offshore wind projects as projected by BVG (2017).




Source: Developed from data provided by BVG (2017).

**Figure G-DEM1. Expected occupational categories for offshore wind development.**

A March 2020 report by the American Wind Energy Association (2020) appears somewhat more conservative and assumes in its baseline scenario that by 2025, U.S. offshore wind installations will reach 2,000 MW per year with domestic content reaching 21% of the total capital expenditure. By 2030, it expects domestic content to increase to 45% in its baseline scenario.

Based on the economic impact methodology used, which is described in the next section, it is estimated that the local share of CapEx for the RWF would range from approximately 20% to 30% of pre-tax CapEx, whereas the local share for operating expenditures (OpEx) (excluding local taxes, lease payments, and finance charges) is estimated at 40% to 50% of total OpEx (excluding local taxes, lease payments, and finance charges).

## Methodology Used to Estimate Employment and Value-Added Impacts of Alternatives Included in the Environmental Impact Statement

This section describes the methodology used to generate estimates of the economic impacts (jobs and value added) of the Project and included alternatives. The first section describes the estimates of economic impacts of the Project as estimated in the COP, and the second section describes the methodology used to assess the impacts of permutations of the Project required for the EIS that were not included in the COP.

### Economics Impacts of the Project as Estimated in the Construction and Operations Plan

In the COP and Appendix CC to the COP, Hamilton and Nubbe (2020), using the Jobs and Economic Development Impacts Offshore Wind Model (JEDI-OWM) developed by the National Renewable Energy

Laboratory (NREL 2017), provide an economic impact analysis summarizing estimates of jobs, earnings, output, and value added that are expected to result from a "Baseline Project" with a nameplate capacity of 712 megawatts (MW) that uses 89 wind turbine generators (WTGs), each with a capacity to generate 8 MW of power. In COP Appendix CC, Hamilton and Nubbe (2020) state that the "primary source for the model inputs was DWW Rev I who provided capital and operating budgets including costs, employment, and percent local data that are specific to the Project." Although the COP and Appendix CC summarize Baseline Project impacts, very few of the project-specific inputs provided to Hamilton and Nubbe (2020) for use in its modeling exercise were actually specified. Two key confidential inputs[7] were included in Appendix CC—specifically, the total expected capital expenditures (Total CapEx) for the Project and the total local expenditure for O&M (Local OpEx). Table DEM-1 summarizes the "local" jobs and investment impacts of the Baseline Project in Rhode Island and Connecticut as estimated by Hamilton and Nubbe (2020).

**Table G-DEM1. Summary of Jobs and Investment Impacts in Rhode Island and Connecticut for the Baseline Project**

| Project Phase | Impact Category | Jobs | Earnings ($ millions) | Output ($ millions) | Value Added ($ millions) |
|---|---|---|---|---|---|
| Construction | Direct | 1,440 | $124.40 | $148.80 | $130.10 |
| | Indirect | 1,623 | $123.00 | $497.40 | $205.80 |
| | Induced | 793 | $51.10 | $137.60 | $81.10 |
| | **Total** | **3,856** | **$298.50** | **$783.90** | **$417.00** |
| Operations | Direct | 58 | $4.90 | $4.90 | $4.90 |
| | Indirect | 18 | $1.50 | $51.40 | $47.50 |
| | Induced | 156 | $10.80 | $29.30 | $17.60 |
| | **Total** | **233** | **$17.20** | **$85.70** | **$70.00** |

Source: Hamilton and Nubbe (2020).

Note that the impacts of the Baseline Project (712-MW capacity using 89 8-MW WTGs) during construction aggregate impacts over the entire construction period. Construction job figures are in job years, which are full-time equivalent (FTE) jobs multiplied by the number of construction years. Operations jobs are FTEs for a period of 1 year.

Northern Economics—the contracted economic analysts for this EIS—have developed similar estimates using the same JEDI-OWM for an identically sized project using confidential inputs for Total CapEx and Total Local OpEx that were documented in Appendix CC, but without the additional inputs that were supplied to Hamilton and Nubbe (2020) from Revolution Wind. These results are provided in Table G-DEM2, and Table G-DEM3 presents a percentage-based comparison of the two set of results. An examination of the tables indicates that there are differences in the two sets of tables—the additional inputs supplied by Revolution Wind to Hamilton and Nubbe (2020) are important for directly estimating Project impacts.

[7] These key inputs are considered confidential and therefore cannot be specified in the EIS.

**Table G-DEM2. Summary of Jobs and Investment Impacts in Rhode Island and Connecticut for the Baseline Project as Developed by Northern Economics**

| Project Phase | Impact Category | Jobs | Earnings ($ millions) | Output ($ millions) | Value Added ($ millions) |
|---|---|---|---|---|---|
| Construction | Direct | 1,185 | $56.52 | $222.28 | $84.95 |
| | Indirect | 2,016 | $146.37 | $574.85 | $224.00 |
| | Induced | 1,376 | $86.84 | $237.76 | $145.13 |
| | **Total** | **4,577** | **$289.73** | **$1,034.89** | **$454.09** |
| Operations | Direct | 42 | $4.32 | $4.32 | $4.32 |
| | Indirect | 99 | $7.70 | $26.35 | $11.45 |
| | Induced | 40 | $2.74 | $7.71 | $4.04 |
| | **Total** | 181 | $14.76 | $38.38 | $19.81 |

Source: Developed by Northern Economics using information in COP Appendix CC (Hamilton and Nubbe 2020).

Note that the impacts of the Baseline Project (712-MW capacity using 89 8-MW WTGs) during construction summarize impacts over the entire construction period. Construction job figures are in job years, which are full-time equivalent (FTE) jobs multiplied by the number of construction years. Operations jobs are FTEs for a period of 1 year.

**Table G-DEM3. Percentage-Based Comparison of Jobs and Economic Development Impacts Offshore Wind Model Results**

| Project Phase | Impact Category | Jobs in Table G-DEM2 as a Percentage of Jobs in Table G-DEM1 (%) | Earnings in Table G-DEM2 as a Percentage of Earnings in Table G-DEM1 (%) | Output in Table G-DEM2 as a Percentage of Output in Table G-DEM1 (%) | Value Added in Table G-DEM2 as a Percentage of Value Added in Table G-DEM1 (%) |
|---|---|---|---|---|---|
| Construction | Direct | 82% | 45% | 149% | 65% |
| | Indirect | 124% | 119% | 116% | 109% |
| | Induced | 174% | 170% | 173% | 179% |
| | **Total** | **119%** | **97%** | **132%** | **109%** |
| Operations | Direct | 71% | 88% | 88% | 88% |
| | Indirect | 71% | 88% | 88% | 88% |
| | Induced | 541% | 513% | 51% | 24% |
| | **Total** | 25% | 25% | 26% | 23% |

Source: Developed by Northern Economics.

Notwithstanding differences in the two sets of results, the full analysis of the economic impacts of the RWF requires estimates for the Baseline Project as well as estimates of economic impacts for the Project if larger WTGs are used (i.e., 10-MW or 12-MW WTGs) and/or if the Project capacity increased to its maximum capacity of 880 MW. In addition, because there is a suite of alternatives that could constrain the number of WTG positions that can be used (i.e., Alternatives C, D, and E), it will be necessary to estimate economic impacts under a much wider range of Project configurations than the single configuration provided in the COP.

Therefore, a methodology that builds on the results developed by Hamilton and Nubbe (2020) but allows the flexibility to estimate impacts under different configurations is required. This methodology is summarized below.

### Methodology to Estimate Project Permutations while Incorporating Information from Hamilton and Nubbe (2020)

The methodology developed to estimate Project permutations relies on the fact that the JEDI-OWM is essentially a scalable model—if the number of WTGs increases relative to the baseline and all other Project inputs are held constant, then the economic impacts generally change proportionally regardless of the starting values.

Assume for example that rather than the Baseline Project of 712 MW using 89 8-MW WTGs, a larger project of 800 MW using 100 8-MW turbines is assessed. In this case, the only change is the number of WTGs used in the Project, which increase by 12.4% from 89 to 100. The WTGs used are assumed to have the same unit cost as the monopile foundations on which they are installed. Similarly, assuming the spacing of the WTGs remains constant, the total length of the inter-array cable would also be expected to increase by an amount that approaches 12.4%. Table G-DEM4 shows the percentage differences between the 800-MW project and the 712-MW project as estimated by Northern Economics. Based on the built-in scalability of the JEDI-OWM model, it assumed that if Hamilton and Nubbe (2020) were to run the same comparison, changing only the total Project capacity by changing the number of WTGs and holding all $-per-kilowatt ratios constant, the results would be remarkably similar as those shown below.

**Table G-DEM4. Percentage-Based Comparison of Northern Economics JEDI-OWM Model Results between an 800-MW Project and a 712-MW Project**

| Project Phase | Impact Category | Jobs with the 800-MW Project as a Percentage of Jobs in Table G-DEM2 (%) | Earnings with the 800-MW Project as a Percentage of Earnings in Table G-DEM2 (%) | Output with the 800-MW Project as a Percentage of Output in Table G-DEM2 (%) | Value Added with the 800-MW Project as a Percentage of Value Added in Table G-DEM2 (%) |
|---|---|---|---|---|---|
| Construction | Direct | 110.8% | 109.0% | 106.6% | 108.4% |
| | Indirect | 109.8% | 110.3% | 110.9% | 110.3% |
| | Induced | 111.0% | 111.2% | 111.1% | 111.1% |
| | **Total** | **110.4%** | **110.3%** | **110.0%** | **110.2%** |

| | | | | | |
|---|---|---|---|---|---|
| Operations | Direct | 112.4% | 112.4% | 112.4% | 112.4% |
| | Indirect | 112.4% | 112.4% | 112.4% | 112.4% |
| | Induced | 112.4% | 112.4% | 112.4% | 112.4% |
| | **Total** | **112.4%** | **112.4%** | **112.4%** | **112.4%** |

Based on the results above, economic impacts of Project permutations will be estimated using the following steps:

1. Estimate the economic impacts of the Project permutation by making appropriate changes to Northern Economics' Baseline Project inputs
2. Estimate the percentage change of the permutation against the Northern Economic Baseline Project impacts.
3. Apply this percentage change to the Baseline Project impacts estimated by Hamilton and Nubbe (2020).

## Other Assumptions Used to Estimate Impacts of Project Permutations

In addition to the scaling methodology described above, the following assumptions are also used in the estimates of economic impacts.

### *Assumptions Regarding the Minimum Project Size If Larger Capacity Wind Turbine Generators are Used*

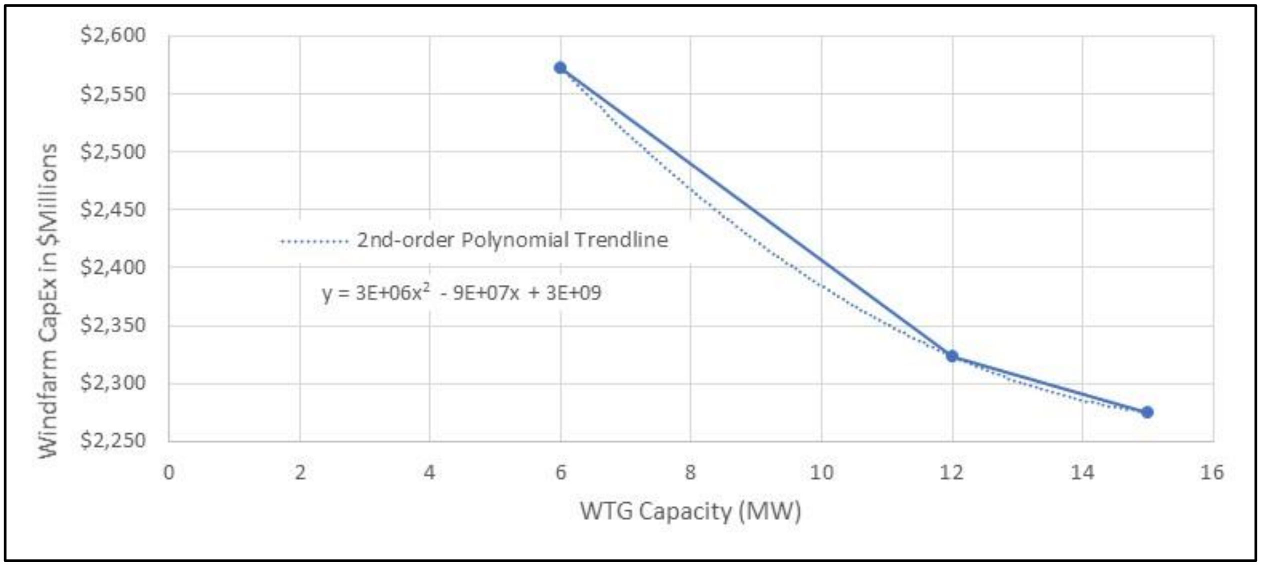
Hamilton and Nubbe (2020) do not explicitly state why they assumed a 712-MW project as opposed to a 704-MW project, which would match the Project's existing power purchase agreement (PPA) and the minimum project listed in the project design envelope (PDE), as reported in EIS Appendix D. Note that a 712-MW project with 89 8-MW WTGs exceeds the PPA by one full 8-MW WTG. Therefore, it is assumed that excess capacity would be built by an amount equal to one WTG in excess of the number of WTGs nominally needed to meet the 704-MW PPA. Thus, if 10-MW WTGs are used, 71 WTGs (with a total capacity of 710 MW) would nominally be able meet the 704-MW PPA. It is assumed, however, that one additional WTG would be installed for a total of 720 MW—the extra WTG would provide greater reliability for customers of the Project. Similarly, if 12-MW WTGs are used, 63 WTGs would nominally meet the PPA capacity with 708 MW. Adding one additional WTG (64 in total) would result in a Project capacity of 720 MW and provide greater reliability.[8]

### *Assumptions Regarding the Relative Project Capital Costs when Higher Capacity Wind Turbine Generators Are Used*

Information regarding the comparative capital costs of offshore wind projects that use smaller or larger WTGs are not readily available, although it is generally assumed and reported that use of larger WTGs generally results in lower overall capital costs and greater overall project efficiency. An updated version of the JEDI-OWM (Release 2021-2) has been made available (NREL 2021), which enables users to

[8] The Project developer has confirmed that the assumption is reasonable.

estimate project capital cost using a choice of three WTG capacities: 6 MW, 12 MW, or 15 MW.[9] Figure G-DEM2 shows hypothetical capital cost of a 720-MW project with three alternative assumptions regarding the size of the WTGs. Moving from the use of 6-MW WTGs to the use of 12-MW WTGs results in a nominal CapEx reduction of approximately $250 million or 10% of total CapEx. Using 15-MW WTGs rather than 12-MW WTGs results in a smaller (2%) CapEx reduction. The 2nd order polynomial trendline shown in the figure was used to estimate CapEx savings for similar size projects using different sizes of WTGs ranging from 6 to 16 MW.




Source: Developed by Northern Economics using JEDI-OWM Release 2021-2 (NREL 2021) and the RWF Project location.

Note: Reviewers should not assume the Project capital costs shown here reflect actual estimates of the Project capital costs for Revolution Wind.

**Figure G-DEM2. Hypothetical capital cost estimates of a 720-MW wind farm with three WTG sizes.**

### *Assumptions Regarding the Maximum Capacity Limits*

The PDE summarized in EIS Appendix D states that the maximum capacity of the Project is 880 MW. The PDE also indicates that WTGs ranging from 8 to 12 MW would be considered, but no more than 100 WTGs would be used. If 100 8-MW WTGs are used, then the largest project that could be built is 800 MW. An 880-MW project could be built using 88 10-MW WTGs, but if 12-MW WTGs are used, then 73 WTGs achieve a project capacity of 876 MW; using 71 12-MW WTGs results in a project that exceeds the maximum project capacity by 8 MW (i.e., project capacity would be 888 MW, and thus would not be developed).

Based on guidance from Revolution Wind (Roll 2021) indicating that they would not exceed the 880-MW maximum capacity of the Project established in the PDE, it is presumed that the maximum project size that would be developed if 12-MW WTGs are used would comprise 73 WTGs with a total capacity of 876 MW. Similarly, if 14-MW WTGs are authorized as in Alternative F, the largest project that would be

[9] Although JEDI-OWM Release 2021-2 includes this built-in capital cost comparison feature, the model does not yet appear to include built-in local economic impact coefficients linked to multipliers that enable the user to generate economic impacts in terms of jobs, earnings, and value added. In addition, NREL has not yet published a user guide for the newer version of the JEDI-OWM.

developed would use 62 14-MW WTGs for a total capacity of 868 MW, noting that adding an additional 14-MW turbine results in 882 MW of total capacity project, which would exceed the Project's maximum capacity of 880 MW (see EIS Appendix D).

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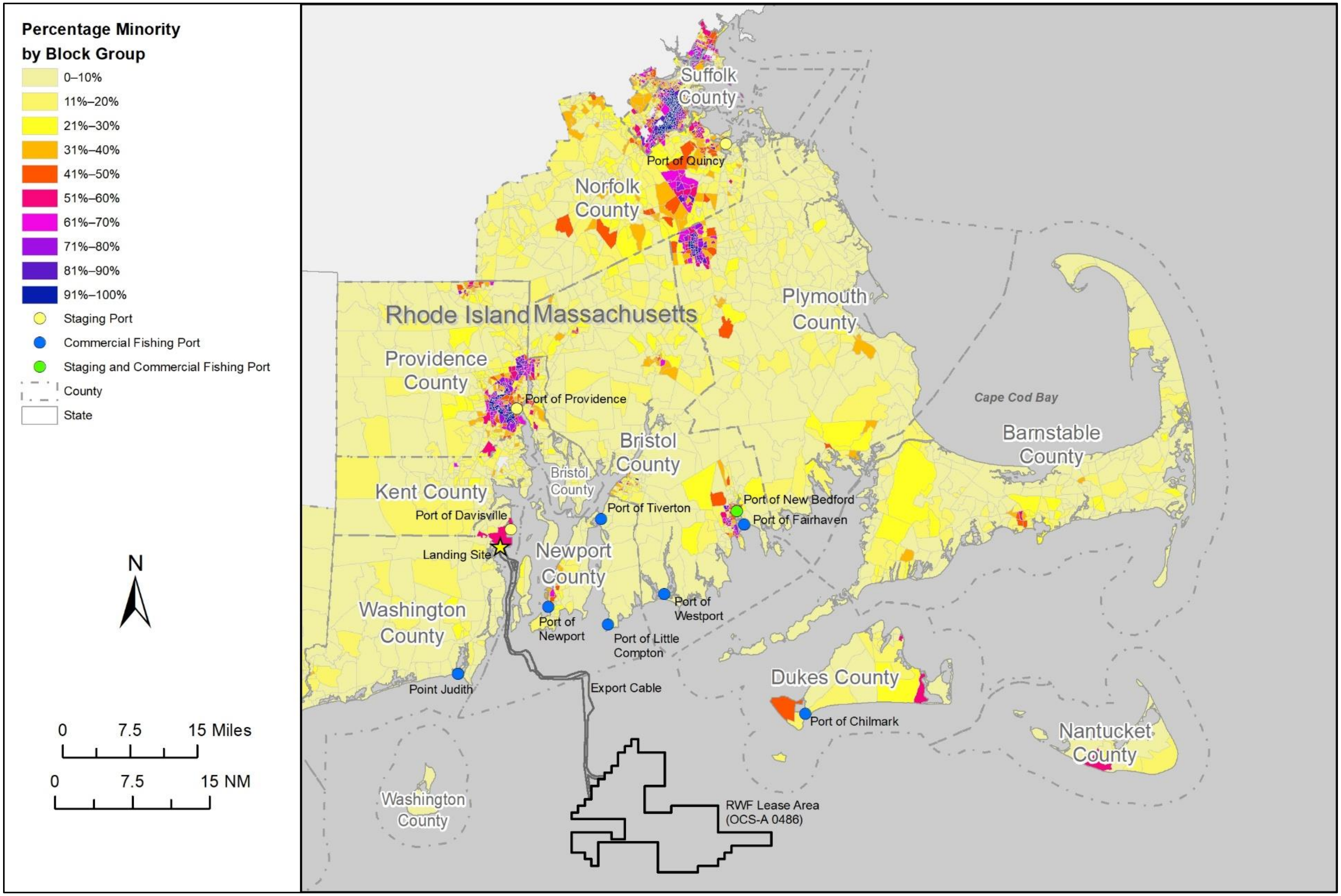
# Environmental Justice

This section provides maps displaying the environmental justice characteristics of the counties and cities/towns in the geographical analysis area. The geographical analysis area includes counties that contain or are adjacent to ports that may be used for Project construction staging, O&M, or decommissioning; contain major ports that commercial fisheries that could be affected by the Project; that contain the Project landing site and onshore transmission cable; or for which some portion of the county lies within the visual study area. Minority and low-income percentages are based on 2015-2019 American Community Survey 5-year summary file data obtained from EPA's Environmental Justice Screening and Mapping Tool (EJScreen), an environmental justice screening and mapping tool (EPA 2021).

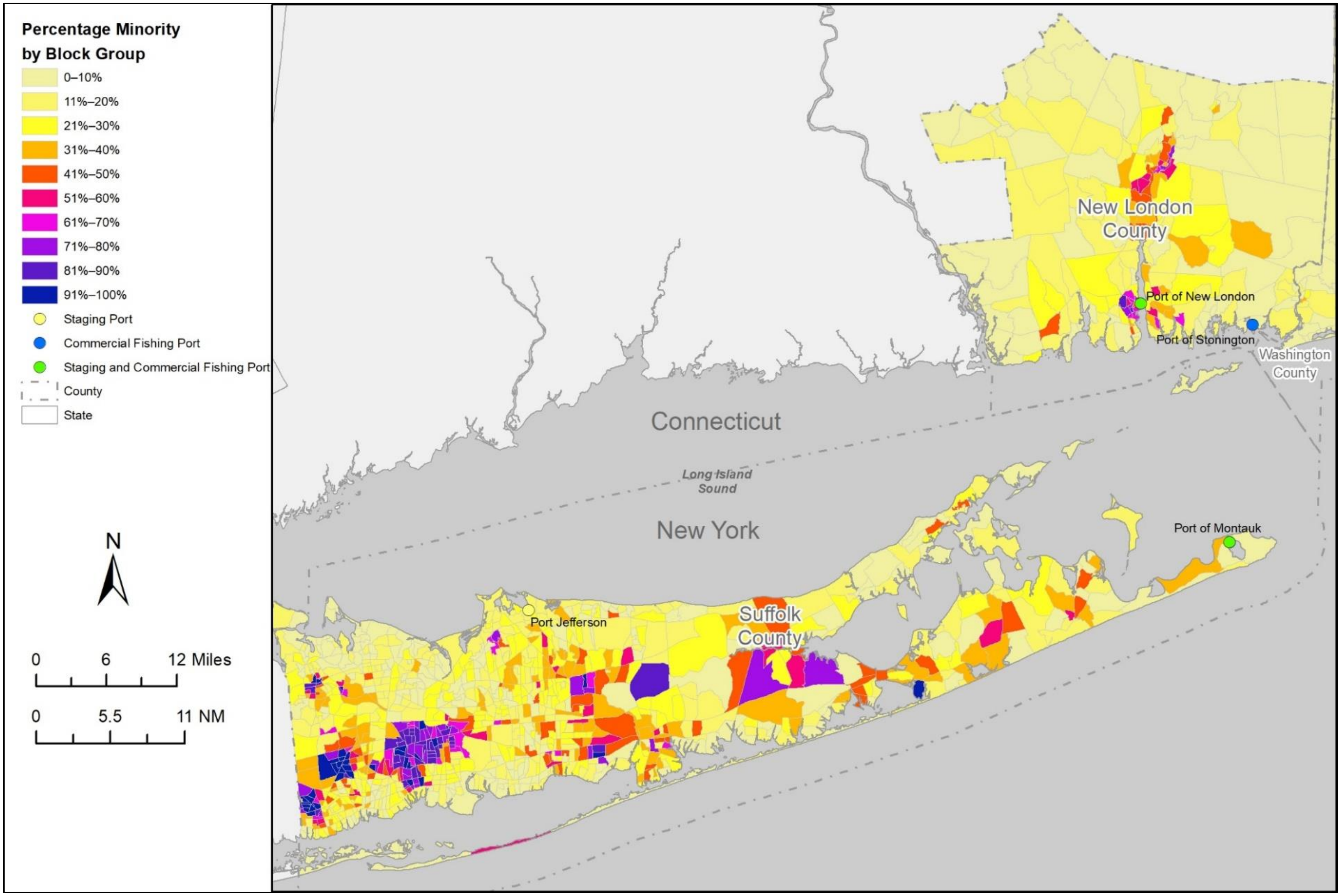
Figures G-EJ1 though G-EJ6 show minority population percentages by census block group, whereas Figures G-EJ7 through G-12 show low-income population percentages by census block group. Figures G-EJ13 though G-EJ18 show the locations of block groups that have been determined to be potential environmental justice areas of concern because of concentrations of minority or low-income populations (see Section 3.12.1 for additional details).

Tables G-EJ1 through G-EJ28 provide additional information about the identity of the block groups determined to be potential environmental justice areas of concern. The tables list the multi-digit identifier of each of these block groups. The block group identifiers are organized by county and sub-county name (city, town, or census designated place). Each identifier listed in the tables include the census tract (CT) code and census block group (BG) code as reported by the U.S. Census Bureau in the online mapping tool available at https://tigerweb.geo.census.gov/tigerweb/ (U.S. Census Bureau 2021). The fully specified identifiers for census block groups include the two-digit code for the state and three-digit code for the county. The captions for the tables include these codes. Each block group is categorized based on whether it is a potential environmental justice concern because of its minority population, low-income population, or both.



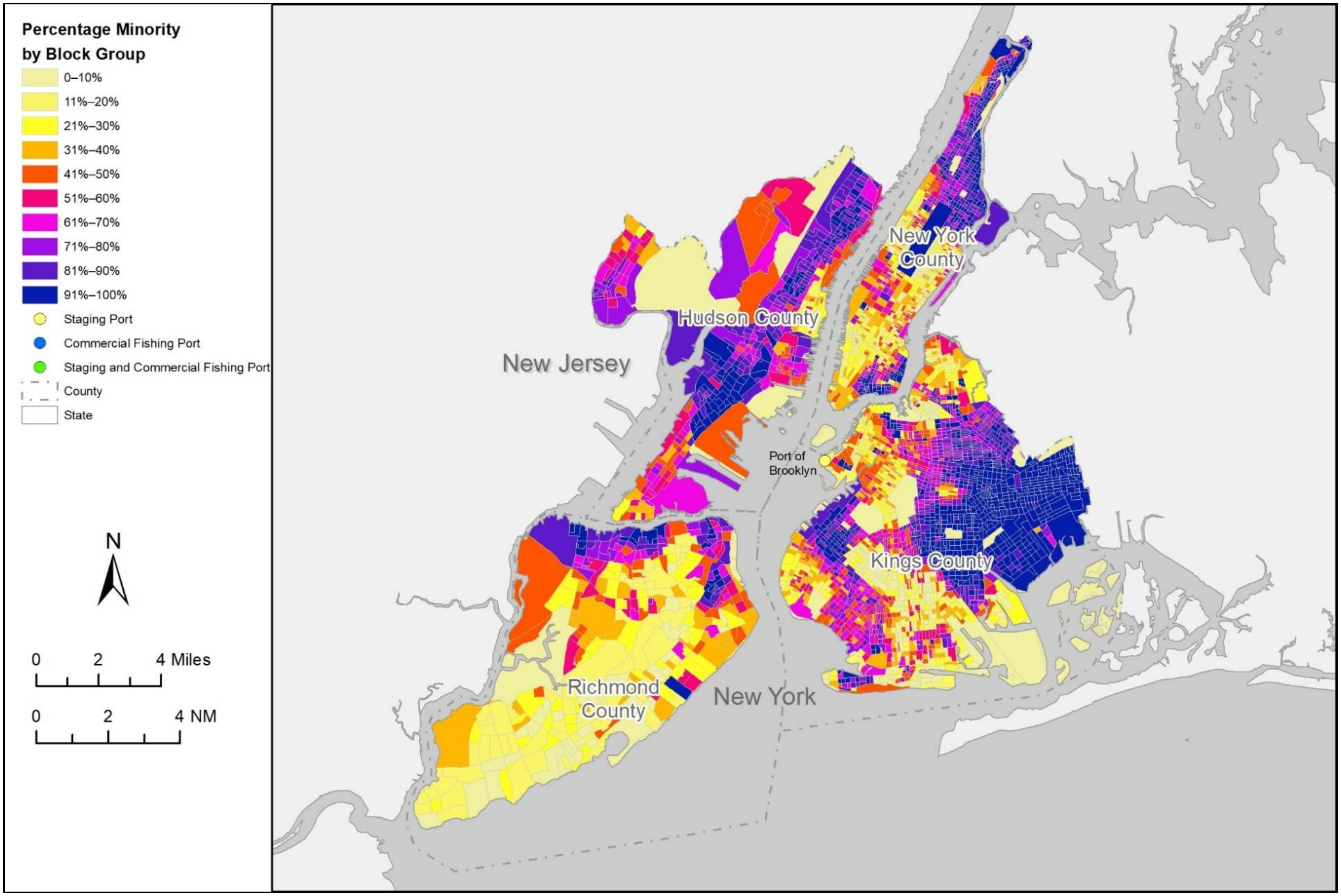

Source: Developed from information in EPA (2021).

**Figure G-EJ1. Distribution of minority populations by census block group in potentially affected counties in Rhode Island and Massachusetts.**



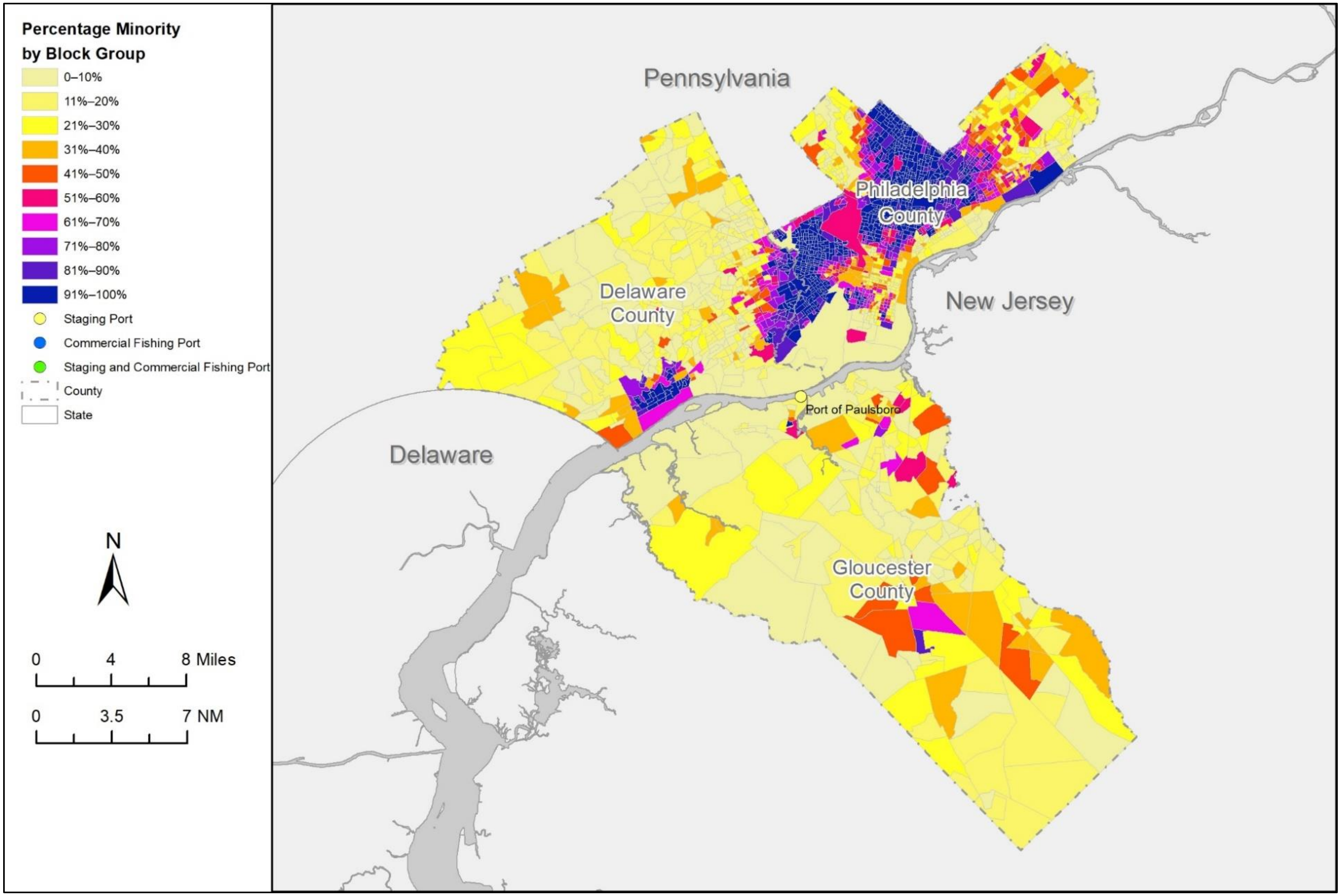

Source: Developed from information in EPA (2021).

**Figure G-EJ2. Distribution of minority populations by census block group in New London County, Connecticut, and Suffolk County, New York.**



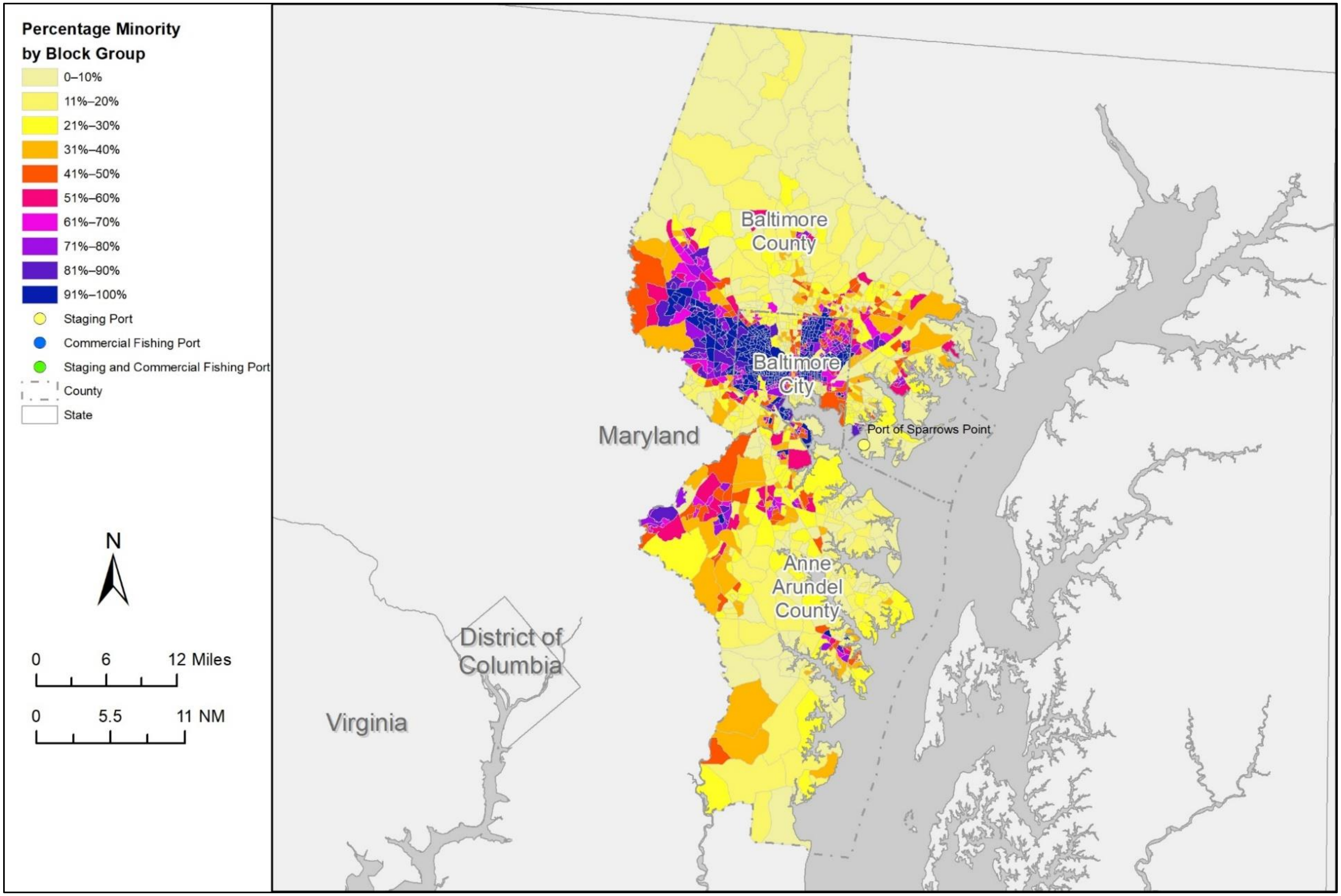

Source: Developed from information in EPA (2021).

**Figure G-EJ3. Distribution of minority populations by census block group in Kings County (Brooklyn), New York; Richmond County, New York; New York County, New York; and Hudson County, New Jersey.**



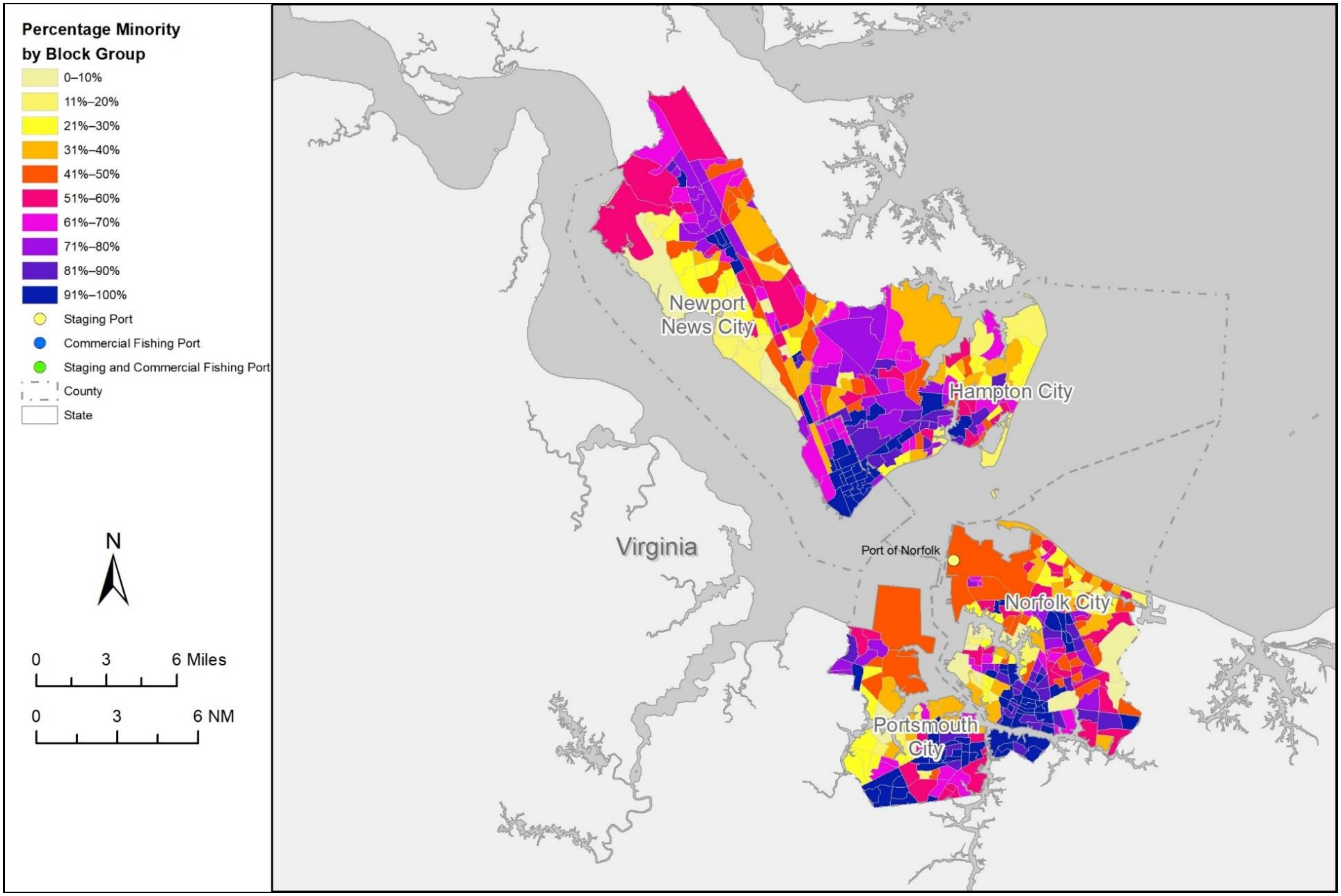

Source: Developed from information in EPA (2021).

**Figure G-EJ4. Distribution of minority populations by census block group in Gloucester County, New Jersey; Philadelphia County, Pennsylvania; and Delaware County, Pennsylvania.**



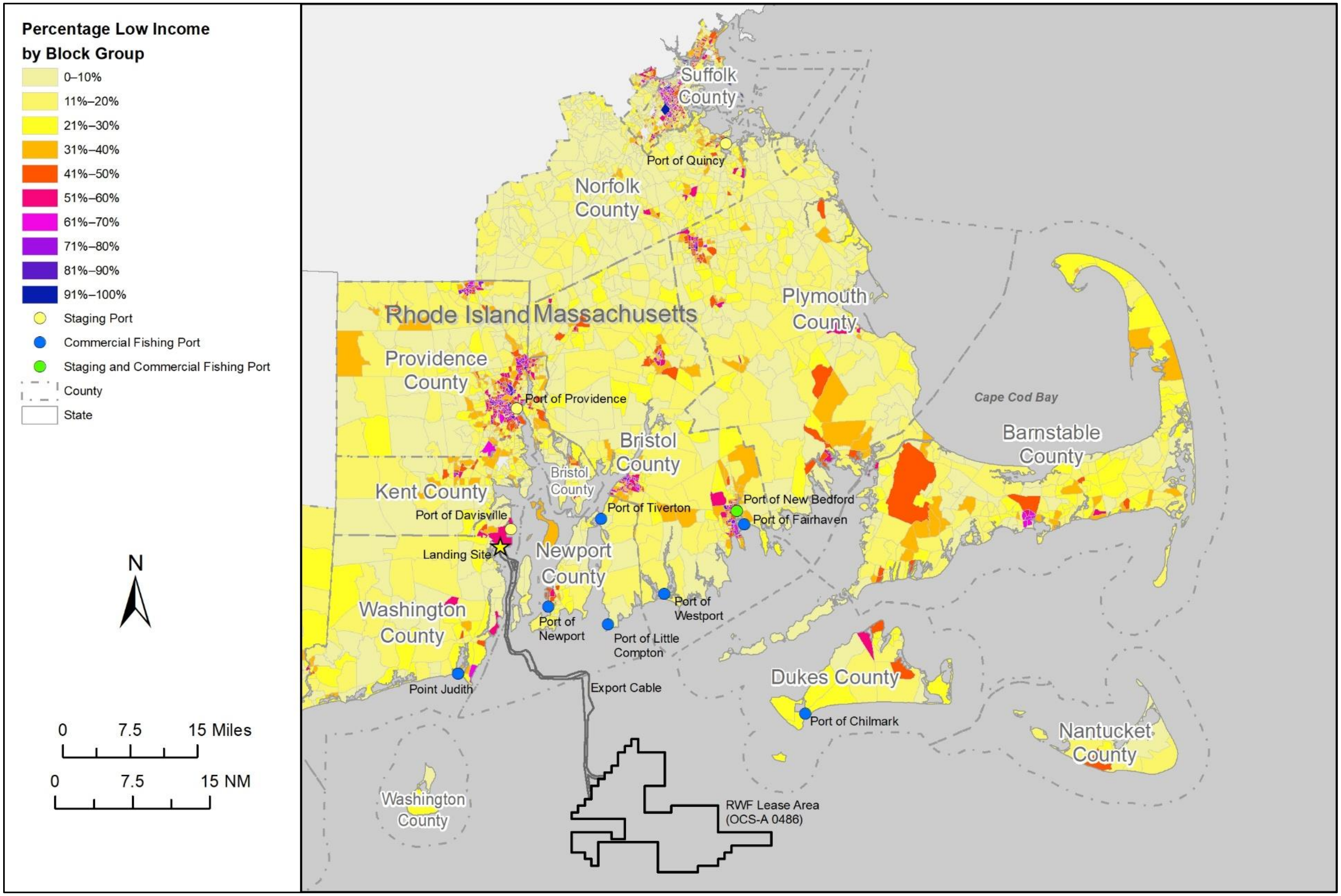

Source: Developed from information in EPA (2021).

**Figure G-EJ5. Distribution of minority populations by census block group in Baltimore County, Baltimore City, and Anne Arundel County, Maryland.**



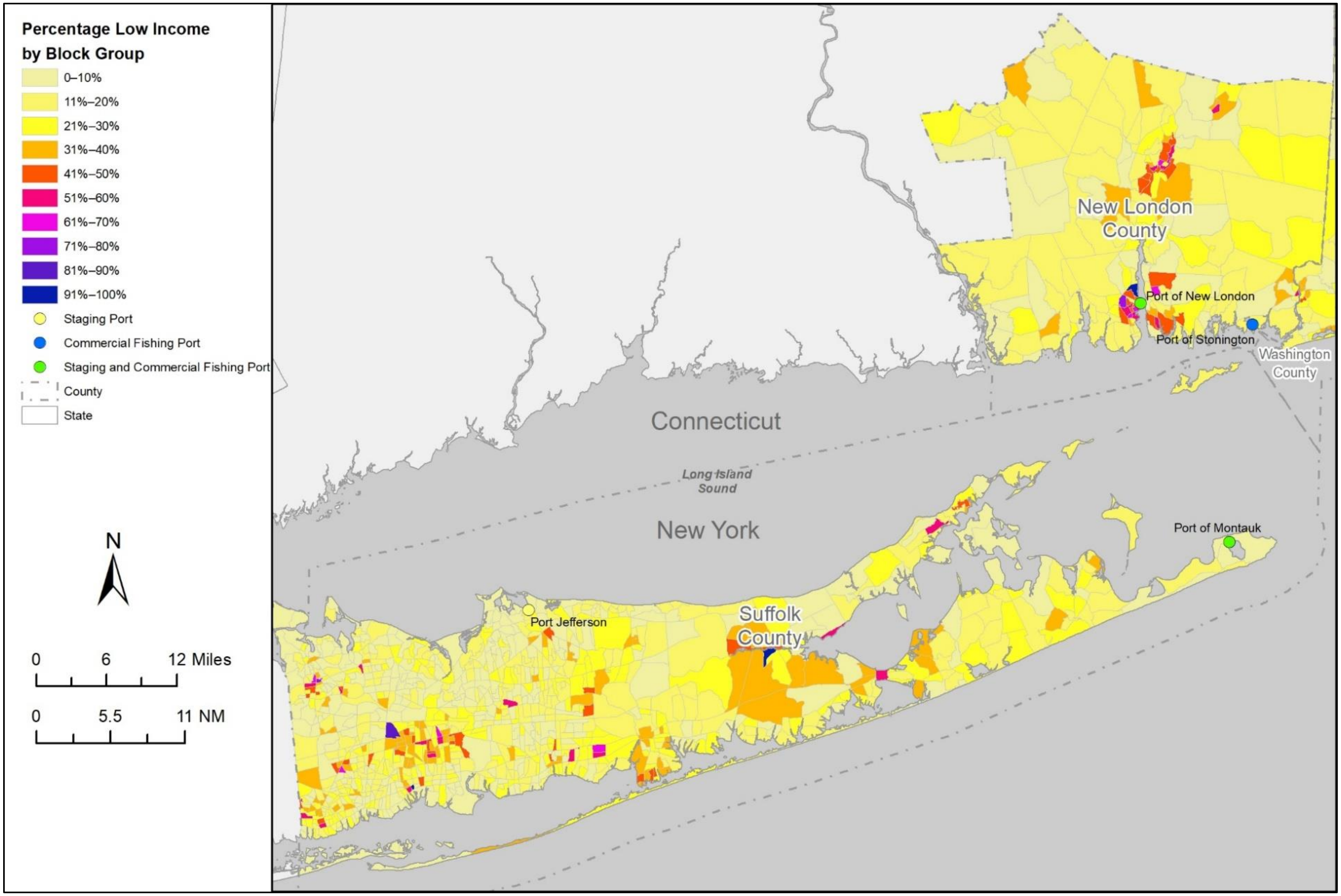

Source: Developed from information in EPA (2021).

**Figure G-EJ6. Distribution of minority populations by census block group in the cities of Norfolk, Portsmouth, Newport News, and Hampton, Virginia.**



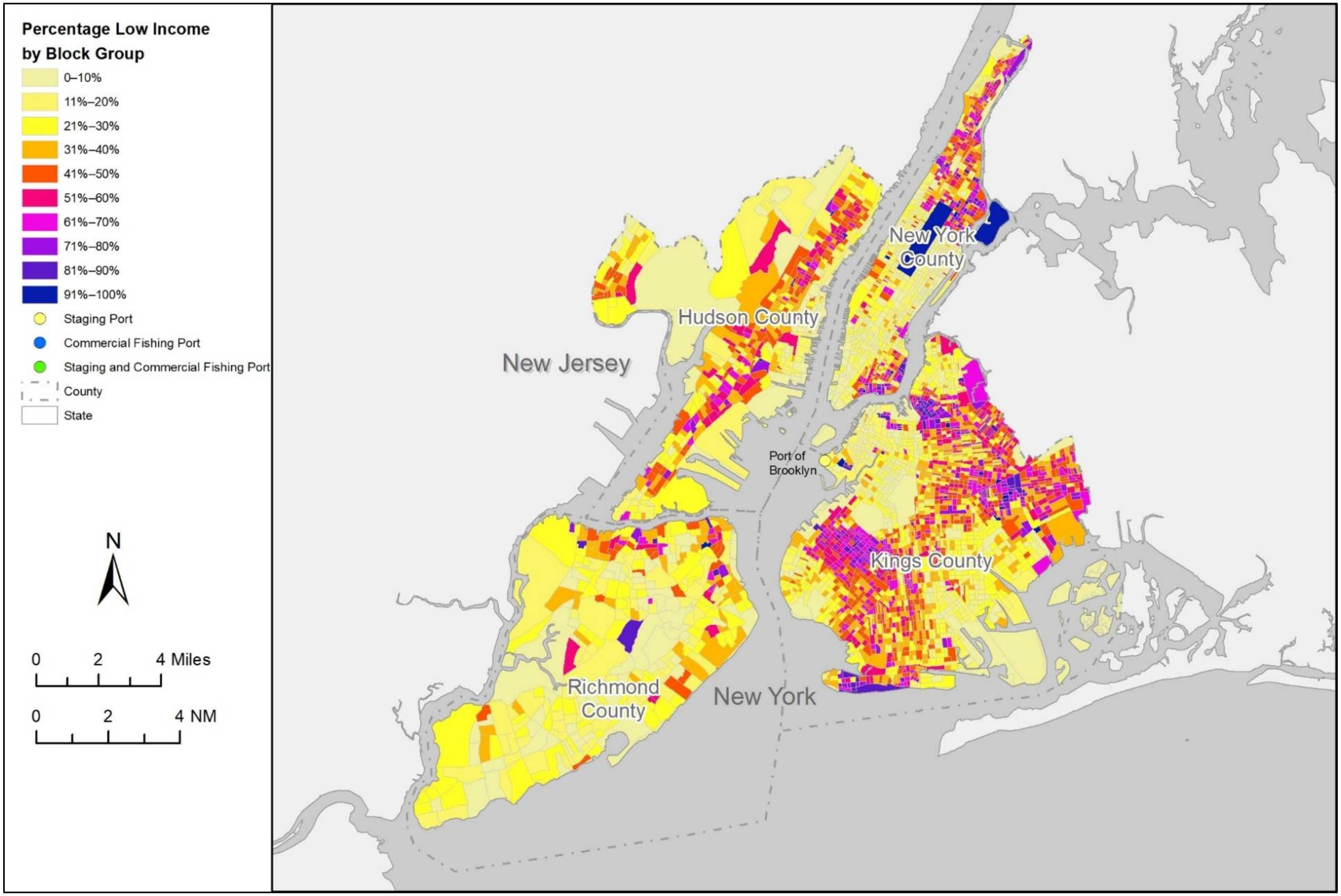

Source: Developed from information in EPA (2021).

**Figure G-EJ7. Distribution of low-income populations by census block group in potentially affected counties in Rhode Island and Massachusetts.**



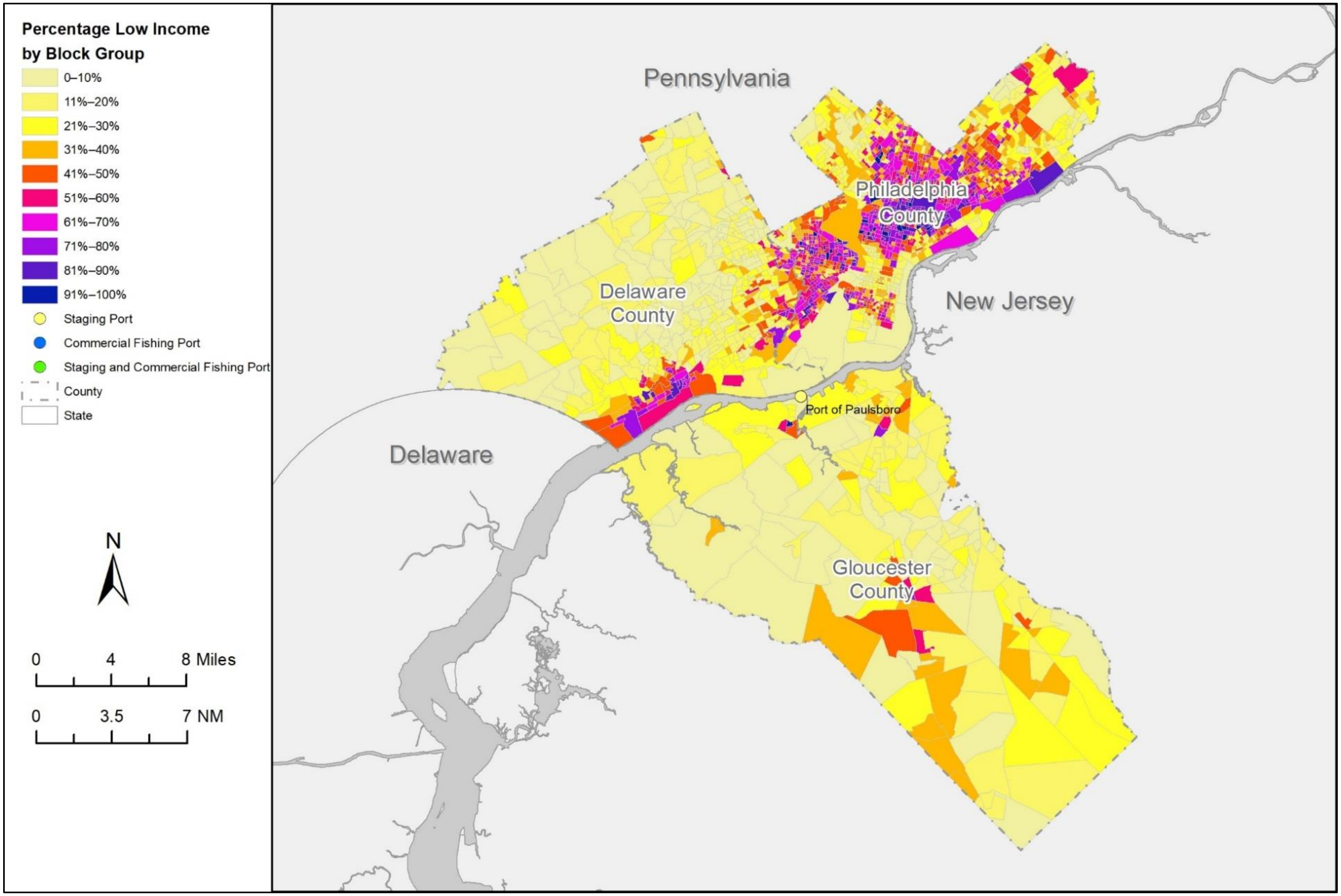

Source: Developed from information in EPA (2021).

**Figure G-EJ8. Distribution of low-income populations by census block group in New London County, Connecticut and Suffolk County, New York.**



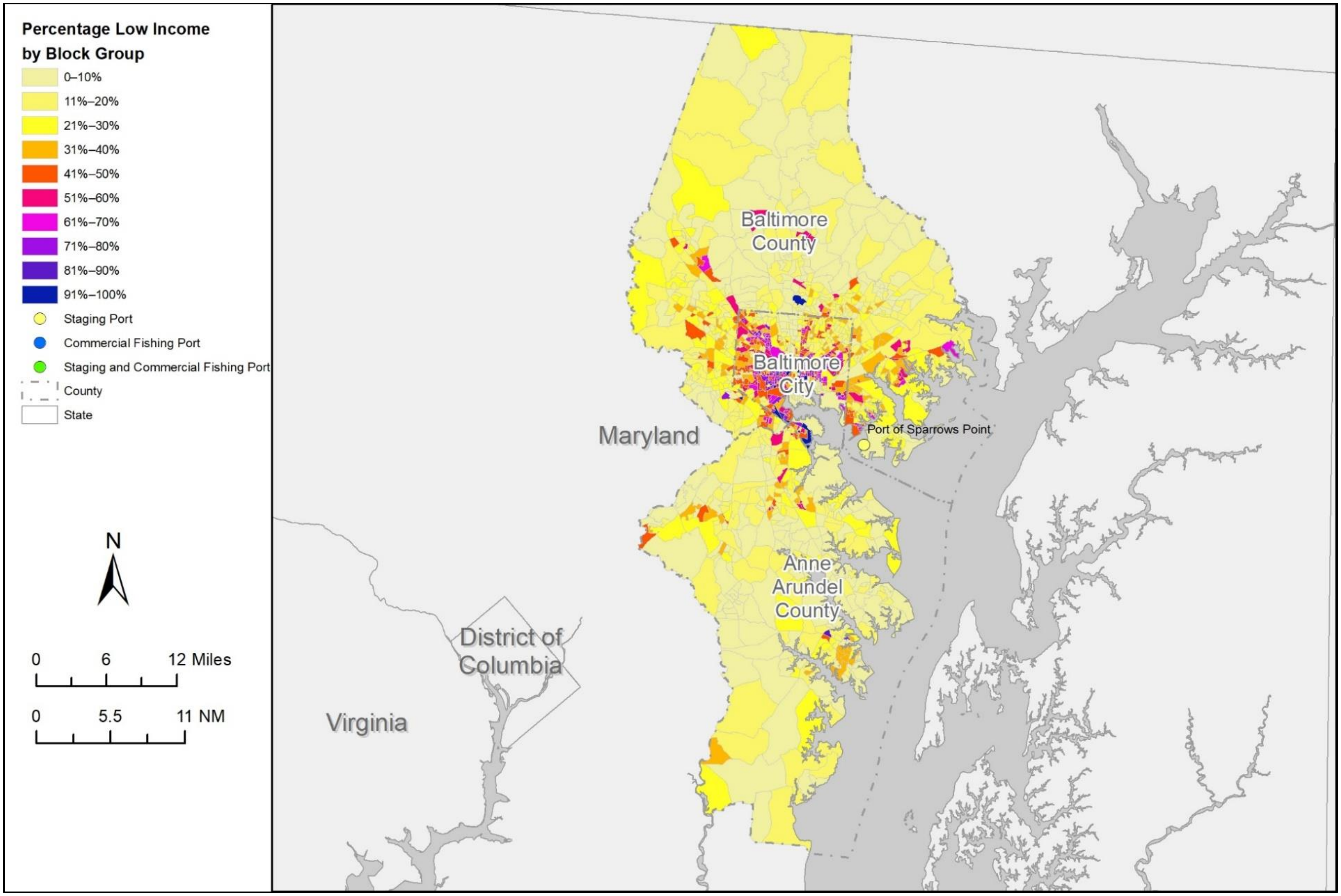

Source: Developed from information in EPA (2021).

**Figure G-EJ9. Distribution of low-income populations by census block group in Kings County (Brooklyn), New York; Richmond County, New York; New York County, New York; and Hudson County, New Jersey.**



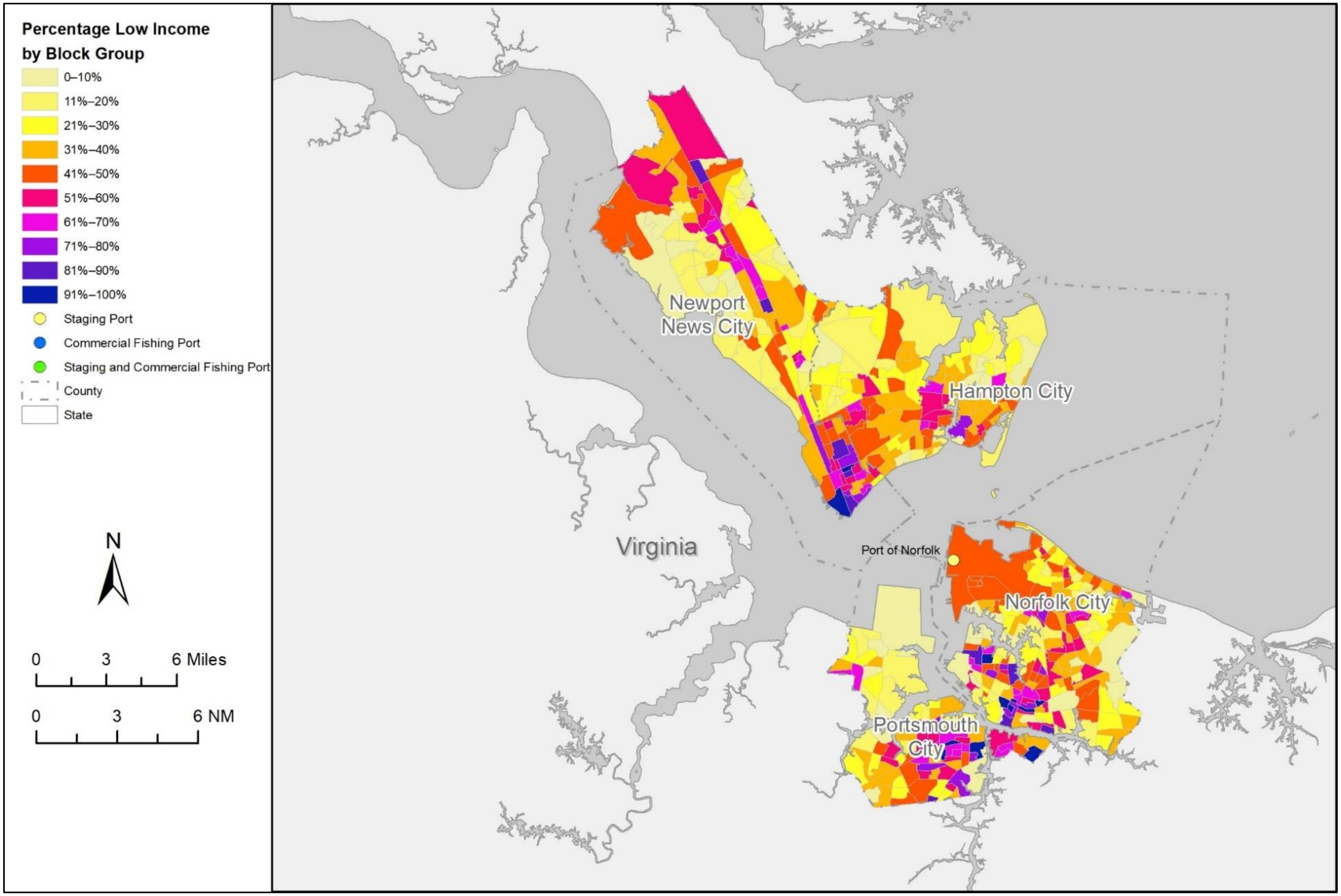

Source: Developed from information in EPA (2021).

**Figure G-EJ10. Distribution of low-income populations by census block group in Gloucester County, New Jersey; Philadelphia County, Pennsylvania; and Delaware County, Pennsylvania.**



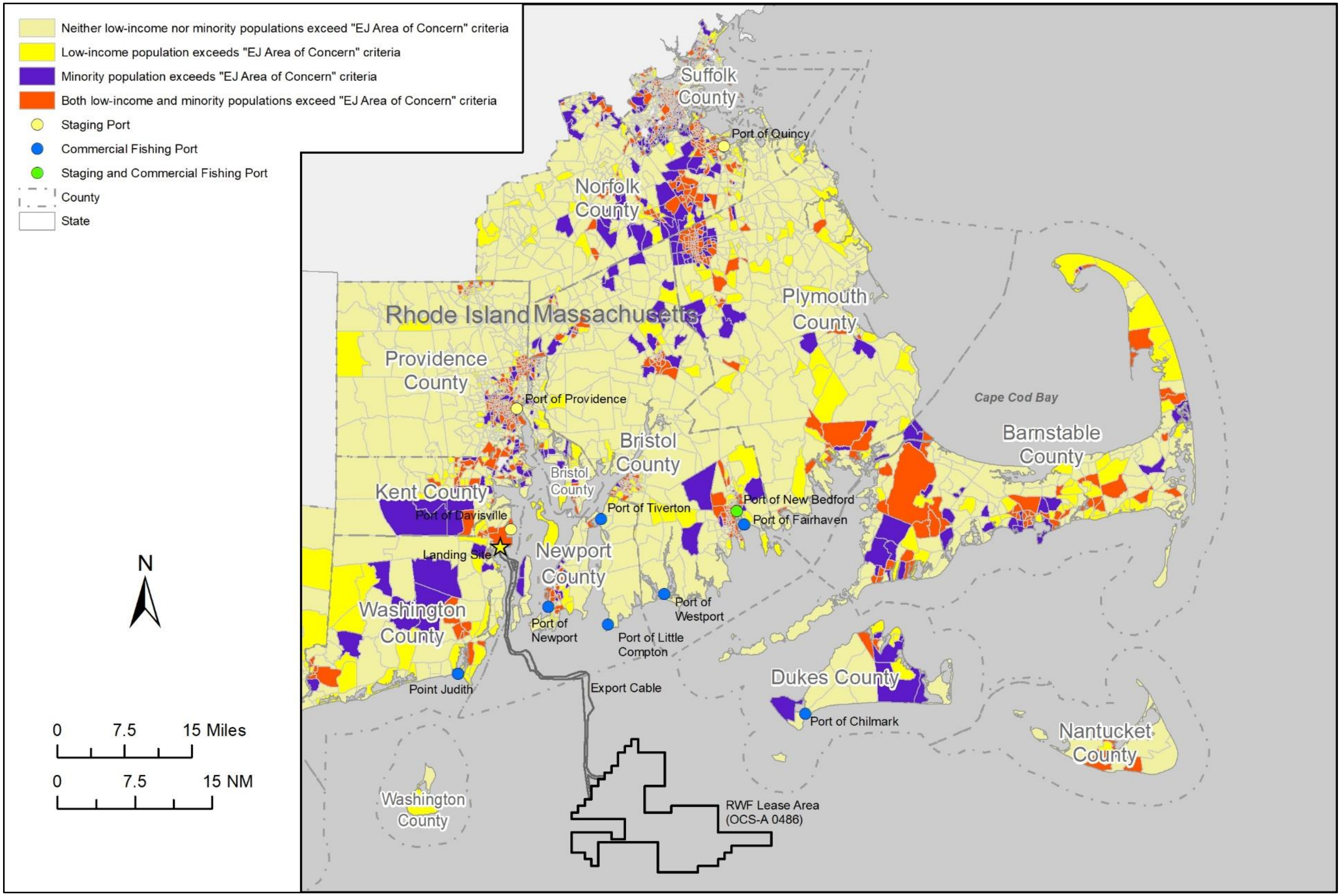

Source: Developed from information in EPA (2021).

**Figure G-EJ11. Distribution of low-income populations by census block group in Baltimore County, Baltimore City, and Anne Arundel County, Maryland.**



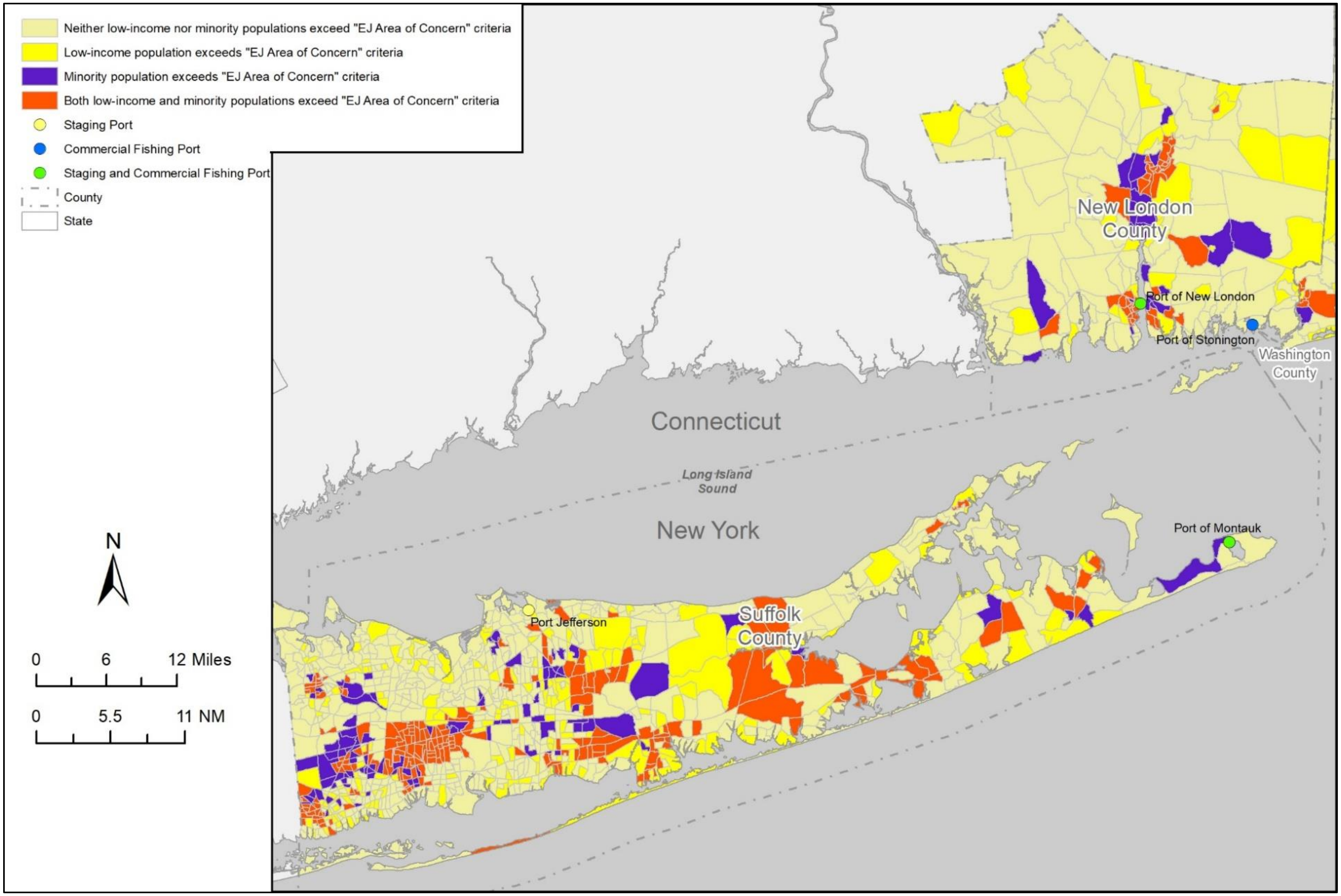

Source: Developed from information in EPA (2021).

**Figure G-EJ12. Distribution of low-income populations by census block group in the cities of Norfolk, Portsmouth, Newport News, and Hampton, Virginia.**



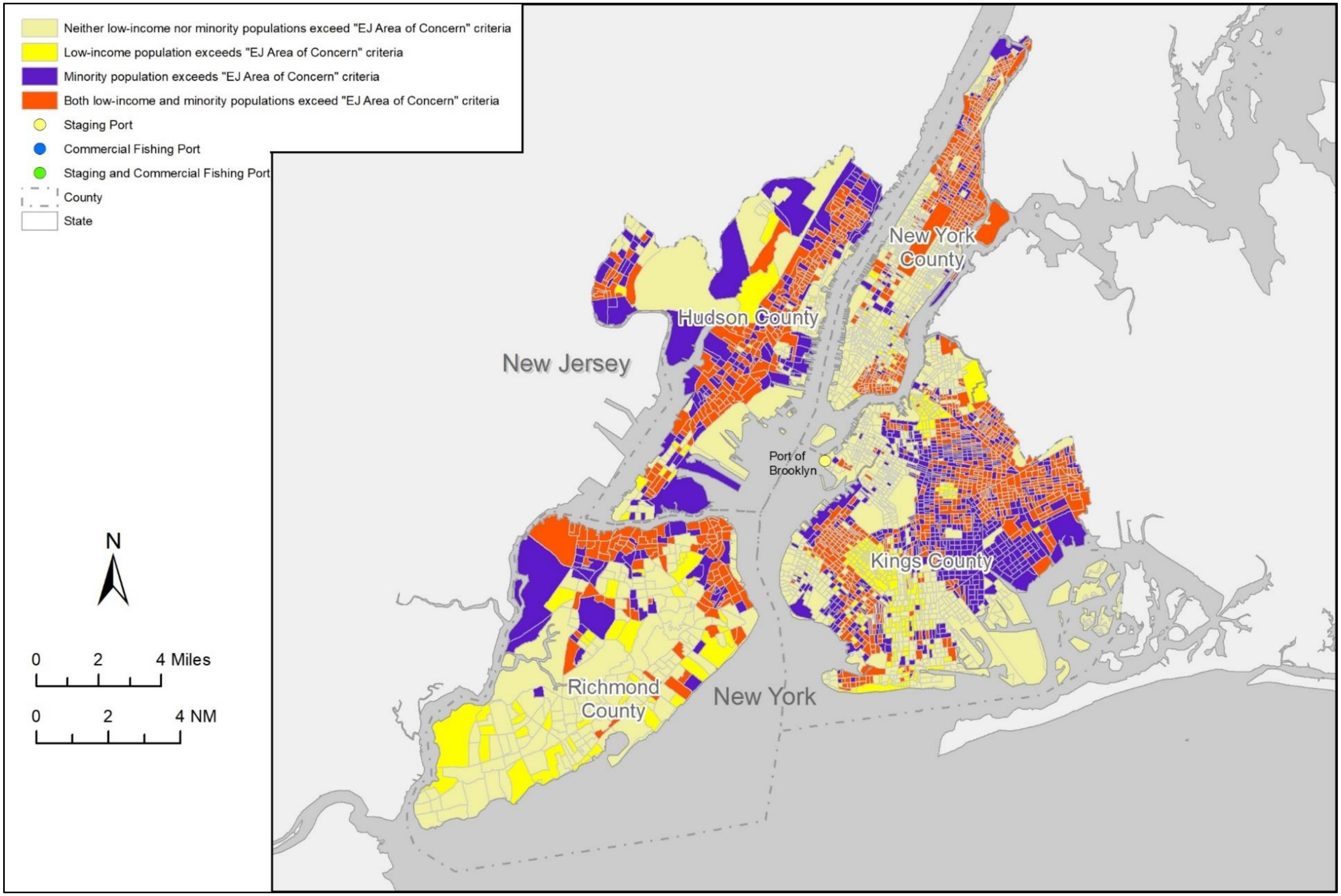

Source: Developed from information in EPA (2021).

**Figure G-EJ13. Census block groups that are potential environmental justice areas of concern in Rhode Island and Massachusetts.**



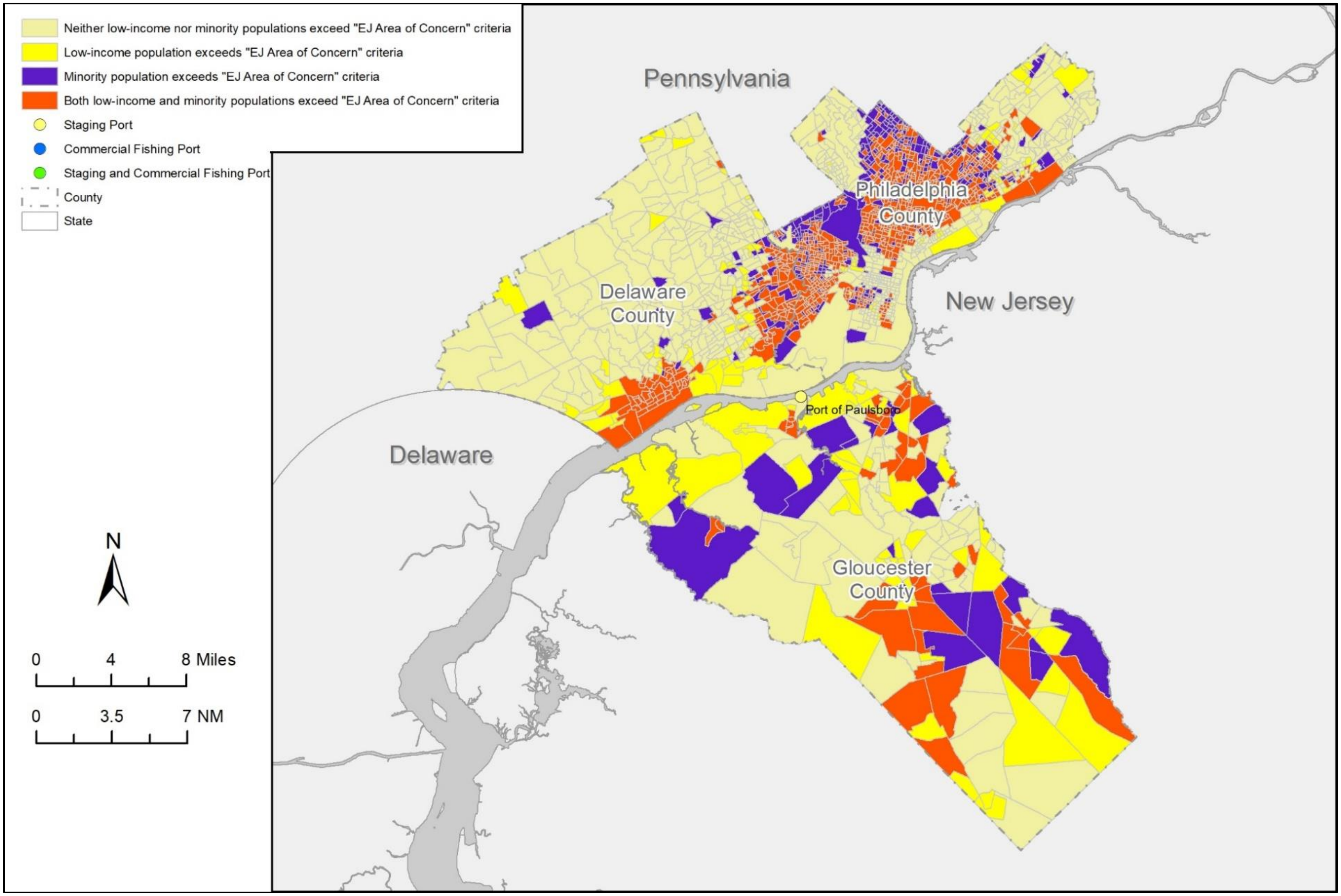

Source: Developed from information in EPA (2021).

**Figure G-EJ14. Census block groups that are potential environmental justice areas of concern in New London County, Connecticut and Suffolk County, New York.**



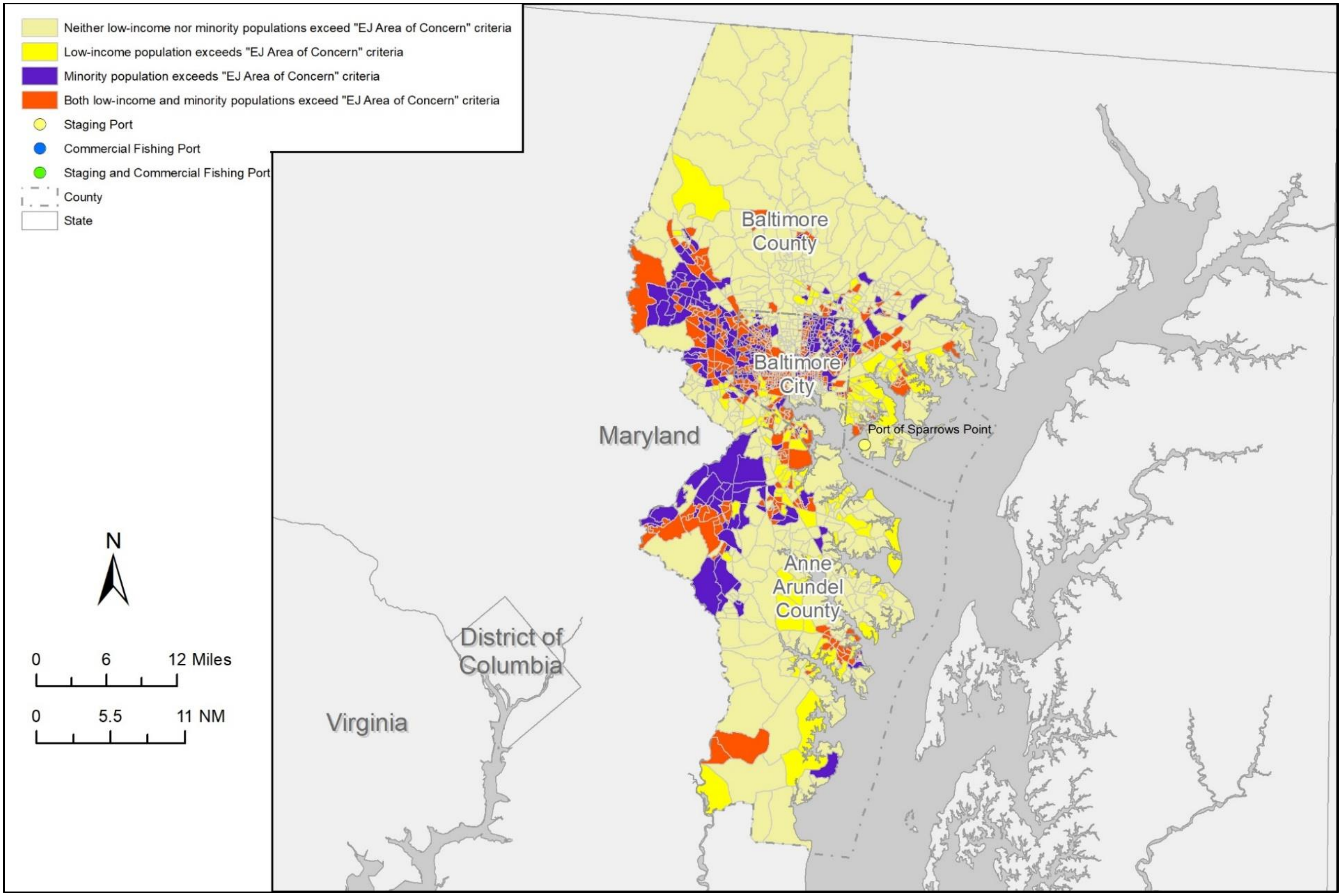

Source: Developed from information in EPA (2021).

**Figure G-EJ15. Census block groups that are potential environmental justice areas of concern in Kings County (Brooklyn), New York; Richmond County, New York; New York County, New York; and Hudson County, New Jersey.**



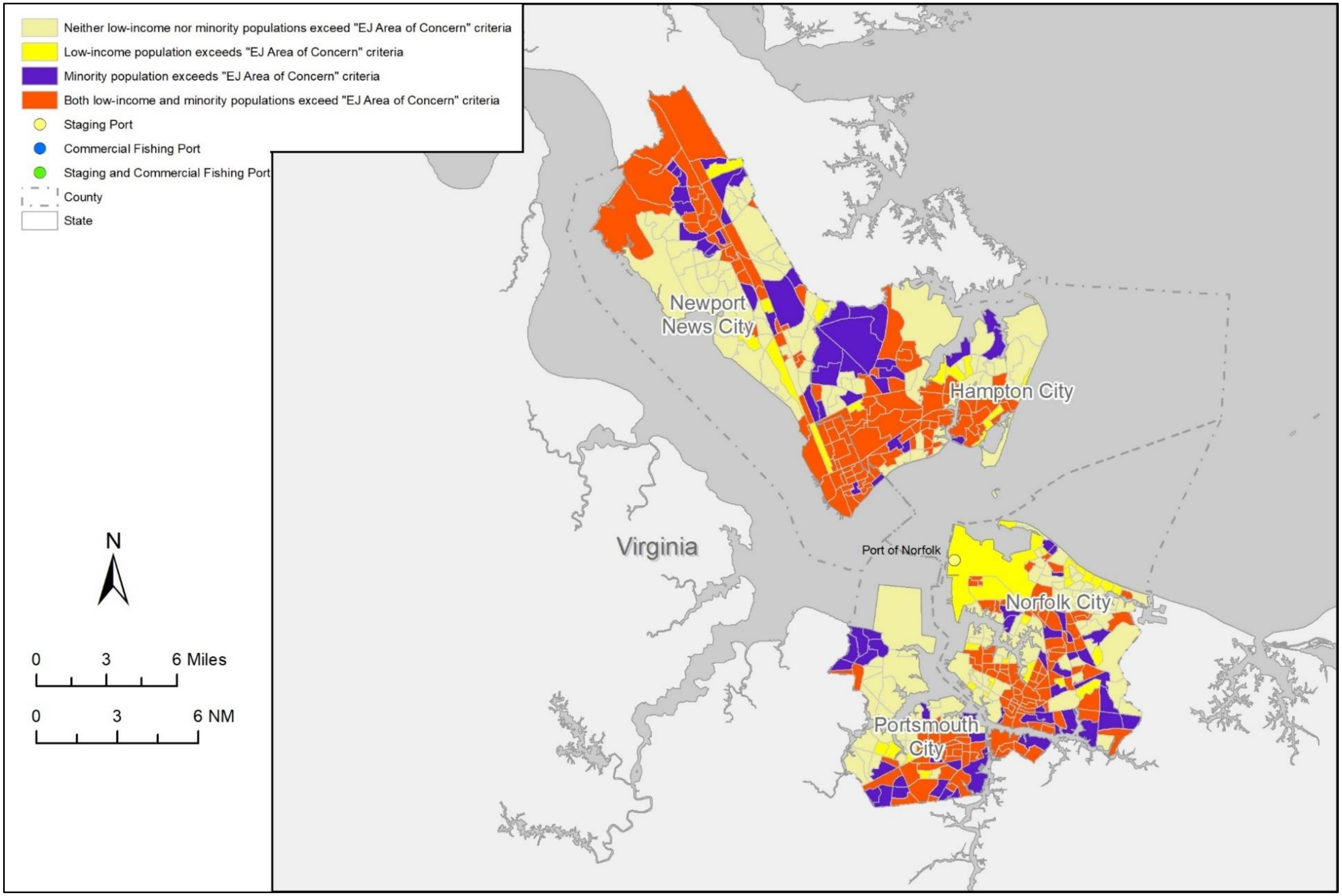

Source: Developed from information in EPA (2021).

**Figure G-EJ26. Census block groups that are potential environmental justice areas of concern in Gloucester County, New Jersey; Philadelphia County, Pennsylvania; and Delaware County, Pennsylvania.**




Source: Developed from information in EPA (2021).

**Figure G-EJ17. Census block groups that are potential environmental justice areas of concern in Baltimore County, Baltimore City, and Anne Arundel County, Maryland.**




Source: Developed from information in EPA (2021).

**Figure G-EJ18. Census block groups that are potential environmental justice areas of concern in the cities of Norfolk, Portsmouth, Newport News, and Hampton, Virginia.**

**Table G-EJ1. Census Tracts (CT) and Block Groups (BG) in Suffolk County, Massachusetts (County ID 25-023) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1 BG 1 | Boston | 1 |
| CT 2.01 BG 1 | Boston | 2 |
| CT 2.02 BG 3 | Boston | 3 |
| CT 2.02 BG 4 | Boston | 1 |
| CT 3.01 BG 1 | Boston | 3 |
| CT 4.01 BG 4 | Boston | 2 |
| CT 4.02 BG 1 | Boston | 2 |
| CT 4.02 BG 2 | Boston | 2 |
| CT 5.02 BG 3 | Boston | 2 |
| CT 5.03 BG 1 | Boston | 2 |
| CT 5.04 BG 2 | Boston | 2 |
| CT 5.04 BG 4 | Boston | 2 |
| CT 6.01 BG 1 | Boston | 2 |
| CT 6.02 BG 1 | Boston | 2 |
| CT 6.02 BG 2 | Boston | 2 |
| CT 6.02 BG 3 | Boston | 1 |
| CT 7.01 BG 2 | Boston | 1 |
| CT 7.01 BG 4 | Boston | 2 |
| CT 7.01 BG 5 | Boston | 2 |
| CT 7.03 BG 1 | Boston | 1 |
| CT 7.03 BG 2 | Boston | 2 |
| CT 7.04 BG 3 | Boston | 2 |
| CT 7.04 BG 4 | Boston | 1 |
| CT 8.02 BG 1 | Boston | 2 |
| CT 8.02 BG 2 | Boston | 2 |
| CT 8.02 BG 3 | Boston | 3 |
| CT 8.02 BG 5 | Boston | 2 |
| CT 8.03 BG 1 | Boston | 2 |
| CT 8.03 BG 2 | Boston | 2 |
| CT 101.03 BG 2 | Boston | 3 |
| CT 101.03 BG 3 | Boston | 2 |
| CT 101.04 BG 3 | Boston | 2 |
| CT 102.03 BG 1 | Boston | 2 |
| CT 102.03 BG 2 | Boston | 2 |
| CT 102.03 BG 3 | Boston | 2 |
| CT 102.04 BG 1 | Boston | 2 |
| CT 102.04 BG 3 | Boston | 1 |
| CT 103 BG 1 | Boston | 2 |
| CT 104.03 BG 1 | Boston | 1 |
| CT 104.03 BG 2 | Boston | 2 |
| CT 104.04 BG 1 | Boston | 2 |
| CT 104.04 BG 2 | Boston | 2 |
| CT 104.04 BG 3 | Boston | 2 |
| CT 104.05 BG 1 | Boston | 2 |
| CT 104.05 BG 2 | Boston | 2 |
| CT 104.05 BG 3 | Boston | 1 |
| CT 105 BG 1 | Boston | 2 |
| CT 105 BG 2 | Boston | 2 |
| CT 105 BG 3 | Boston | 3 |
| CT 203.01 BG 1 | Boston | 2 |
| CT 303 BG 2 | Boston | 2 |
| CT 303 BG 3 | Boston | 2 |
| CT 402 BG 1 | Boston | 1 |
| CT 403 BG 1 | Boston | 1 |
| CT 408.01 BG 1 | Boston | 1 |
| CT 408.01 BG 2 | Boston | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 501.01 BG 1 | Boston | 1 |
| CT 501.01 BG 2 | Boston | 1 |
| CT 501.01 BG 3 | Boston | 1 |
| CT 502 BG 1 | Boston | 1 |
| CT 502 BG 2 | Boston | 1 |
| CT 502 BG 3 | Boston | 1 |
| CT 502 BG 4 | Boston | 1 |
| CT 503 BG 1 | Boston | 1 |
| CT 503 BG 2 | Boston | 1 |
| CT 504 BG 1 | Boston | 1 |
| CT 504 BG 2 | Boston | 1 |
| CT 505 BG 1 | Boston | 1 |
| CT 506 BG 1 | Boston | 1 |
| CT 506 BG 2 | Boston | 3 |
| CT 507 BG 1 | Boston | 1 |
| CT 507 BG 2 | Boston | 1 |
| CT 507 BG 3 | Boston | 1 |
| CT 509.01 BG 1 | Boston | 1 |
| CT 509.01 BG 2 | Boston | 1 |
| CT 509.01 BG 3 | Boston | 1 |
| CT 510 BG 2 | Boston | 1 |
| CT 511.01 BG 1 | Boston | 1 |
| CT 511.01 BG 2 | Boston | 1 |
| CT 511.01 BG 3 | Boston | 3 |
| CT 511.01 BG 4 | Boston | 1 |
| CT 512 BG 2 | Boston | 1 |
| CT 607 BG 1 | Boston | 1 |
| CT 607 BG 2 | Boston | 1 |
| CT 610 BG 2 | Boston | 1 |
| CT 610 BG 3 | Boston | 1 |
| CT 611.01 BG 1 | Boston | 1 |
| CT 611.01 BG 2 | Boston | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 701.01 BG 2 | Boston | 1 |
| CT 701.01 BG 3 | Boston | 1 |
| CT 701.01 BG 5 | Boston | 3 |
| CT 701.01 BG 6 | Boston | 2 |
| CT 701.01 BG 7 | Boston | 1 |
| CT 702 BG 1 | Boston | 1 |
| CT 702 BG 2 | Boston | 1 |
| CT 702 BG 3 | Boston | 2 |
| CT 704.02 BG 1 | Boston | 1 |
| CT 705 BG 2 | Boston | 1 |
| CT 705 BG 3 | Boston | 2 |
| CT 705 BG 4 | Boston | 1 |
| CT 707 BG 1 | Boston | 3 |
| CT 708 BG 1 | Boston | 3 |
| CT 709 BG 1 | Boston | 2 |
| CT 709 BG 2 | Boston | 1 |
| CT 711.01 BG 2 | Boston | 2 |
| CT 711.01 BG 3 | Boston | 1 |
| CT 712.01 BG 1 | Boston | 2 |
| CT 712.01 BG 2 | Boston | 1 |
| CT 801 BG 1 | Boston | 1 |
| CT 801 BG 2 | Boston | 1 |
| CT 803 BG 1 | Boston | 1 |
| CT 804.01 BG 1 | Boston | 1 |
| CT 804.01 BG 2 | Boston | 1 |
| CT 805 BG 1 | Boston | 1 |
| CT 805 BG 2 | Boston | 1 |
| CT 806.01 BG 1 | Boston | 1 |
| CT 806.01 BG 2 | Boston | 1 |
| CT 806.01 BG 3 | Boston | 1 |
| CT 808.01 BG 1 | Boston | 1 |
| CT 808.01 BG 2 | Boston | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 809 BG 1 | Boston | 1 |
| CT 809 BG 2 | Boston | 2 |
| CT 809 BG 3 | Boston | 2 |
| CT 810.01 BG 1 | Boston | 1 |
| CT 810.01 BG 2 | Boston | 1 |
| CT 810.01 BG 3 | Boston | 1 |
| CT 810.01 BG 4 | Boston | 1 |
| CT 811 BG 1 | Boston | 1 |
| CT 811 BG 2 | Boston | 1 |
| CT 812 BG 1 | Boston | 1 |
| CT 812 BG 2 | Boston | 1 |
| CT 813 BG 1 | Boston | 1 |
| CT 813 BG 2 | Boston | 1 |
| CT 813 BG 3 | Boston | 1 |
| CT 814 BG 1 | Boston | 1 |
| CT 814 BG 2 | Boston | 1 |
| CT 814 BG 3 | Boston | 1 |
| CT 815 BG 1 | Boston | 1 |
| CT 815 BG 2 | Boston | 1 |
| CT 817 BG 1 | Boston | 1 |
| CT 817 BG 2 | Boston | 1 |
| CT 817 BG 3 | Boston | 1 |
| CT 817 BG 4 | Boston | 1 |
| CT 817 BG 5 | Boston | 1 |
| CT 818 BG 1 | Boston | 1 |
| CT 818 BG 2 | Boston | 1 |
| CT 818 BG 3 | Boston | 1 |
| CT 819 BG 1 | Boston | 1 |
| CT 819 BG 2 | Boston | 1 |
| CT 819 BG 3 | Boston | 1 |
| CT 819 BG 4 | Boston | 1 |
| CT 820 BG 1 | Boston | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 820 BG 2 | Boston | 3 |
| CT 820 BG 3 | Boston | 1 |
| CT 821 BG 1 | Boston | 1 |
| CT 821 BG 2 | Boston | 1 |
| CT 821 BG 3 | Boston | 1 |
| CT 901 BG 1 | Boston | 1 |
| CT 901 BG 2 | Boston | 1 |
| CT 901 BG 3 | Boston | 1 |
| CT 901 BG 4 | Boston | 1 |
| CT 901 BG 5 | Boston | 1 |
| CT 902 BG 1 | Boston | 1 |
| CT 902 BG 2 | Boston | 1 |
| CT 902 BG 3 | Boston | 1 |
| CT 903 BG 1 | Boston | 1 |
| CT 903 BG 2 | Boston | 1 |
| CT 903 BG 3 | Boston | 1 |
| CT 904 BG 1 | Boston | 1 |
| CT 904 BG 2 | Boston | 1 |
| CT 904 BG 3 | Boston | 1 |
| CT 904 BG 4 | Boston | 3 |
| CT 906 BG 1 | Boston | 1 |
| CT 906 BG 2 | Boston | 1 |
| CT 907 BG 3 | Boston | 2 |
| CT 909.01 BG 1 | Boston | 1 |
| CT 909.01 BG 2 | Boston | 1 |
| CT 910.01 BG 1 | Boston | 3 |
| CT 911 BG 4 | Boston | 3 |
| CT 912 BG 1 | Boston | 3 |
| CT 912 BG 2 | Boston | 1 |
| CT 913 BG 1 | Boston | 1 |
| CT 913 BG 2 | Boston | 1 |
| CT 914 BG 1 | Boston | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 914 BG 2 | Boston | 3 |
| CT 915 BG 1 | Boston | 1 |
| CT 915 BG 2 | Boston | 3 |
| CT 915 BG 3 | Boston | 1 |
| CT 916 BG 1 | Boston | 1 |
| CT 916 BG 2 | Boston | 1 |
| CT 916 BG 3 | Boston | 1 |
| CT 917 BG 1 | Boston | 1 |
| CT 917 BG 2 | Boston | 3 |
| CT 917 BG 3 | Boston | 1 |
| CT 918 BG 1 | Boston | 1 |
| CT 918 BG 2 | Boston | 3 |
| CT 918 BG 3 | Boston | 1 |
| CT 919 BG 1 | Boston | 1 |
| CT 919 BG 2 | Boston | 3 |
| CT 919 BG 3 | Boston | 1 |
| CT 919 BG 4 | Boston | 3 |
| CT 920 BG 1 | Boston | 1 |
| CT 920 BG 2 | Boston | 3 |
| CT 920 BG 3 | Boston | 3 |
| CT 920 BG 4 | Boston | 1 |
| CT 921.01 BG 1 | Boston | 3 |
| CT 921.01 BG 2 | Boston | 1 |
| CT 921.01 BG 4 | Boston | 1 |
| CT 921.01 BG 5 | Boston | 1 |
| CT 922 BG 1 | Boston | 3 |
| CT 922 BG 2 | Boston | 3 |
| CT 922 BG 3 | Boston | 3 |
| CT 922 BG 4 | Boston | 1 |
| CT 923 BG 1 | Boston | 3 |
| CT 923 BG 2 | Boston | 1 |
| CT 923 BG 3 | Boston | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 923 BG 4 | Boston | 3 |
| CT 924 BG 1 | Boston | 1 |
| CT 924 BG 2 | Boston | 1 |
| CT 924 BG 3 | Boston | 1 |
| CT 924 BG 4 | Boston | 1 |
| CT 924 BG 5 | Boston | 1 |
| CT 1001 BG 1 | Boston | 1 |
| CT 1001 BG 2 | Boston | 3 |
| CT 1001 BG 3 | Boston | 1 |
| CT 1001 BG 4 | Boston | 3 |
| CT 1001 BG 5 | Boston | 1 |
| CT 1001 BG 6 | Boston | 1 |
| CT 1001 BG 7 | Boston | 1 |
| CT 1002 BG 1 | Boston | 1 |
| CT 1002 BG 2 | Boston | 1 |
| CT 1002 BG 3 | Boston | 1 |
| CT 1003 BG 1 | Boston | 1 |
| CT 1003 BG 2 | Boston | 3 |
| CT 1003 BG 3 | Boston | 1 |
| CT 1003 BG 4 | Boston | 1 |
| CT 1004 BG 1 | Boston | 1 |
| CT 1004 BG 2 | Boston | 3 |
| CT 1004 BG 3 | Boston | 3 |
| CT 1004 BG 4 | Boston | 1 |
| CT 1005 BG 1 | Boston | 1 |
| CT 1005 BG 2 | Boston | 3 |
| CT 1005 BG 3 | Boston | 1 |
| CT 1005 BG 4 | Boston | 1 |
| CT 1005 BG 5 | Boston | 1 |
| CT 1006.01 BG 1 | Boston | 1 |
| CT 1006.01 BG 2 | Boston | 1 |
| CT 1006.01 BG 3 | Boston | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1006.01 BG 4 | Boston | 3 |
| CT 1008 BG 1 | Boston | 3 |
| CT 1008 BG 4 | Boston | 3 |
| CT 1009 BG 1 | Boston | 3 |
| CT 1009 BG 2 | Boston | 1 |
| CT 1009 BG 3 | Boston | 3 |
| CT 1009 BG 4 | Boston | 3 |
| CT 1009 BG 5 | Boston | 3 |
| CT 1010.01 BG 1 | Boston | 3 |
| CT 1010.01 BG 2 | Boston | 1 |
| CT 1010.01 BG 3 | Boston | 3 |
| CT 1010.01 BG 4 | Boston | 1 |
| CT 1010.01 BG 5 | Boston | 1 |
| CT 1010.01 BG 6 | Boston | 3 |
| CT 1010.02 BG 1 | Boston | 1 |
| CT 1010.02 BG 2 | Boston | 1 |
| CT 1010.02 BG 3 | Boston | 3 |
| CT 1011.01 BG 1 | Boston | 1 |
| CT 1011.01 BG 2 | Boston | 3 |
| CT 1011.01 BG 3 | Boston | 1 |
| CT 1011.02 BG 1 | Boston | 3 |
| CT 1011.02 BG 2 | Boston | 1 |
| CT 1011.02 BG 3 | Boston | 3 |
| CT 1011.02 BG 4 | Boston | 1 |
| CT 1101.03 BG 2 | Boston | 1 |
| CT 1101.03 BG 3 | Boston | 1 |
| CT 1101.03 BG 4 | Boston | 1 |
| CT 1101.03 BG 7 | Boston | 1 |
| CT 1102.01 BG 1 | Boston | 1 |
| CT 1103.01 BG 1 | Boston | 3 |
| CT 1104.01 BG 1 | Boston | 1 |
| CT 1104.03 BG 1 | Boston | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1105.01 BG 1 | Boston | 2 |
| CT 1105.02 BG 1 | Boston | 1 |
| CT 1105.02 BG 2 | Boston | 3 |
| CT 1201.04 BG 2 | Boston | 1 |
| CT 1202.01 BG 2 | Boston | 1 |
| CT 1203.01 BG 1 | Boston | 3 |
| CT 1203.01 BG 2 | Boston | 1 |
| CT 1203.01 BG 3 | Boston | 3 |
| CT 1204 BG 2 | Boston | 3 |
| CT 1204 BG 5 | Boston | 2 |
| CT 1205 BG 1 | Boston | 1 |
| CT 1205 BG 2 | Boston | 3 |
| CT 1205 BG 3 | Boston | 1 |
| CT 1207 BG 1 | Boston | 3 |
| CT 1301 BG 2 | Boston | 3 |
| CT 1304.04 BG 1 | Boston | 3 |
| CT 1304.06 BG 1 | Boston | 1 |
| CT 1304.06 BG 2 | Boston | 1 |
| CT 1401.02 BG 1 | Boston | 3 |
| CT 1401.02 BG 2 | Boston | 3 |
| CT 1401.02 BG 4 | Boston | 3 |
| CT 1401.05 BG 1 | Boston | 3 |
| CT 1401.05 BG 2 | Boston | 3 |
| CT 1401.06 BG 1 | Boston | 1 |
| CT 1401.06 BG 2 | Boston | 1 |
| CT 1401.07 BG 1 | Boston | 3 |
| CT 1401.07 BG 2 | Boston | 3 |
| CT 1402.01 BG 1 | Boston | 3 |
| CT 1402.01 BG 2 | Boston | 3 |
| CT 1402.02 BG 1 | Boston | 3 |
| CT 1402.02 BG 2 | Boston | 1 |
| CT 1402.02 BG 3 | Boston | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1402.02 BG 4 | Boston | 3 |
| CT 1403 BG 1 | Boston | 1 |
| CT 1403 BG 2 | Boston | 1 |
| CT 1403 BG 3 | Boston | 1 |
| CT 1403 BG 4 | Boston | 3 |
| CT 1403 BG 5 | Boston | 1 |
| CT 1403 BG 6 | Boston | 1 |
| CT 1404 BG 1 | Boston | 1 |
| CT 1404 BG 2 | Boston | 3 |
| CT 1404 BG 3 | Boston | 3 |
| CT 1404 BG 4 | Boston | 1 |
| CT 1404 BG 5 | Boston | 3 |
| CT 1404 BG 6 | Boston | 1 |
| CT 1404 BG 7 | Boston | 3 |
| CT 1601.01 BG 1 | Chelsea | 1 |
| CT 1601.01 BG 2 | Chelsea | 1 |
| CT 1601.01 BG 3 | Chelsea | 1 |
| CT 1601.01 BG 4 | Chelsea | 3 |
| CT 1601.01 BG 5 | Chelsea | 1 |
| CT 1602 BG 1 | Chelsea | 1 |
| CT 1602 BG 2 | Chelsea | 1 |
| CT 1602 BG 3 | Chelsea | 1 |
| CT 1603 BG 2 | Chelsea | 1 |
| CT 1604 BG 1 | Chelsea | 1 |
| CT 1604 BG 2 | Chelsea | 1 |
| CT 1605.01 BG 1 | Chelsea | 1 |
| CT 1605.01 BG 2 | Chelsea | 1 |
| CT 1605.01 BG 3 | Chelsea | 3 |
| CT 1605.01 BG 4 | Chelsea | 1 |
| CT 1605.01 BG 5 | Chelsea | 1 |
| CT 1605.02 BG 1 | Chelsea | 1 |
| CT 1605.02 BG 2 | Chelsea | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1605.02 BG 3 | Chelsea | 1 |
| CT 1606.01 BG 1 | Chelsea | 1 |
| CT 1606.01 BG 2 | Chelsea | 3 |
| CT 1606.02 BG 1 | Chelsea | 1 |
| CT 1606.02 BG 2 | Chelsea | 3 |
| CT 1606.02 BG 3 | Chelsea | 3 |
| CT 1606.02 BG 4 | Chelsea | 1 |
| CT 1606.02 BG 5 | Chelsea | 3 |
| CT 1701 BG 1 | Revere | 2 |
| CT 1701 BG 3 | Revere | 2 |
| CT 1701 BG 4 | Revere | 1 |
| CT 1701 BG 5 | Revere | 3 |
| CT 1701 BG 6 | Revere | 3 |
| CT 1701 BG 7 | Revere | 1 |
| CT 1702 BG 1 | Revere | 2 |
| CT 1702 BG 2 | Revere | 2 |
| CT 1702 BG 3 | Revere | 1 |
| CT 1703 BG 1 | Revere | 3 |
| CT 1703 BG 2 | Revere | 3 |
| CT 1703 BG 6 | Revere | 2 |
| CT 1704 BG 1 | Revere | 2 |
| CT 1704 BG 2 | Revere | 1 |
| CT 1704 BG 3 | Revere | 1 |
| CT 1704 BG 4 | Revere | 2 |
| CT 1705.01 BG 1 | Revere | 2 |
| CT 1705.01 BG 2 | Revere | 2 |
| CT 1705.02 BG 2 | Revere | 2 |
| CT 1706.01 BG 4 | Revere | 1 |
| CT 1707.01 BG 1 | Revere | 2 |
| CT 1707.01 BG 2 | Revere | 3 |
| CT 1707.02 BG 1 | Revere | 1 |
| CT 1707.02 BG 2 | Revere | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1707.02 BG 3 | Revere | 3 |
| CT 1707.02 BG 4 | Revere | 3 |
| CT 1707.02 BG 5 | Revere | 2 |
| CT 1708 BG 1 | Revere | 1 |
| CT 1708 BG 2 | Revere | 2 |
| CT 1708 BG 3 | Revere | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1708 BG 4 | Revere | 2 |
| CT 1801.01 BG 3 | Winthrop | 2 |
| CT 9801.01 BG 1 | Boston | 1 |
| CT 9803 BG 1 | Boston | 1 |
| CT 9811 BG 4 | Boston | 1 |
| CT 9901.01 BG 0 | No place name | 3 |

**Table G-EJ2. Census Tracts (CT) and Block Groups (BG) in Norfolk County, Massachusetts (County ID 25-023) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4001 BG 1 | Brookline | 1 |
| CT 4001 BG 2 | Brookline | 1 |
| CT 4001 BG 3 | Brookline | 1 |
| CT 4001 BG 4 | Brookline | 1 |
| CT 4002 BG 1 | Brookline | 1 |
| CT 4002 BG 2 | Brookline | 1 |
| CT 4002 BG 3 | Brookline | 1 |
| CT 4003 BG 2 | Brookline | 1 |
| CT 4003 BG 3 | Brookline | 3 |
| CT 4004 BG 1 | Brookline | 2 |
| CT 4005 BG 1 | Brookline | 2 |
| CT 4005 BG 2 | Brookline | 2 |
| CT 4006 BG 1 | Brookline | 2 |
| CT 4006 BG 2 | Brookline | 3 |
| CT 4006 BG 3 | Brookline | 1 |
| CT 4007 BG 1 | Brookline | 3 |
| CT 4007 BG 2 | Brookline | 1 |
| CT 4008 BG 1 | Brookline | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4008 BG 2 | Brookline | 2 |
| CT 4008 BG 3 | Brookline | 1 |
| CT 4009 BG 1 | Brookline | 1 |
| CT 4009 BG 2 | Brookline | 1 |
| CT 4009 BG 3 | Brookline | 2 |
| CT 4010 BG 1 | Brookline | 3 |
| CT 4010 BG 3 | Brookline | 1 |
| CT 4011 BG 1 | Brookline | 1 |
| CT 4011 BG 2 | Brookline | 1 |
| CT 4011 BG 3 | Brookline | 3 |
| CT 4012 BG 1 | Brookline | 3 |
| CT 4012 BG 2 | Brookline | 3 |
| CT 4012 BG 3 | Brookline | 3 |
| CT 4012 BG 4 | Brookline | 1 |
| CT 4021.01 BG 2 | Dedham | 3 |
| CT 4021.01 BG 3 | Dedham | 1 |
| CT 4021.01 BG 4 | Dedham | 2 |
| CT 4021.02 BG 1 | Dedham | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4021.02 BG 2 | Dedham | 3 |
| CT 4021.02 BG 3 | Dedham | 1 |
| CT 4021.02 BG 4 | Dedham | 1 |
| CT 4022 BG 1 | Dedham | 3 |
| CT 4022 BG 2 | Dedham | 1 |
| CT 4024 BG 1 | Dedham | 1 |
| CT 4024 BG 2 | Dedham | 3 |
| CT 4025 BG 1 | Dedham | 1 |
| CT 4031 BG 4 | Needham | 3 |
| CT 4034 BG 3 | Needham | 1 |
| CT 4035 BG 1 | Needham | 1 |
| CT 4035 BG 2 | Needham | 1 |
| CT 4041 BG 1 | Wellesley | 3 |
| CT 4041 BG 2 | Wellesley | 1 |
| CT 4041 BG 3 | Wellesley | 3 |
| CT 4042.01 BG 4 | Wellesley | 2 |
| CT 4042.02 BG 3 | Wellesley | 3 |
| CT 4043.01 BG 4 | Wellesley | 3 |
| CT 4043.01 BG 5 | Wellesley | 1 |
| CT 4043.02 BG 1 | Wellesley | 3 |
| CT 4044 BG 1 | Wellesley | 2 |
| CT 4044 BG 5 | Wellesley | 3 |
| CT 4051 BG 1 | No place name | 3 |
| CT 4061.01 BG 1 | Medfield | 2 |
| CT 4071 BG 2 | Millis-Clicquot | 2 |
| CT 4081.02 BG 2 | No place name | 2 |
| CT 4081.02 BG 3 | No place name | 2 |
| CT 4091.01 BG 3 | No place name | 3 |
| CT 4101 BG 2 | No place name | 2 |
| CT 4104 BG 4 | Foxborough | 1 |
| CT 4104 BG 5 | Foxborough | 1 |
| CT 4111 BG 1 | No place name | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4111 BG 2 | No place name | 1 |
| CT 4112 BG 3 | No place name | 1 |
| CT 4113.02 BG 1 | No place name | 2 |
| CT 4113.02 BG 3 | Walpole | 2 |
| CT 4121 BG 2 | No place name | 2 |
| CT 4123 BG 1 | No place name | 3 |
| CT 4131 BG 4 | Norwood | 2 |
| CT 4131 BG 5 | Norwood | 1 |
| CT 4132 BG 2 | Norwood | 2 |
| CT 4132 BG 3 | Norwood | 1 |
| CT 4132 BG 4 | Norwood | 2 |
| CT 4134.01 BG 1 | Norwood | 2 |
| CT 4134.02 BG 1 | Norwood | 3 |
| CT 4134.02 BG 2 | Norwood | 3 |
| CT 4135 BG 1 | Norwood | 3 |
| CT 4135 BG 2 | Norwood | 1 |
| CT 4135 BG 3 | Norwood | 1 |
| CT 4141 BG 2 | Sharon | 2 |
| CT 4141 BG 3 | No place name | 3 |
| CT 4141 BG 4 | No place name | 3 |
| CT 4142 BG 2 | No place name | 3 |
| CT 4142 BG 3 | No place name | 3 |
| CT 4151.02 BG 2 | No place name | 1 |
| CT 4151.02 BG 3 | No place name | 3 |
| CT 4151.02 BG 4 | No place name | 2 |
| CT 4151.02 BG 5 | No place name | 2 |
| CT 4152 BG 2 | No place name | 3 |
| CT 4161.01 BG 4 | Milton | 2 |
| CT 4162 BG 1 | Milton | 3 |
| CT 4162 BG 2 | Milton | 3 |
| CT 4162 BG 4 | Milton | 3 |
| CT 4162 BG 5 | Milton | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4162 BG 6 | Milton | 3 |
| CT 4162 BG 7 | Milton | 3 |
| CT 4163 BG 2 | Milton | 1 |
| CT 4163 BG 5 | Milton | 1 |
| CT 4164 BG 1 | Milton | 3 |
| CT 4164 BG 7 | Milton | 3 |
| CT 4171 BG 1 | Quincy | 1 |
| CT 4171 BG 2 | Quincy | 1 |
| CT 4171 BG 3 | Quincy | 1 |
| CT 4171 BG 4 | Quincy | 3 |
| CT 4171 BG 5 | Quincy | 1 |
| CT 4172 BG 1 | Quincy | 1 |
| CT 4172 BG 2 | Quincy | 1 |
| CT 4172 BG 3 | Quincy | 1 |
| CT 4172 BG 4 | Quincy | 1 |
| CT 4172 BG 5 | Quincy | 1 |
| CT 4172 BG 6 | Quincy | 3 |
| CT 4172 BG 7 | Quincy | 1 |
| CT 4173 BG 1 | Quincy | 2 |
| CT 4173 BG 2 | Quincy | 3 |
| CT 4174 BG 2 | Quincy | 1 |
| CT 4174 BG 3 | Quincy | 2 |
| CT 4175.01 BG 1 | Quincy | 3 |
| CT 4175.01 BG 2 | Quincy | 1 |
| CT 4175.01 BG 3 | Quincy | 1 |
| CT 4175.01 BG 4 | Quincy | 1 |
| CT 4175.02 BG 1 | Quincy | 1 |
| CT 4175.02 BG 2 | Quincy | 1 |
| CT 4175.02 BG 3 | Quincy | 1 |
| CT 4175.02 BG 4 | Quincy | 1 |
| CT 4176.01 BG 1 | Quincy | 2 |
| CT 4176.01 BG 2 | Quincy | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4176.01 BG 3 | Quincy | 1 |
| CT 4176.01 BG 4 | Quincy | 1 |
| CT 4176.02 BG 2 | Quincy | 1 |
| CT 4176.02 BG 3 | Quincy | 1 |
| CT 4177.01 BG 2 | Quincy | 1 |
| CT 4177.01 BG 3 | Quincy | 3 |
| CT 4177.01 BG 4 | Quincy | 2 |
| CT 4177.02 BG 2 | Quincy | 1 |
| CT 4177.02 BG 3 | Quincy | 2 |
| CT 4178.01 BG 3 | Quincy | 2 |
| CT 4178.01 BG 5 | Quincy | 2 |
| CT 4178.02 BG 1 | Quincy | 1 |
| CT 4178.02 BG 2 | Quincy | 1 |
| CT 4179.01 BG 1 | Quincy | 1 |
| CT 4179.01 BG 2 | Quincy | 1 |
| CT 4179.01 BG 3 | Quincy | 1 |
| CT 4179.01 BG 4 | Quincy | 1 |
| CT 4179.01 BG 5 | Quincy | 1 |
| CT 4179.02 BG 1 | Quincy | 1 |
| CT 4179.02 BG 2 | Quincy | 1 |
| CT 4179.02 BG 3 | Quincy | 1 |
| CT 4180.02 BG 1 | Quincy | 1 |
| CT 4180.02 BG 2 | Quincy | 2 |
| CT 4180.02 BG 3 | Quincy | 2 |
| CT 4180.02 BG 4 | Quincy | 1 |
| CT 4180.02 BG 5 | Quincy | 1 |
| CT 4180.03 BG 1 | Quincy | 1 |
| CT 4180.04 BG 1 | Quincy | 1 |
| CT 4180.04 BG 2 | Quincy | 1 |
| CT 4180.04 BG 3 | Quincy | 1 |
| CT 4181.01 BG 1 | Quincy | 1 |
| CT 4181.01 BG 2 | Quincy | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4181.01 BG 3 | Quincy | 1 |
| CT 4181.02 BG 1 | Quincy | 1 |
| CT 4181.02 BG 2 | Quincy | 1 |
| CT 4182 BG 1 | Quincy | 1 |
| CT 4182 BG 2 | Quincy | 1 |
| CT 4182 BG 3 | Quincy | 2 |
| CT 4182 BG 4 | Quincy | 3 |
| CT 4191 BG 1 | Braintree | 3 |
| CT 4191 BG 2 | Braintree | 2 |
| CT 4191 BG 4 | Braintree | 1 |
| CT 4192 BG 1 | Braintree | 2 |
| CT 4192 BG 2 | Braintree | 2 |
| CT 4193 BG 1 | Braintree | 1 |
| CT 4193 BG 2 | Braintree | 2 |
| CT 4193 BG 3 | Braintree | 2 |
| CT 4193 BG 4 | Braintree | 3 |
| CT 4194 BG 3 | Braintree | 1 |
| CT 4195 BG 2 | Braintree | 3 |
| CT 4197 BG 1 | Braintree | 3 |
| CT 4198 BG 1 | Braintree | 3 |
| CT 4198 BG 2 | Braintree | 1 |
| CT 4201 BG 1 | Randolph | 1 |
| CT 4201 BG 2 | Randolph | 1 |
| CT 4201 BG 3 | Randolph | 3 |
| CT 4201 BG 4 | Randolph | 1 |
| CT 4201 BG 5 | Randolph | 1 |
| CT 4202.01 BG 1 | Randolph | 3 |
| CT 4202.01 BG 2 | Randolph | 1 |
| CT 4202.02 BG 1 | Randolph | 3 |
| CT 4202.02 BG 2 | Randolph | 1 |
| CT 4202.02 BG 3 | Randolph | 1 |
| CT 4203.01 BG 1 | Randolph | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4203.01 BG 2 | Randolph | 1 |
| CT 4203.01 BG 3 | Randolph | 1 |
| CT 4203.01 BG 4 | Randolph | 3 |
| CT 4203.02 BG 1 | Randolph | 1 |
| CT 4203.02 BG 2 | Randolph | 1 |
| CT 4203.02 BG 3 | Randolph | 3 |
| CT 4203.02 BG 4 | Randolph | 1 |
| CT 4203.02 BG 5 | Randolph | 1 |
| CT 4211 BG 1 | Holbrook | 1 |
| CT 4211 BG 3 | Holbrook | 3 |
| CT 4211 BG 4 | Holbrook | 2 |
| CT 4212 BG 1 | Holbrook | 3 |
| CT 4212 BG 4 | Holbrook | 1 |
| CT 4212 BG 5 | Holbrook | 1 |
| CT 4221 BG 4 | Weymouth | 2 |
| CT 4222 BG 2 | Weymouth | 2 |
| CT 4222 BG 5 | Weymouth | 1 |
| CT 4222 BG 6 | Weymouth | 2 |
| CT 4223.02 BG 2 | Weymouth | 3 |
| CT 4223.02 BG 3 | Weymouth | 1 |
| CT 4224 BG 1 | Weymouth | 2 |
| CT 4224 BG 2 | Weymouth | 2 |
| CT 4224 BG 5 | Weymouth | 1 |
| CT 4225.01 BG 1 | Weymouth | 2 |
| CT 4225.01 BG 2 | Weymouth | 2 |
| CT 4225.01 BG 4 | Weymouth | 2 |
| CT 4225.02 BG 2 | Weymouth | 1 |
| CT 4225.02 BG 3 | Weymouth | 1 |
| CT 4225.02 BG 4 | Weymouth | 2 |
| CT 4226 BG 1 | Weymouth | 2 |
| CT 4226 BG 2 | Weymouth | 2 |
| CT 4226 BG 3 | Weymouth | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4226 BG 5 | Weymouth | 2 |
| CT 4227 BG 1 | Weymouth | 2 |
| CT 4227 BG 2 | Weymouth | 2 |
| CT 4228 BG 1 | Weymouth | 2 |
| CT 4228 BG 3 | Weymouth | 2 |
| CT 4228 BG 4 | Weymouth | 2 |
| CT 4231 BG 1 | No place name | 2 |
| CT 4231 BG 2 | No place name | 2 |
| CT 4401 BG 1 | No place name | 2 |
| CT 4421.01 BG 1 | Franklin | 2 |
| CT 4422.02 BG 1 | Franklin | 2 |
| CT 4422.02 BG 2 | Franklin | 2 |
| CT 4431.01 BG 2 | No place name | 2 |
| CT 4431.01 BG 4 | No place name | 2 |
| CT 4431.02 BG 5 | No place name | 2 |
| CT 4561.01 BG 1 | No place name | 3 |
| CT 4561.01 BG 2 | No place name | 3 |
| CT 4561.02 BG 1 | No place name | 2 |
| CT 4561.02 BG 2 | No place name | 3 |
| CT 4561.02 BG 3 | No place name | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4562 BG 1 | No place name | 1 |
| CT 4562 BG 2 | No place name | 3 |
| CT 4563.01 BG 1 | No place name | 1 |
| CT 4563.01 BG 2 | No place name | 1 |
| CT 4563.02 BG 1 | No place name | 2 |
| CT 4563.02 BG 2 | No place name | 1 |
| CT 4563.02 BG 3 | No place name | 2 |
| CT 4563.02 BG 4 | No place name | 1 |
| CT 4564.01 BG 1 | No place name | 3 |
| CT 4564.01 BG 2 | No place name | 2 |
| CT 4564.02 BG 1 | No place name | 3 |
| CT 4564.02 BG 2 | No place name | 2 |
| CT 4564.02 BG 4 | No place name | 3 |
| CT 4571 BG 1 | No place name | 3 |
| CT 4571 BG 2 | No place name | 3 |
| CT 4571 BG 3 | No place name | 2 |
| CT 4571 BG 4 | No place name | 2 |
| CT 4572 BG 1 | Needham | 3 |
| CT 4572 BG 4 | Needham | 3 |

**Table G-EJ3. Census Tracts (CT) and Block Groups (BG) in Plymouth County, Massachusetts (County ID 25-023) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 5001.01 BG 3 | Hull | 2 |
| CT 5021.01 BG 4 | Rockland | 2 |
| CT 5021.02 BG 3 | Rockland | 1 |
| CT 5031.02 BG 3 | Hanover | 2 |
| CT 5031.02 BG 5 | Hanover | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 5031.02 BG 6 | Hanover | 2 |
| CT 5051.01 BG 4 | Scituate | 3 |
| CT 5052 BG 1 | Scituate | 2 |
| CT 5052 BG 2 | Scituate | 2 |
| CT 5061.01 BG 3 | Marshfield | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 5061.02 BG 1 | Marshfield | 2 |
| CT 5061.02 BG 3 | Marshfield | 1 |
| CT 5061.02 BG 4 | Marshfield | 2 |
| CT 5062.02 BG 1 | Marshfield | 2 |
| CT 5062.03 BG 1 | Marshfield | 2 |
| CT 5062.04 BG 2 | Marshfield | 2 |
| CT 5081.02 BG 1 | Pembroke | 2 |
| CT 5091.01 BG 3 | Kingston | 2 |
| CT 5091.02 BG 1 | Kingston | 2 |
| CT 5101 BG 1 | Brockton | 1 |
| CT 5101 BG 2 | Brockton | 3 |
| CT 5101 BG 3 | Brockton | 3 |
| CT 5101 BG 4 | Brockton | 1 |
| CT 5102 BG 1 | Brockton | 3 |
| CT 5102 BG 2 | Brockton | 3 |
| CT 5102 BG 3 | Brockton | 3 |
| CT 5102 BG 4 | Brockton | 1 |
| CT 5103 BG 1 | Brockton | 1 |
| CT 5103 BG 2 | Brockton | 1 |
| CT 5103 BG 3 | Brockton | 1 |
| CT 5104 BG 1 | Brockton | 1 |
| CT 5104 BG 2 | Brockton | 1 |
| CT 5104 BG 3 | Brockton | 1 |
| CT 5104 BG 4 | Brockton | 1 |
| CT 5105.01 BG 1 | Brockton | 1 |
| CT 5105.01 BG 2 | Brockton | 1 |
| CT 5105.02 BG 1 | Brockton | 1 |
| CT 5105.02 BG 2 | Brockton | 1 |
| CT 5105.02 BG 3 | Brockton | 1 |
| CT 5105.02 BG 4 | Brockton | 1 |
| CT 5105.02 BG 5 | Brockton | 1 |
| CT 5105.03 BG 1 | Brockton | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 5105.03 BG 2 | Brockton | 1 |
| CT 5105.03 BG 3 | Brockton | 3 |
| CT 5106 BG 1 | Brockton | 1 |
| CT 5106 BG 2 | Brockton | 3 |
| CT 5106 BG 3 | Brockton | 3 |
| CT 5107 BG 1 | Brockton | 1 |
| CT 5107 BG 2 | Brockton | 1 |
| CT 5107 BG 3 | Brockton | 3 |
| CT 5107 BG 4 | Brockton | 1 |
| CT 5107 BG 5 | Brockton | 1 |
| CT 5107 BG 6 | Brockton | 1 |
| CT 5108 BG 1 | Brockton | 1 |
| CT 5108 BG 2 | Brockton | 1 |
| CT 5108 BG 3 | Brockton | 1 |
| CT 5108 BG 4 | Brockton | 1 |
| CT 5108 BG 5 | Brockton | 1 |
| CT 5108 BG 6 | Brockton | 1 |
| CT 5109 BG 1 | Brockton | 1 |
| CT 5109 BG 2 | Brockton | 1 |
| CT 5109 BG 3 | Brockton | 1 |
| CT 5110 BG 1 | Brockton | 1 |
| CT 5110 BG 2 | Brockton | 1 |
| CT 5111 BG 1 | Brockton | 3 |
| CT 5111 BG 2 | Brockton | 1 |
| CT 5111 BG 3 | Brockton | 3 |
| CT 5111 BG 4 | Brockton | 1 |
| CT 5111 BG 5 | Brockton | 3 |
| CT 5111 BG 6 | Brockton | 3 |
| CT 5112 BG 1 | Brockton | 1 |
| CT 5112 BG 2 | Brockton | 3 |
| CT 5112 BG 3 | Brockton | 1 |
| CT 5112 BG 4 | Brockton | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 5112 BG 5 | Brockton | 1 |
| CT 5113.01 BG 1 | Brockton | 1 |
| CT 5113.01 BG 2 | Brockton | 3 |
| CT 5113.01 BG 3 | Brockton | 1 |
| CT 5113.01 BG 4 | Brockton | 1 |
| CT 5113.01 BG 5 | Brockton | 3 |
| CT 5113.02 BG 1 | East Bridgewater | 1 |
| CT 5113.02 BG 2 | Brockton | 3 |
| CT 5113.02 BG 3 | Brockton | 1 |
| CT 5113.02 BG 4 | Brockton | 1 |
| CT 5114 BG 1 | Brockton | 1 |
| CT 5114 BG 2 | Brockton | 1 |
| CT 5114 BG 3 | Brockton | 1 |
| CT 5114 BG 4 | Brockton | 1 |
| CT 5115 BG 1 | Brockton | 1 |
| CT 5115 BG 2 | Brockton | 1 |
| CT 5115 BG 3 | Brockton | 1 |
| CT 5115 BG 4 | Brockton | 1 |
| CT 5116 BG 1 | Brockton | 1 |
| CT 5116 BG 2 | Brockton | 1 |
| CT 5116 BG 3 | Brockton | 1 |
| CT 5116 BG 4 | Brockton | 3 |
| CT 5116 BG 5 | Brockton | 3 |
| CT 5116 BG 6 | Brockton | 1 |
| CT 5116 BG 7 | Brockton | 2 |
| CT 5117.01 BG 1 | Brockton | 3 |
| CT 5117.01 BG 2 | Brockton | 3 |
| CT 5117.01 BG 3 | Brockton | 3 |
| CT 5117.01 BG 4 | Brockton | 3 |
| CT 5117.01 BG 5 | Brockton | 3 |
| CT 5117.02 BG 1 | Brockton | 3 |
| CT 5117.02 BG 2 | Brockton | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 5201 BG 1 | Abington | 2 |
| CT 5202.01 BG 1 | Abington | 3 |
| CT 5202.01 BG 2 | Abington | 1 |
| CT 5202.02 BG 1 | Abington | 2 |
| CT 5211.01 BG 2 | Whitman | 2 |
| CT 5211.02 BG 1 | Whitman | 2 |
| CT 5211.02 BG 2 | Whitman | 2 |
| CT 5212.01 BG 3 | Whitman | 2 |
| CT 5221.02 BG 4 | Hanson | 2 |
| CT 5231 BG 1 | East Bridgewater | 1 |
| CT 5232.01 BG 1 | East Bridgewater | 2 |
| CT 5232.02 BG 1 | East Bridgewater | 2 |
| CT 5232.02 BG 2 | East Bridgewater | 1 |
| CT 5241.01 BG 3 | West Bridgewater | 2 |
| CT 5241.02 BG 1 | West Bridgewater | 2 |
| CT 5251.01 BG 1 | Bridgewater | 3 |
| CT 5251.01 BG 2 | Bridgewater | 3 |
| CT 5251.01 BG 3 | Bridgewater | 2 |
| CT 5251.01 BG 4 | Bridgewater | 2 |
| CT 5251.04 BG 3 | Bridgewater | 2 |
| CT 5252.03 BG 2 | Bridgewater | 2 |
| CT 5252.03 BG 3 | Bridgewater | 1 |
| CT 5252.04 BG 1 | Bridgewater | 3 |
| CT 5253 BG 1 | Bridgewater | 3 |
| CT 5301 BG 2 | Plymouth | 1 |
| CT 5302 BG 1 | Plymouth | 2 |
| CT 5302 BG 2 | Plymouth | 2 |
| CT 5302 BG 3 | Plymouth | 2 |
| CT 5303 BG 2 | Plymouth | 1 |
| CT 5303 BG 3 | Plymouth | 2 |
| CT 5303 BG 4 | Plymouth | 2 |
| CT 5305 BG 1 | Plymouth | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 5305 BG 3 | Plymouth | 1 |
| CT 5305 BG 5 | Plymouth | 2 |
| CT 5306 BG 1 | Plymouth | 3 |
| CT 5308.01 BG 2 | Plymouth | 2 |
| CT 5308.02 BG 5 | Plymouth | 2 |
| CT 5309.01 BG 4 | Plymouth | 2 |
| CT 5401.01 BG 2 | Lakeville | 2 |
| CT 5423 BG 1 | Middleborough | 2 |
| CT 5423 BG 2 | Middleborough | 2 |
| CT 5423 BG 4 | Middleborough | 1 |
| CT 5423 BG 5 | Middleborough | 2 |
| CT 5423 BG 6 | Middleborough | 2 |
| CT 5441 BG 1 | Carver | 3 |
| CT 5441 BG 4 | Carver | 2 |
| CT 5442 BG 1 | Carver | 2 |
| CT 5442 BG 3 | Carver | 2 |
| CT 5442 BG 4 | Carver | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 5451 BG 1 | Wareham | 1 |
| CT 5451 BG 2 | Wareham | 2 |
| CT 5451 BG 4 | Wareham | 2 |
| CT 5452 BG 1 | Wareham | 3 |
| CT 5452 BG 2 | Wareham | 3 |
| CT 5452 BG 3 | Wareham | 1 |
| CT 5452 BG 4 | Wareham | 1 |
| CT 5453 BG 1 | Wareham | 1 |
| CT 5453 BG 3 | Wareham | 2 |
| CT 5453 BG 4 | Wareham | 2 |
| CT 5454 BG 1 | Wareham | 1 |
| CT 5454 BG 2 | Wareham | 2 |
| CT 5454 BG 5 | Wareham | 1 |
| CT 5601 BG 4 | Mattapoisett | 1 |
| CT 5611 BG 4 | Marion | 2 |
| CT 5611 BG 5 | Marion | 1 |
| CT 5612 BG 1 | Bridgewater | 1 |

### Table G-EJ4. Census Tracts (CT) and Block Groups (BG) in Bristol County, Massachusetts (County ID 25-005) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6002.02 BG 2 | Easton | 3 |
| CT 6002.02 BG 3 | Easton | 2 |
| CT 6002.03 BG 2 | Easton | 3 |
| CT 6101 BG 3 | Mansfield | 3 |
| CT 6102.03 BG 3 | Mansfield | 3 |
| CT 6102.04 BG 3 | Mansfield | 3 |
| CT 6122 BG 2 | Raynham | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6131 BG 1 | Taunton | 2 |
| CT 6131 BG 2 | Taunton | 3 |
| CT 6131 BG 3 | Taunton | 2 |
| CT 6131 BG 4 | Taunton | 3 |
| CT 6133 BG 2 | Taunton | 3 |
| CT 6134 BG 2 | Taunton | 1 |
| CT 6136 BG 1 | Taunton | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6136 BG 2 | Taunton | 2 |
| CT 6137 BG 2 | Taunton | 1 |
| CT 6138 BG 1 | Taunton | 1 |
| CT 6138 BG 2 | Taunton | 1 |
| CT 6138 BG 3 | Taunton | 1 |
| CT 6138 BG 4 | Taunton | 1 |
| CT 6139.01 BG 2 | Taunton | 1 |
| CT 6139.02 BG 1 | Taunton | 3 |
| CT 6139.02 BG 2 | Taunton | 1 |
| CT 6140 BG 1 | Taunton | 1 |
| CT 6140 BG 2 | Taunton | 1 |
| CT 6141.01 BG 1 | Taunton | 3 |
| CT 6141.01 BG 2 | Taunton | 1 |
| CT 6141.01 BG 3 | Taunton | 1 |
| CT 6141.02 BG 1 | Taunton | 2 |
| CT 6301.01 BG 1 | North Attleborough | 3 |
| CT 6301.01 BG 2 | North Attleborough | 1 |
| CT 6301.02 BG 2 | North Attleborough | 2 |
| CT 6301.02 BG 3 | North Attleborough | 2 |
| CT 6302 BG 4 | North Attleborough | 1 |
| CT 6303 BG 3 | North Attleborough | 2 |
| CT 6304 BG 3 | North Attleborough | 3 |
| CT 6311 BG 1 | Attleboro | 3 |
| CT 6311 BG 3 | Attleboro | 1 |
| CT 6311 BG 4 | Attleboro | 2 |
| CT 6311 BG 5 | Attleboro | 3 |
| CT 6312 BG 3 | Attleboro | 1 |
| CT 6312 BG 5 | Attleboro | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6313 BG 3 | Attleboro | 2 |
| CT 6314 BG 1 | Attleboro | 1 |
| CT 6314 BG 2 | Attleboro | 3 |
| CT 6315 BG 1 | Attleboro | 3 |
| CT 6315 BG 2 | Attleboro | 2 |
| CT 6316 BG 1 | Attleboro | 1 |
| CT 6316 BG 2 | Attleboro | 3 |
| CT 6316 BG 3 | Attleboro | 1 |
| CT 6317 BG 1 | Attleboro | 1 |
| CT 6317 BG 2 | Attleboro | 2 |
| CT 6322 BG 2 | Seekonk | 2 |
| CT 6401 BG 1 | Fall River | 1 |
| CT 6401 BG 2 | Fall River | 1 |
| CT 6401 BG 4 | Fall River | 1 |
| CT 6401 BG 5 | Tiverton | 2 |
| CT 6402 BG 1 | Fall River | 2 |
| CT 6402 BG 2 | Fall River | 2 |
| CT 6402 BG 3 | Fall River | 1 |
| CT 6402 BG 4 | Fall River | 2 |
| CT 6402 BG 5 | Fall River | 1 |
| CT 6403 BG 1 | Fall River | 1 |
| CT 6403 BG 2 | Fall River | 1 |
| CT 6403 BG 3 | Fall River | 1 |
| CT 6404 BG 1 | Fall River | 2 |
| CT 6404 BG 2 | Fall River | 1 |
| CT 6404 BG 3 | Fall River | 2 |
| CT 6405 BG 1 | Fall River | 2 |
| CT 6405 BG 2 | Fall River | 1 |
| CT 6405 BG 3 | Fall River | 3 |
| CT 6405 BG 4 | Fall River | 3 |
| CT 6405 BG 5 | Fall River | 1 |
| CT 6406 BG 1 | Fall River | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6406 BG 2 | Fall River | 1 |
| CT 6406 BG 3 | Fall River | 1 |
| CT 6406 BG 4 | Fall River | 1 |
| CT 6407 BG 1 | Fall River | 2 |
| CT 6407 BG 2 | Fall River | 1 |
| CT 6408 BG 1 | Fall River | 1 |
| CT 6408 BG 2 | Fall River | 2 |
| CT 6409.01 BG 1 | Fall River | 1 |
| CT 6409.01 BG 2 | Fall River | 2 |
| CT 6409.01 BG 3 | Fall River | 1 |
| CT 6409.01 BG 4 | Fall River | 1 |
| CT 6409.01 BG 5 | Fall River | 1 |
| CT 6410 BG 1 | Fall River | 1 |
| CT 6410 BG 2 | Fall River | 1 |
| CT 6410 BG 3 | Fall River | 1 |
| CT 6411.01 BG 1 | Fall River | 1 |
| CT 6411.01 BG 2 | Fall River | 1 |
| CT 6412 BG 1 | Fall River | 1 |
| CT 6412 BG 2 | Fall River | 2 |
| CT 6413 BG 1 | Fall River | 1 |
| CT 6413 BG 2 | Fall River | 1 |
| CT 6413 BG 3 | Fall River | 1 |
| CT 6413 BG 4 | Fall River | 1 |
| CT 6413 BG 5 | Fall River | 1 |
| CT 6414 BG 1 | Fall River | 1 |
| CT 6414 BG 2 | Fall River | 1 |
| CT 6414 BG 3 | Fall River | 1 |
| CT 6415 BG 1 | Fall River | 1 |
| CT 6415 BG 2 | Fall River | 2 |
| CT 6416 BG 2 | Fall River | 2 |
| CT 6417 BG 2 | Fall River | 2 |
| CT 6417 BG 3 | Fall River | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6417 BG 4 | Fall River | 1 |
| CT 6418 BG 1 | Fall River | 3 |
| CT 6418 BG 3 | Fall River | 2 |
| CT 6419 BG 1 | Fall River | 1 |
| CT 6419 BG 2 | Fall River | 1 |
| CT 6420 BG 1 | Fall River | 2 |
| CT 6420 BG 2 | Fall River | 1 |
| CT 6420 BG 3 | Fall River | 1 |
| CT 6421 BG 2 | Fall River | 1 |
| CT 6421 BG 3 | Fall River | 3 |
| CT 6422 BG 1 | Fall River | 2 |
| CT 6422 BG 2 | Fall River | 1 |
| CT 6422 BG 3 | Fall River | 1 |
| CT 6422 BG 4 | Fall River | 2 |
| CT 6424 BG 1 | Fall River | 1 |
| CT 6442 BG 5 | Somerset | 2 |
| CT 6451.01 BG 3 | Swansea | 2 |
| CT 6451.02 BG 3 | Swansea | 2 |
| CT 6461.01 BG 2 | Westport | 2 |
| CT 6461.01 BG 3 | Westport | 2 |
| CT 6501.02 BG 1 | New Bedford | 1 |
| CT 6501.02 BG 2 | New Bedford | 2 |
| CT 6501.02 BG 3 | New Bedford | 1 |
| CT 6502.01 BG 3 | New Bedford | 1 |
| CT 6502.02 BG 1 | New Bedford | 2 |
| CT 6503 BG 1 | New Bedford | 3 |
| CT 6503 BG 2 | New Bedford | 1 |
| CT 6503 BG 3 | New Bedford | 1 |
| CT 6504 BG 1 | New Bedford | 2 |
| CT 6504 BG 2 | New Bedford | 2 |
| CT 6504 BG 3 | New Bedford | 1 |
| CT 6505 BG 1 | New Bedford | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6505 BG 2 | New Bedford | 2 |
| CT 6505 BG 3 | New Bedford | 1 |
| CT 6506 BG 1 | New Bedford | 1 |
| CT 6506 BG 2 | New Bedford | 1 |
| CT 6506 BG 3 | New Bedford | 1 |
| CT 6507 BG 1 | New Bedford | 1 |
| CT 6507 BG 2 | New Bedford | 1 |
| CT 6508 BG 1 | New Bedford | 1 |
| CT 6508 BG 2 | New Bedford | 1 |
| CT 6508 BG 3 | New Bedford | 1 |
| CT 6508 BG 4 | New Bedford | 1 |
| CT 6509 BG 1 | New Bedford | 1 |
| CT 6509 BG 2 | New Bedford | 1 |
| CT 6509 BG 3 | New Bedford | 1 |
| CT 6510.01 BG 1 | New Bedford | 1 |
| CT 6510.02 BG 1 | New Bedford | 3 |
| CT 6510.02 BG 2 | New Bedford | 1 |
| CT 6511 BG 1 | New Bedford | 1 |
| CT 6511 BG 2 | New Bedford | 1 |
| CT 6511 BG 3 | New Bedford | 1 |
| CT 6511 BG 4 | New Bedford | 2 |
| CT 6512 BG 1 | New Bedford | 1 |
| CT 6512 BG 2 | New Bedford | 1 |
| CT 6513 BG 1 | New Bedford | 1 |
| CT 6513 BG 2 | New Bedford | 1 |
| CT 6514 BG 1 | New Bedford | 1 |
| CT 6514 BG 2 | New Bedford | 1 |
| CT 6514 BG 3 | New Bedford | 1 |
| CT 6514 BG 4 | New Bedford | 1 |
| CT 6515 BG 1 | New Bedford | 1 |
| CT 6515 BG 2 | New Bedford | 1 |
| CT 6515 BG 3 | New Bedford | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6515 BG 4 | New Bedford | 1 |
| CT 6516 BG 1 | New Bedford | 1 |
| CT 6516 BG 2 | New Bedford | 1 |
| CT 6516 BG 3 | New Bedford | 3 |
| CT 6516 BG 4 | New Bedford | 1 |
| CT 6517 BG 1 | New Bedford | 1 |
| CT 6517 BG 2 | New Bedford | 1 |
| CT 6518 BG 1 | New Bedford | 1 |
| CT 6518 BG 2 | New Bedford | 1 |
| CT 6519 BG 1 | New Bedford | 1 |
| CT 6519 BG 2 | New Bedford | 1 |
| CT 6520 BG 1 | New Bedford | 1 |
| CT 6520 BG 2 | New Bedford | 1 |
| CT 6520 BG 3 | New Bedford | 1 |
| CT 6521 BG 1 | New Bedford | 1 |
| CT 6521 BG 3 | New Bedford | 1 |
| CT 6523 BG 1 | New Bedford | 2 |
| CT 6523 BG 2 | New Bedford | 1 |
| CT 6524 BG 1 | New Bedford | 1 |
| CT 6524 BG 2 | New Bedford | 1 |
| CT 6525 BG 1 | New Bedford | 1 |
| CT 6525 BG 2 | New Bedford | 1 |
| CT 6526 BG 1 | New Bedford | 1 |
| CT 6526 BG 2 | New Bedford | 1 |
| CT 6527 BG 1 | New Bedford | 1 |
| CT 6527 BG 2 | New Bedford | 1 |
| CT 6527 BG 3 | New Bedford | 1 |
| CT 6527 BG 4 | New Bedford | 1 |
| CT 6528 BG 1 | New Bedford | 2 |
| CT 6528 BG 3 | New Bedford | 1 |
| CT 6531.01 BG 3 | Dartmouth | 2 |
| CT 6531.02 BG 2 | Dartmouth | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6533.01 BG 3 | Dartmouth | 2 |
| CT 6541 BG 3 | Acushnet | 3 |
| CT 6541 BG 4 | Acushnet | 2 |
| CT 6542 BG 1 | Acushnet | 2 |
| CT 6542 BG 2 | Acushnet | 2 |
| CT 6542 BG 3 | Acushnet | 1 |
| CT 6552 BG 1 | Fairhaven | 3 |
| CT 6552 BG 2 | Fairhaven | 2 |
| CT 6552 BG 3 | Fairhaven | 1 |
| CT 6552 BG 4 | Fairhaven | 2 |
| CT 6552 BG 5 | Fairhaven | 1 |
| CT 6553 BG 1 | Fairhaven | 2 |
| CT 6553 BG 3 | Fairhaven | 2 |
| CT 6554 BG 4 | Fairhaven | 2 |
| CT 9855 BG 1 | Dartmouth | 3 |

### Table G-EJ5. Census Tracts (CT) and Block Groups (BG) in Barnstable County, Massachusetts (County ID 25-001) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 101 BG 1 | Provincetown | 2 |
| CT 101 BG 2 | Provincetown | 1 |
| CT 101 BG 3 | Provincetown | 3 |
| CT 101 BG 4 | Provincetown | 1 |
| CT 102.06 BG 1 | Wellfleet | 2 |
| CT 102.06 BG 2 | Wellfleet | 1 |
| CT 102.06 BG 3 | Wellfleet | 2 |
| CT 102.08 BG 2 | Truro | 2 |
| CT 102.08 BG 3 | Truro | 2 |
| CT 103.04 BG 2 | Eastham | 2 |
| CT 103.04 BG 3 | Eastham | 3 |
| CT 103.06 BG 1 | Eastham | 1 |
| CT 103.06 BG 2 | Eastham | 1 |
| CT 104 BG 2 | Orleans | 1 |
| CT 105 BG 1 | Orleans | 2 |
| CT 106 BG 3 | Chatham | 1 |
| CT 107 BG 4 | Chatham | 2 |
| CT 108 BG 1 | Brewster | 2 |
| CT 108 BG 5 | Brewster | 2 |
| CT 109 BG 2 | Brewster | 3 |
| CT 110.02 BG 3 | Harwich | 2 |
| CT 110.02 BG 4 | Harwich | 1 |
| CT 112 BG 1 | Harwich | 2 |
| CT 112 BG 2 | Harwich | 1 |
| CT 112 BG 3 | Harwich | 2 |
| CT 112 BG 4 | Harwich | 2 |
| CT 113 BG 1 | Dennis | 2 |
| CT 114 BG 4 | Dennis | 1 |
| CT 115 BG 1 | Dennis | 1 |
| CT 115 BG 2 | Dennis | 2 |
| CT 115 BG 4 | Dennis | 2 |
| CT 115 BG 5 | Dennis | 1 |
| CT 116 BG 1 | Dennis | 1 |
| CT 116 BG 2 | Dennis | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 116 BG 3 | Dennis | 2 |
| CT 117 BG 1 | Dennis | 1 |
| CT 117 BG 3 | Dennis | 2 |
| CT 118.02 BG 1 | Yarmouth | 2 |
| CT 118.02 BG 3 | Yarmouth | 2 |
| CT 118.02 BG 4 | Yarmouth | 1 |
| CT 120.01 BG 2 | Yarmouth | 2 |
| CT 120.01 BG 4 | Yarmouth | 2 |
| CT 120.02 BG 1 | Yarmouth | 1 |
| CT 121.01 BG 1 | Yarmouth | 3 |
| CT 121.01 BG 2 | Yarmouth | 3 |
| CT 121.01 BG 3 | Yarmouth | 2 |
| CT 121.01 BG 4 | Yarmouth | 1 |
| CT 121.01 BG 5 | Yarmouth | 2 |
| CT 121.02 BG 1 | Yarmouth | 1 |
| CT 121.02 BG 2 | Yarmouth | 3 |
| CT 121.02 BG 3 | Yarmouth | 2 |
| CT 121.02 BG 4 | Yarmouth | 1 |
| CT 125.02 BG 1 | Barnstable | 3 |
| CT 125.02 BG 2 | Barnstable | 1 |
| CT 125.02 BG 3 | Barnstable | 3 |
| CT 125.02 BG 4 | Barnstable | 1 |
| CT 126.01 BG 1 | Barnstable | 1 |
| CT 126.01 BG 2 | Barnstable | 1 |
| CT 126.02 BG 1 | Barnstable | 1 |
| CT 126.02 BG 2 | Barnstable | 1 |
| CT 126.02 BG 3 | Barnstable | 1 |
| CT 126.02 BG 4 | Barnstable | 3 |
| CT 127 BG 1 | Barnstable | 2 |
| CT 127 BG 2 | Barnstable | 2 |
| CT 127 BG 4 | Barnstable | 3 |
| CT 128 BG 2 | Barnstable | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 129 BG 1 | Barnstable | 3 |
| CT 130.02 BG 3 | Barnstable | 3 |
| CT 131 BG 1 | Barnstable | 2 |
| CT 133 BG 1 | Sandwich | 1 |
| CT 135 BG 4 | Sandwich | 3 |
| CT 136 BG 2 | Sandwich | 2 |
| CT 136 BG 3 | Sandwich | 3 |
| CT 137 BG 4 | Bourne | 3 |
| CT 138 BG 1 | Bourne | 3 |
| CT 138 BG 2 | Bourne | 3 |
| CT 138 BG 3 | Bourne | 3 |
| CT 139 BG 1 | Bourne | 2 |
| CT 139 BG 3 | Bourne | 1 |
| CT 140.02 BG 3 | Bourne | 2 |
| CT 140.02 BG 4 | Bourne | 1 |
| CT 141 BG 1 | Bourne | 1 |
| CT 144.02 BG 1 | Falmouth | 3 |
| CT 144.02 BG 2 | Falmouth | 3 |
| CT 144.02 BG 3 | Falmouth | 3 |
| CT 145 BG 1 | Falmouth | 2 |
| CT 145 BG 2 | Falmouth | 2 |
| CT 145 BG 3 | Falmouth | 1 |
| CT 146 BG 2 | Falmouth | 1 |
| CT 146 BG 3 | Falmouth | 1 |
| CT 146 BG 4 | Falmouth | 3 |
| CT 147 BG 1 | Falmouth | 3 |
| CT 147 BG 2 | Falmouth | 2 |
| CT 147 BG 3 | Falmouth | 1 |
| CT 148 BG 1 | Falmouth | 1 |
| CT 148 BG 3 | Falmouth | 1 |
| CT 148 BG 4 | Falmouth | 3 |
| CT 149 BG 3 | Falmouth | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 150.01 BG 1 | Mashpee | 1 |
| CT 150.01 BG 2 | Mashpee | 3 |
| CT 150.02 BG 1 | Mashpee | 1 |
| CT 150.02 BG 2 | Mashpee | 1 |
| CT 151 BG 1 | Mashpee | 3 |
| CT 153 BG 1 | Barnstable | 1 |
| CT 153 BG 2 | Barnstable | 1 |
| CT 153 BG 3 | Barnstable | 1 |

**Table G-EJ6. Census Tracts (CT) and Block Groups (BG) in Nantucket County, Massachusetts (County ID 25-019) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 9501 BG 1 | Nantucket | 2 |
| CT 9501 BG 2 | Nantucket | 1 |
| CT 9502 BG 1 | Nantucket | 3 |
| CT 9502 BG 2 | Nantucket | 1 |
| CT 9502 BG 4 | Nantucket | 1 |
| CT 9504 BG 2 | Nantucket | 1 |

**Table G-EJ7. Census Tracts (CT) and Block Groups (BG) in Dukes County, Massachusetts (County ID 25-007) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 2001 BG 1 | Tisbury | 2 |
| CT 2001 BG 2 | Tisbury | 3 |
| CT 2001 BG 4 | Tisbury | 1 |
| CT 2001 BG 5 | Tisbury | 1 |
| CT 2002 BG 1 | Oak Bluffs | 2 |
| CT 2002 BG 2 | Oak Bluffs | 3 |
| CT 2002 BG 3 | Oak Bluffs | 3 |
| CT 2002 BG 4 | Oak Bluffs | 2 |
| CT 2002 BG 5 | Oak Bluffs | 2 |
| CT 2003 BG 2 | Edgartown | 3 |
| CT 2003 BG 3 | Edgartown | 3 |
| CT 2003 BG 4 | Edgartown | 2 |
| CT 2004 BG 5 | Aquinnah | 3 |

### Table G-EJ8. Census Tracts (CT) and Block Groups (BG) in Providence County, Rhode Island (County ID 44-007) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1.01 BG 1 | Providence | 1 |
| CT 1.01 BG 2 | Providence | 1 |
| CT 1.01 BG 3 | Providence | 1 |
| CT 1.01 BG 4 | Providence | 3 |
| CT 1.02 BG 1 | Providence | 1 |
| CT 1.02 BG 2 | Providence | 1 |
| CT 1.02 BG 3 | Providence | 1 |
| CT 1.02 BG 4 | Providence | 1 |
| CT 10 BG 1 | Providence | 1 |
| CT 10 BG 2 | Providence | 1 |
| CT 101.02 BG 2 | East Providence | 2 |
| CT 102 BG 2 | East Providence | 2 |
| CT 102 BG 3 | East Providence | 3 |
| CT 102 BG 4 | East Providence | 3 |
| CT 102 BG 5 | East Providence | 2 |
| CT 102 BG 6 | East Providence | 1 |
| CT 102 BG 7 | East Providence | 3 |
| CT 103 BG 1 | East Providence | 2 |
| CT 104 BG 1 | East Providence | 2 |
| CT 104 BG 2 | East Providence | 3 |
| CT 104 BG 5 | East Providence | 2 |
| CT 105.01 BG 1 | East Providence | 2 |
| CT 105.02 BG 3 | East Providence | 2 |
| CT 105.02 BG 4 | East Providence | 3 |
| CT 106 BG 1 | East Providence | 2 |
| CT 106 BG 6 | East Providence | 2 |
| CT 107.02 BG 4 | East Providence | 2 |
| CT 108 BG 1 | Central Falls | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 108 BG 2 | Central Falls | 1 |
| CT 108 BG 3 | Central Falls | 1 |
| CT 109 BG 1 | Central Falls | 1 |
| CT 109 BG 2 | Central Falls | 1 |
| CT 109 BG 3 | Central Falls | 1 |
| CT 11 BG 1 | Providence | 1 |
| CT 11 BG 2 | Providence | 2 |
| CT 11 BG 3 | Providence | 2 |
| CT 110 BG 1 | Central Falls | 1 |
| CT 110 BG 2 | Central Falls | 1 |
| CT 110 BG 3 | Central Falls | 1 |
| CT 111 BG 1 | Central Falls | 1 |
| CT 111 BG 2 | Central Falls | 1 |
| CT 112 BG 5 | Cumberland | 2 |
| CT 115 BG 4 | Lincoln | 2 |
| CT 117.01 BG 2 | Lincoln | 2 |
| CT 117.02 BG 1 | Lincoln | 2 |
| CT 118 BG 2 | North Providence | 2 |
| CT 118 BG 3 | North Providence | 2 |
| CT 118 BG 4 | North Providence | 1 |
| CT 119.01 BG 2 | North Providence | 3 |
| CT 12 BG 1 | Providence | 1 |
| CT 12 BG 2 | Providence | 1 |
| CT 12 BG 3 | Providence | 1 |
| CT 120 BG 2 | North Providence | 2 |
| CT 120 BG 4 | North Providence | 2 |
| CT 121.04 BG 2 | North Providence | 2 |
| CT 123 BG 1 | Johnston | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 124.01 BG 1 | Johnston | 3 |
| CT 125 BG 1 | Johnston | 2 |
| CT 126.02 BG 2 | Smithfield | 2 |
| CT 129 BG 1 | Burrillville | 2 |
| CT 13 BG 1 | Providence | 1 |
| CT 13 BG 2 | Providence | 1 |
| CT 13 BG 3 | Providence | 1 |
| CT 13 BG 4 | Providence | 1 |
| CT 130.02 BG 4 | Burrillville | 2 |
| CT 131.01 BG 2 | Glocester | 2 |
| CT 135 BG 2 | Cranston | 1 |
| CT 135 BG 3 | Cranston | 2 |
| CT 135 BG 4 | Cranston | 1 |
| CT 135 BG 5 | Cranston | 3 |
| CT 136 BG 2 | Warwick | 1 |
| CT 137.01 BG 1 | Cranston | 3 |
| CT 137.01 BG 2 | Cranston | 3 |
| CT 137.01 BG 4 | Cranston | 2 |
| CT 137.02 BG 1 | Cranston | 2 |
| CT 137.02 BG 2 | Cranston | 2 |
| CT 14 BG 1 | Providence | 1 |
| CT 14 BG 2 | Providence | 1 |
| CT 14 BG 3 | Providence | 3 |
| CT 14 BG 4 | Providence | 1 |
| CT 14 BG 5 | Providence | 1 |
| CT 140 BG 2 | Cranston | 2 |
| CT 140 BG 3 | Cranston | 1 |
| CT 140 BG 4 | Cranston | 3 |
| CT 141 BG 1 | Cranston | 1 |
| CT 141 BG 2 | Cranston | 1 |
| CT 141 BG 3 | Cranston | 2 |
| CT 141 BG 4 | Cranston | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 142 BG 2 | Cranston | 1 |
| CT 145.02 BG 3 | Cranston | 2 |
| CT 147 BG 1 | Cranston | 3 |
| CT 147 BG 2 | Cranston | 1 |
| CT 147 BG 3 | Cranston | 1 |
| CT 147 BG 4 | Cranston | 2 |
| CT 147 BG 5 | Cranston | 2 |
| CT 147 BG 6 | Cranston | 3 |
| CT 148 BG 3 | Cranston | 2 |
| CT 15 BG 1 | Providence | 1 |
| CT 15 BG 2 | Providence | 1 |
| CT 15 BG 3 | Providence | 3 |
| CT 150 BG 1 | Pawtucket | 3 |
| CT 150 BG 2 | Pawtucket | 1 |
| CT 151 BG 1 | Pawtucket | 1 |
| CT 151 BG 2 | Pawtucket | 1 |
| CT 151 BG 3 | Pawtucket | 1 |
| CT 152 BG 1 | Pawtucket | 1 |
| CT 152 BG 2 | Pawtucket | 1 |
| CT 153 BG 1 | Pawtucket | 1 |
| CT 153 BG 2 | Pawtucket | 2 |
| CT 154 BG 1 | Pawtucket | 1 |
| CT 154 BG 2 | Pawtucket | 1 |
| CT 155 BG 2 | Pawtucket | 1 |
| CT 155 BG 3 | Pawtucket | 1 |
| CT 155 BG 4 | Pawtucket | 3 |
| CT 156 BG 1 | Pawtucket | 1 |
| CT 156 BG 3 | Pawtucket | 2 |
| CT 159 BG 1 | Pawtucket | 3 |
| CT 159 BG 2 | Pawtucket | 2 |
| CT 159 BG 3 | Pawtucket | 3 |
| CT 159 BG 4 | Pawtucket | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 16 BG 1 | Providence | 1 |
| CT 16 BG 2 | Providence | 1 |
| CT 16 BG 3 | Providence | 1 |
| CT 16 BG 4 | Providence | 1 |
| CT 16 BG 5 | Providence | 1 |
| CT 16 BG 6 | Providence | 1 |
| CT 16 BG 7 | Providence | 3 |
| CT 160 BG 1 | Pawtucket | 1 |
| CT 160 BG 2 | Pawtucket | 1 |
| CT 160 BG 3 | Pawtucket | 3 |
| CT 161 BG 1 | Pawtucket | 1 |
| CT 161 BG 2 | Pawtucket | 3 |
| CT 161 BG 3 | Pawtucket | 1 |
| CT 161 BG 4 | Pawtucket | 1 |
| CT 163 BG 1 | Pawtucket | 3 |
| CT 163 BG 2 | Pawtucket | 3 |
| CT 164 BG 1 | Pawtucket | 1 |
| CT 164 BG 2 | Pawtucket | 1 |
| CT 164 BG 3 | Pawtucket | 1 |
| CT 165 BG 2 | Pawtucket | 2 |
| CT 166 BG 1 | Pawtucket | 1 |
| CT 167 BG 1 | Pawtucket | 1 |
| CT 167 BG 2 | Pawtucket | 1 |
| CT 168 BG 3 | Pawtucket | 2 |
| CT 17 BG 1 | Providence | 3 |
| CT 17 BG 2 | Providence | 1 |
| CT 17 BG 3 | Providence | 1 |
| CT 170 BG 4 | Pawtucket | 3 |
| CT 171 BG 1 | Pawtucket | 3 |
| CT 171 BG 2 | Pawtucket | 3 |
| CT 171 BG 3 | Pawtucket | 1 |
| CT 171 BG 4 | Pawtucket | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 173 BG 1 | Woonsocket | 2 |
| CT 173 BG 2 | Woonsocket | 2 |
| CT 174 BG 1 | Woonsocket | 1 |
| CT 174 BG 2 | Woonsocket | 2 |
| CT 174 BG 3 | Woonsocket | 1 |
| CT 175 BG 2 | Woonsocket | 2 |
| CT 175 BG 3 | Woonsocket | 2 |
| CT 176 BG 1 | Woonsocket | 1 |
| CT 176 BG 2 | Woonsocket | 1 |
| CT 178 BG 1 | Woonsocket | 2 |
| CT 178 BG 2 | Woonsocket | 2 |
| CT 178 BG 3 | Woonsocket | 1 |
| CT 179 BG 1 | Woonsocket | 2 |
| CT 179 BG 2 | Woonsocket | 2 |
| CT 179 BG 3 | Woonsocket | 2 |
| CT 18 BG 1 | Providence | 1 |
| CT 18 BG 2 | Providence | 1 |
| CT 18 BG 3 | Providence | 1 |
| CT 18 BG 4 | Providence | 1 |
| CT 18 BG 5 | Providence | 1 |
| CT 18 BG 6 | Providence | 1 |
| CT 180 BG 1 | Woonsocket | 1 |
| CT 180 BG 2 | Woonsocket | 1 |
| CT 180 BG 3 | Woonsocket | 2 |
| CT 181 BG 1 | Woonsocket | 1 |
| CT 181 BG 2 | Woonsocket | 1 |
| CT 182 BG 2 | Woonsocket | 2 |
| CT 183 BG 1 | Woonsocket | 1 |
| CT 184 BG 1 | Woonsocket | 2 |
| CT 184 BG 3 | Woonsocket | 1 |
| CT 184 BG 5 | Woonsocket | 1 |
| CT 185 BG 1 | Woonsocket | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 19 BG 1 | Providence | 1 |
| CT 19 BG 2 | Providence | 1 |
| CT 19 BG 3 | Providence | 1 |
| CT 19 BG 4 | Providence | 3 |
| CT 19 BG 5 | Providence | 1 |
| CT 19 BG 6 | Providence | 1 |
| CT 2 BG 1 | Providence | 3 |
| CT 2 BG 2 | Providence | 1 |
| CT 2 BG 3 | Providence | 1 |
| CT 2 BG 4 | Providence | 1 |
| CT 2 BG 5 | Providence | 1 |
| CT 20 BG 1 | Providence | 1 |
| CT 20 BG 2 | Providence | 1 |
| CT 20 BG 3 | Providence | 1 |
| CT 20 BG 4 | Providence | 3 |
| CT 21.01 BG 1 | Providence | 1 |
| CT 21.01 BG 2 | Providence | 3 |
| CT 21.01 BG 3 | Providence | 1 |
| CT 21.02 BG 1 | Providence | 3 |
| CT 21.02 BG 2 | Providence | 1 |
| CT 21.02 BG 3 | Providence | 1 |
| CT 21.02 BG 4 | Providence | 1 |
| CT 21.02 BG 5 | Providence | 3 |
| CT 22 BG 1 | Providence | 1 |
| CT 22 BG 2 | Providence | 1 |
| CT 22 BG 3 | Providence | 1 |
| CT 22 BG 4 | Providence | 1 |
| CT 23 BG 1 | Providence | 2 |
| CT 23 BG 4 | Providence | 2 |
| CT 23 BG 5 | Providence | 3 |
| CT 23 BG 6 | Providence | 3 |
| CT 24 BG 1 | Providence | 2 |
| CT 24 BG 2 | Providence | 1 |
| CT 24 BG 4 | Providence | 1 |
| CT 25 BG 1 | Providence | 1 |
| CT 25 BG 2 | Providence | 3 |
| CT 26 BG 1 | Providence | 1 |
| CT 26 BG 2 | Providence | 1 |
| CT 26 BG 3 | Providence | 1 |
| CT 27 BG 1 | Providence | 1 |
| CT 27 BG 2 | Providence | 1 |
| CT 27 BG 3 | Providence | 1 |
| CT 27 BG 4 | Providence | 2 |
| CT 28 BG 1 | Providence | 1 |
| CT 28 BG 2 | Providence | 1 |
| CT 28 BG 3 | Providence | 1 |
| CT 28 BG 4 | Providence | 1 |
| CT 29 BG 1 | Providence | 3 |
| CT 29 BG 2 | Providence | 1 |
| CT 29 BG 3 | Providence | 1 |
| CT 29 BG 4 | Providence | 1 |
| CT 29 BG 5 | Providence | 1 |
| CT 3 BG 1 | Providence | 1 |
| CT 3 BG 2 | Providence | 1 |
| CT 3 BG 3 | Providence | 1 |
| CT 3 BG 4 | Providence | 1 |
| CT 3 BG 5 | Providence | 1 |
| CT 3 BG 6 | Providence | 3 |
| CT 31 BG 2 | Providence | 1 |
| CT 31 BG 3 | Providence | 1 |
| CT 31 BG 5 | Providence | 1 |
| CT 32 BG 1 | Providence | 2 |
| CT 32 BG 4 | Providence | 3 |
| CT 33 BG 4 | Providence | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 35 BG 2 | Providence | 2 |
| CT 35 BG 3 | Providence | 3 |
| CT 36.01 BG 1 | Providence | 1 |
| CT 36.02 BG 1 | Providence | 3 |
| CT 36.02 BG 3 | Providence | 2 |
| CT 37 BG 1 | Providence | 1 |
| CT 37 BG 2 | Providence | 1 |
| CT 37 BG 3 | Providence | 2 |
| CT 37 BG 4 | Providence | 2 |
| CT 4 BG 1 | Providence | 1 |
| CT 4 BG 2 | Providence | 1 |
| CT 4 BG 3 | Providence | 1 |
| CT 4 BG 4 | Providence | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 5 BG 1 | Providence | 1 |
| CT 5 BG 2 | Providence | 1 |
| CT 5 BG 3 | Providence | 1 |
| CT 6 BG 1 | Providence | 3 |
| CT 6 BG 2 | Providence | 1 |
| CT 7 BG 1 | Providence | 1 |
| CT 7 BG 2 | Providence | 1 |
| CT 7 BG 3 | Providence | 1 |
| CT 8 BG 1 | Providence | 3 |
| CT 8 BG 2 | Providence | 1 |
| CT 8 BG 3 | Providence | 1 |
| CT 9 BG 1 | Providence | 1 |
| CT 9 BG 2 | Providence | 1 |

**Table G-EJ9. Census Tracts (CT) and Block Groups (BG) in Bristol County, Rhode Island (County ID 44-001) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 301 BG 1 | Barrington | 2 |
| CT 301 BG 2 | Barrington | 3 |
| CT 301 BG 3 | Barrington | 3 |
| CT 301 BG 4 | Barrington | 1 |
| CT 302 BG 2 | Barrington | 3 |
| CT 303 BG 1 | Barrington | 3 |
| CT 304 BG 2 | Barrington | 3 |
| CT 305 BG 1 | Warren | 1 |
| CT 305 BG 2 | Warren | 2 |
| CT 305 BG 3 | Warren | 2 |
| CT 306.01 BG 1 | Warren | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 306.02 BG 1 | Warren | 2 |
| CT 306.02 BG 3 | Warren | 2 |
| CT 306.02 BG 4 | Warren | 2 |
| CT 307 BG 1 | Bristol | 2 |
| CT 307 BG 2 | Bristol | 2 |
| CT 307 BG 3 | Bristol | 1 |
| CT 307 BG 4 | Bristol | 1 |
| CT 308 BG 1 | Bristol | 1 |
| CT 308 BG 3 | Bristol | 1 |
| CT 309.01 BG 1 | Bristol | 1 |
| CT 309.02 BG 1 | Bristol | 3 |

| Census Tract & Block Group ID | Place Name | Category | Census Tract & Block Group ID | Place Name | Category |
|---|---|---|---|---|---|
| CT 309.02 BG 3 | Bristol | 2 | CT 309.02 BG 4 | Bristol | 1 |

**Table G-EJ10. Census Tracts (CT) and Block Groups (BG) in Kent County, Rhode Island (County ID 44-003) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category | Census Tract & Block Group ID | Place Name | Category |
|---|---|---|---|---|---|
| CT 201.01 BG 1 | West Warwick | 1 | CT 208 BG 1 | West Greenwich | 3 |
| CT 201.01 BG 3 | West Warwick | 3 | CT 208 BG 2 | West Greenwich | 3 |
| CT 201.02 BG 1 | West Warwick | 2 | CT 209.01 BG 1 | East Greenwich | 1 |
| CT 201.02 BG 2 | West Warwick | 1 | CT 209.01 BG 3 | East Greenwich | 2 |
| CT 201.02 BG 3 | West Warwick | 2 | CT 209.03 BG 1 | East Greenwich | 3 |
| CT 202 BG 1 | West Warwick | 1 | CT 209.03 BG 2 | East Greenwich | 1 |
| CT 202 BG 2 | West Warwick | 1 | CT 209.03 BG 3 | East Greenwich | 3 |
| CT 202 BG 3 | West Warwick | 1 | CT 210.01 BG 1 | Warwick | 1 |
| CT 203 BG 1 | West Warwick | 1 | CT 210.01 BG 2 | Warwick | 3 |
| CT 203 BG 2 | West Warwick | 2 | CT 210.02 BG 1 | Warwick | 3 |
| CT 203 BG 3 | West Warwick | 2 | CT 210.02 BG 3 | Warwick | 3 |
| CT 203 BG 4 | West Warwick | 1 | CT 210.02 BG 4 | Warwick | 1 |
| CT 203 BG 5 | West Warwick | 2 | CT 211 BG 3 | Warwick | 1 |
| CT 204 BG 3 | West Warwick | 1 | CT 211 BG 4 | Warwick | 1 |
| CT 205 BG 1 | West Warwick | 3 | CT 212 BG 2 | Warwick | 1 |
| CT 205 BG 2 | West Warwick | 1 | CT 212 BG 3 | Warwick | 1 |
| CT 206.01 BG 1 | Coventry | 2 | CT 213 BG 1 | Warwick | 1 |
| CT 206.02 BG 1 | Coventry | 2 | CT 213 BG 3 | Warwick | 3 |
| CT 206.02 BG 2 | Coventry | 1 | CT 213 BG 4 | Warwick | 3 |
| CT 206.03 BG 1 | Coventry | 2 | CT 214.01 BG 1 | Warwick | 1 |
| CT 206.04 BG 1 | Coventry | 2 | CT 214.01 BG 3 | Warwick | 3 |
| CT 206.04 BG 2 | Coventry | 2 | CT 214.02 BG 1 | Warwick | 2 |
| CT 207.03 BG 2 | Coventry | 2 | CT 214.02 BG 2 | Warwick | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 214.02 BG 3 | Warwick | 1 |
| CT 215.01 BG 2 | Warwick | 2 |
| CT 215.01 BG 3 | Warwick | 2 |
| CT 215.02 BG 1 | Warwick | 3 |
| CT 215.02 BG 3 | Warwick | 3 |
| CT 215.02 BG 4 | Warwick | 1 |
| CT 216 BG 1 | Warwick | 3 |
| CT 217 BG 2 | Warwick | 2 |
| CT 217 BG 3 | Warwick | 3 |
| CT 217 BG 4 | Warwick | 1 |
| CT 217 BG 5 | Warwick | 1 |
| CT 218 BG 1 | Warwick | 3 |
| CT 219.01 BG 1 | Warwick | 1 |
| CT 219.01 BG 2 | Warwick | 3 |
| CT 219.01 BG 3 | Warwick | 2 |
| CT 219.02 BG 1 | Warwick | 3 |
| CT 219.02 BG 3 | Warwick | 3 |
| CT 219.03 BG 3 | Warwick | 1 |
| CT 220 BG 2 | Warwick | 2 |
| CT 220 BG 3 | Warwick | 2 |
| CT 221 BG 1 | Warwick | 1 |
| CT 221 BG 2 | Warwick | 3 |
| CT 222.01 BG 1 | Warwick | 3 |
| CT 222.01 BG 4 | Warwick | 3 |
| CT 222.01 BG 5 | Warwick | 2 |
| CT 222.02 BG 2 | Warwick | 1 |
| CT 222.02 BG 3 | Warwick | 3 |
| CT 223 BG 2 | Warwick | 1 |
| CT 223 BG 3 | Warwick | 1 |
| CT 223 BG 4 | Warwick | 2 |

**Table G-EJ11. Census Tracts (CT) and Block Groups (BG) in Washington County, Rhode Island (County ID 44-009) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 415 BG 1 | New Shoreham | 2 |
| CT 501.02 BG 2 | North Kingstown | 2 |
| CT 501.03 BG 1 | North Kingstown | 1 |
| CT 501.03 BG 2 | North Kingstown | 1 |
| CT 501.03 BG 3 | North Kingstown | 1 |
| CT 501.03 BG 4 | North Kingstown | 2 |
| CT 501.03 BG 5 | North Kingstown | 2 |
| CT 503.01 BG 2 | North Kingstown | 3 |
| CT 503.01 BG 3 | North Kingstown | 2 |
| CT 503.02 BG 2 | North Kingstown | 3 |
| CT 503.02 BG 3 | North Kingstown | 1 |
| CT 504.02 BG 1 | North Kingstown | 2 |
| CT 505 BG 3 | Exeter | 3 |
| CT 506 BG 1 | Richmond | 3 |
| CT 506 BG 3 | Richmond | 3 |
| CT 507 BG 1 | Hopkinton | 2 |
| CT 507 BG 3 | Hopkinton | 2 |
| CT 507 BG 4 | Hopkinton | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 507 BG 6 | Hopkinton | 3 |
| CT 508.01 BG 1 | Westerly | 1 |
| CT 508.01 BG 2 | Westerly | 1 |
| CT 508.01 BG 3 | Westerly | 1 |
| CT 508.01 BG 4 | Westerly | 2 |
| CT 508.01 BG 5 | Westerly | 1 |
| CT 508.02 BG 1 | Westerly | 1 |
| CT 508.02 BG 2 | Westerly | 3 |
| CT 509.01 BG 2 | Westerly | 1 |
| CT 509.02 BG 1 | Westerly | 2 |
| CT 509.02 BG 2 | Westerly | 2 |
| CT 510 BG 4 | Westerly | 2 |
| CT 510 BG 5 | Westerly | 2 |
| CT 511.01 BG 2 | Charlestown | 2 |
| CT 511.02 BG 1 | Charlestown | 2 |
| CT 512.01 BG 1 | South Kingstown | 1 |
| CT 512.01 BG 2 | South Kingstown | 1 |
| CT 512.02 BG 2 | South Kingstown | 1 |
| CT 512.02 BG 3 | South Kingstown | 1 |
| CT 512.02 BG 4 | South Kingstown | 2 |
| CT 513.02 BG 5 | South Kingstown | 2 |
| CT 513.02 BG 6 | South Kingstown | 2 |
| CT 513.05 BG 2 | South Kingstown | 2 |
| CT 513.06 BG 1 | South Kingstown | 3 |
| CT 513.06 BG 3 | South Kingstown | 1 |
| CT 514 BG 1 | South Kingstown | 1 |
| CT 515.02 BG 2 | Narragansett | 2 |
| CT 515.03 BG 2 | Narragansett | 1 |
| CT 515.03 BG 3 | Narragansett | 2 |
| CT 515.04 BG 1 | Narragansett | 2 |
| CT 515.04 BG 2 | Narragansett | 2 |
| CT 515.04 BG 3 | Narragansett | 2 |
| CT 515.04 BG 4 | Narragansett | 1 |

**Table G-EJ12. Census Tracts (CT) and Block Groups (BG) in Newport County, Rhode Island (County ID 44-005) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 401.01 BG 1 | Portsmouth | 1 |
| CT 401.03 BG 3 | Portsmouth | 2 |
| CT 401.03 BG 4 | Portsmouth | 3 |
| CT 402 BG 1 | Middletown | 1 |
| CT 403.02 BG 1 | Middletown | 3 |
| CT 403.02 BG 2 | Middletown | 1 |
| CT 403.03 BG 1 | Middletown | 3 |
| CT 403.03 BG 2 | Middletown | 1 |
| CT 403.04 BG 1 | Middletown | 3 |
| CT 403.04 BG 2 | Middletown | 2 |
| CT 404 BG 2 | Middletown | 2 |
| CT 404 BG 3 | Middletown | 2 |
| CT 405 BG 1 | Newport | 1 |
| CT 405 BG 2 | Newport | 1 |
| CT 405 BG 3 | Newport | 1 |
| CT 406 BG 1 | Newport | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 406 BG 2 | Newport | 1 |
| CT 406 BG 3 | Newport | 2 |
| CT 406 BG 4 | Newport | 1 |
| CT 407 BG 2 | Newport | 1 |
| CT 408 BG 1 | Newport | 1 |
| CT 409 BG 1 | Un-named area | 2 |
| CT 409 BG 3 | Newport | 2 |
| CT 410 BG 1 | Newport | 1 |
| CT 410 BG 2 | Newport | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 411 BG 1 | Newport | 1 |
| CT 411 BG 2 | Newport | 2 |
| CT 411 BG 3 | Newport | 2 |
| CT 412 BG 1 | Newport | 1 |
| CT 413 BG 1 | Jamestown | 3 |
| CT 413 BG 2 | Jamestown | 3 |
| CT 416.01 BG 1 | Tiverton | 2 |
| CT 416.01 BG 2 | Tiverton | 2 |

### Table G-EJ13. Census Tracts (CT) and Block Groups (BG) in New London County, Connecticut (County ID 09-011) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6601.02 BG 1 | Old Lyme | 2 |
| CT 6601.02 BG 4 | Old Lyme | 3 |
| CT 6903 BG 1 | New London | 3 |
| CT 6903 BG 2 | New London | 1 |
| CT 6903 BG 3 | New London | 1 |
| CT 6903 BG 4 | New London | 1 |
| CT 6904 BG 1 | New London | 1 |
| CT 6904 BG 2 | New London | 1 |
| CT 6905 BG 1 | New London | 1 |
| CT 6905 BG 2 | New London | 1 |
| CT 6907 BG 1 | New London | 1 |
| CT 6908 BG 1 | New London | 1 |
| CT 6908 BG 2 | New London | 1 |
| CT 6908 BG 3 | New London | 1 |
| CT 6909 BG 4 | New London | 3 |
| CT 6934 BG 1 | Waterford | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6934 BG 2 | Waterford | 2 |
| CT 6934 BG 3 | Waterford | 2 |
| CT 6952.01 BG 1 | Montville | 1 |
| CT 6952.01 BG 2 | Montville | 2 |
| CT 6961 BG 1 | Norwich | 2 |
| CT 6961 BG 2 | Norwich | 1 |
| CT 6961 BG 3 | Norwich | 1 |
| CT 6961 BG 4 | Norwich | 3 |
| CT 6962 BG 2 | Norwich | 3 |
| CT 6963 BG 2 | Norwich | 2 |
| CT 6964 BG 1 | Norwich | 1 |
| CT 6964 BG 2 | Norwich | 1 |
| CT 6964 BG 3 | Norwich | 1 |
| CT 6964 BG 4 | Norwich | 1 |
| CT 6964 BG 5 | Norwich | 1 |
| CT 6965 BG 1 | Norwich | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 6965 BG 2 | Norwich | 1 |
| CT 6965 BG 3 | Norwich | 1 |
| CT 6966 BG 1 | Norwich | 3 |
| CT 6966 BG 2 | Norwich | 3 |
| CT 6967 BG 1 | Norwich | 1 |
| CT 6967 BG 2 | Norwich | 1 |
| CT 6967 BG 3 | Norwich | 1 |
| CT 6968 BG 1 | Norwich | 1 |
| CT 6968 BG 2 | Norwich | 1 |
| CT 6970 BG 1 | Norwich | 1 |
| CT 6970 BG 2 | Norwich | 1 |
| CT 7001 BG 3 | Preston | 2 |
| CT 7011 BG 1 | Ledyard | 3 |
| CT 7011 BG 2 | Ledyard | 2 |
| CT 7011 BG 3 | Ledyard | 1 |
| CT 7012 BG 2 | Ledyard | 2 |
| CT 7021 BG 1 | Groton | 2 |
| CT 7023 BG 2 | Groton | 3 |
| CT 7024 BG 1 | Groton | 3 |
| CT 7024 BG 2 | Groton | 3 |
| CT 7024 BG 3 | Groton | 1 |
| CT 7025 BG 1 | Groton | 1 |
| CT 7025 BG 2 | Groton | 1 |
| CT 7027 BG 1 | Groton | 1 |
| CT 7027 BG 2 | Groton | 3 |
| CT 7027 BG 3 | Groton | 2 |
| CT 7028 BG 1 | Groton | 1 |
| CT 7051.02 BG 2 | Stonington | 2 |
| CT 7051.02 BG 3 | Stonington | 2 |
| CT 7051.02 BG 4 | Stonington | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 7071 BG 1 | North Stonington | 3 |
| CT 7071 BG 3 | North Stonington | 2 |
| CT 7081 BG 2 | Voluntown | 2 |
| CT 7091 BG 2 | Griswold | 2 |
| CT 7092 BG 1 | Griswold | 2 |
| CT 7092 BG 2 | Griswold | 2 |
| CT 7092 BG 3 | Griswold | 1 |
| CT 7092 BG 4 | Griswold | 2 |
| CT 7092 BG 5 | Griswold | 2 |
| CT 7111 BG 2 | Sprague | 2 |
| CT 7141.01 BG 3 | Colchester | 2 |
| CT 7141.03 BG 3 | Colchester | 2 |
| CT 7161.01 BG 1 | East Lyme | 1 |
| CT 7161.01 BG 3 | East Lyme | 3 |
| CT 8701 BG 5 | Lebanon | 2 |
| CT 8702 BG 1 | Groton | 2 |
| CT 8702 BG 3 | Groton | 3 |
| CT 8702 BG 4 | Groton | 1 |
| CT 8703 BG 1 | New London | 1 |
| CT 8703 BG 2 | New London | 1 |
| CT 8703 BG 3 | New London | 2 |
| CT 8703 BG 4 | New London | 1 |
| CT 8705.01 BG 1 | Montville | 3 |
| CT 8705.01 BG 2 | Montville | 3 |
| CT 8705.01 BG 3 | Montville | 3 |
| CT 8705.02 BG 1 | Montville | 3 |
| CT 8705.02 BG 2 | Montville | 2 |
| CT 8707.04 BG 2 | East Lyme | 2 |
| CT 9800 BG 1 | Groton | 3 |

**Table G-EJ14. Census Tracts (CT) and Block Groups (BG) in Suffolk County, New York (County ID 36-103) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1102 BG 2 | Huntington | 2 |
| CT 1102 BG 5 | Huntington | 2 |
| CT 1103 BG 3 | Huntington | 2 |
| CT 1106 BG 3 | Huntington | 2 |
| CT 1108.03 BG 2 | Huntington | 2 |
| CT 1109.02 BG 1 | Huntington | 3 |
| CT 1109.02 BG 2 | Huntington | 1 |
| CT 1110.01 BG 2 | Huntington | 2 |
| CT 1110.02 BG 1 | Huntington | 1 |
| CT 1110.02 BG 3 | Huntington | 1 |
| CT 1110.02 BG 4 | Huntington | 1 |
| CT 1111 BG 1 | Huntington | 1 |
| CT 1111 BG 2 | Huntington | 3 |
| CT 1111 BG 3 | Huntington | 1 |
| CT 1111 BG 4 | Huntington | 1 |
| CT 1111 BG 5 | Huntington | 2 |
| CT 1112.01 BG 1 | Huntington | 1 |
| CT 1112.01 BG 2 | Huntington | 1 |
| CT 1112.02 BG 1 | Huntington | 1 |
| CT 1112.02 BG 2 | Huntington | 1 |
| CT 1112.02 BG 3 | Huntington | 3 |
| CT 1114.02 BG 1 | Huntington | 2 |
| CT 1115.03 BG 2 | Huntington | 1 |
| CT 1115.03 BG 3 | Huntington | 2 |
| CT 1115.05 BG 2 | Huntington | 1 |
| CT 1115.05 BG 3 | Huntington | 1 |
| CT 1115.05 BG 4 | Huntington | 3 |
| CT 1115.06 BG 1 | Huntington | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1115.06 BG 2 | Huntington | 1 |
| CT 1117.01 BG 1 | Huntington | 2 |
| CT 1117.01 BG 2 | Huntington | 2 |
| CT 1117.01 BG 3 | Huntington | 2 |
| CT 1117.01 BG 4 | Huntington | 2 |
| CT 1117.04 BG 1 | Huntington | 2 |
| CT 1118.01 BG 1 | Huntington | 3 |
| CT 1118.01 BG 4 | Huntington | 3 |
| CT 1120.01 BG 1 | Huntington | 2 |
| CT 1120.02 BG 3 | Huntington | 2 |
| CT 1121.03 BG 2 | Huntington | 2 |
| CT 1121.03 BG 3 | Huntington | 2 |
| CT 1121.04 BG 1 | Huntington | 3 |
| CT 1122.04 BG 3 | Huntington | 2 |
| CT 1122.1 BG 2 | Huntington | 1 |
| CT 1122.1 BG 3 | Huntington | 3 |
| CT 1122.12 BG 1 | Huntington | 3 |
| CT 1122.13 BG 1 | Huntington | 3 |
| CT 1122.13 BG 2 | Huntington | 3 |
| CT 1122.13 BG 3 | Huntington | 3 |
| CT 1122.14 BG 1 | Huntington | 1 |
| CT 1122.14 BG 4 | Huntington | 3 |
| CT 1223 BG 1 | Babylon | 3 |
| CT 1223 BG 2 | Babylon | 2 |
| CT 1224.03 BG 1 | Babylon | 3 |
| CT 1224.03 BG 2 | Babylon | 3 |
| CT 1224.04 BG 1 | Babylon | 3 |
| CT 1224.05 BG 1 | Babylon | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1224.05 BG 2 | Babylon | 3 |
| CT 1224.06 BG 1 | Babylon | 1 |
| CT 1224.06 BG 2 | Babylon | 1 |
| CT 1224.06 BG 3 | Babylon | 1 |
| CT 1225.01 BG 1 | Babylon | 1 |
| CT 1225.01 BG 2 | Babylon | 1 |
| CT 1225.01 BG 3 | Babylon | 1 |
| CT 1225.02 BG 1 | Babylon | 3 |
| CT 1225.02 BG 2 | Babylon | 3 |
| CT 1225.02 BG 3 | Babylon | 3 |
| CT 1226.01 BG 1 | Babylon | 3 |
| CT 1226.01 BG 3 | Babylon | 3 |
| CT 1226.02 BG 1 | Babylon | 1 |
| CT 1226.02 BG 2 | Babylon | 2 |
| CT 1226.03 BG 1 | Babylon | 3 |
| CT 1226.03 BG 3 | Babylon | 2 |
| CT 1226.03 BG 4 | Babylon | 3 |
| CT 1227.04 BG 1 | Babylon | 1 |
| CT 1227.04 BG 2 | Babylon | 3 |
| CT 1227.05 BG 1 | Babylon | 1 |
| CT 1227.05 BG 2 | Babylon | 3 |
| CT 1227.06 BG 1 | Babylon | 2 |
| CT 1227.06 BG 2 | Babylon | 1 |
| CT 1227.07 BG 1 | Babylon | 2 |
| CT 1228.01 BG 1 | Babylon | 1 |
| CT 1228.01 BG 2 | Babylon | 1 |
| CT 1228.01 BG 4 | Babylon | 3 |
| CT 1228.02 BG 1 | Babylon | 3 |
| CT 1228.02 BG 2 | Babylon | 3 |
| CT 1229.01 BG 2 | Babylon | 2 |
| CT 1229.01 BG 4 | Babylon | 3 |
| CT 1229.02 BG 3 | Babylon | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1230.01 BG 2 | Babylon | 3 |
| CT 1230.01 BG 3 | Babylon | 2 |
| CT 1230.01 BG 4 | Babylon | 3 |
| CT 1230.02 BG 2 | Babylon | 1 |
| CT 1230.02 BG 3 | Babylon | 1 |
| CT 1231.01 BG 1 | Babylon | 2 |
| CT 1231.01 BG 2 | Babylon | 2 |
| CT 1231.02 BG 3 | Babylon | 3 |
| CT 1232.01 BG 1 | Babylon | 1 |
| CT 1232.02 BG 1 | Babylon | 3 |
| CT 1232.02 BG 2 | Babylon | 1 |
| CT 1232.02 BG 3 | Babylon | 1 |
| CT 1232.02 BG 4 | Babylon | 3 |
| CT 1233.01 BG 1 | Babylon | 1 |
| CT 1233.01 BG 2 | Babylon | 1 |
| CT 1233.01 BG 3 | Babylon | 1 |
| CT 1233.01 BG 4 | Babylon | 1 |
| CT 1233.01 BG 5 | Babylon | 3 |
| CT 1233.01 BG 6 | Babylon | 1 |
| CT 1233.02 BG 1 | Babylon | 1 |
| CT 1234.01 BG 1 | Babylon | 3 |
| CT 1234.01 BG 2 | Babylon | 2 |
| CT 1234.01 BG 3 | Babylon | 2 |
| CT 1234.02 BG 1 | Babylon | 2 |
| CT 1234.02 BG 2 | Babylon | 3 |
| CT 1234.02 BG 3 | Babylon | 2 |
| CT 1234.02 BG 5 | Babylon | 2 |
| CT 1235 BG 1 | Babylon | 1 |
| CT 1235 BG 2 | Babylon | 1 |
| CT 1235 BG 3 | Babylon | 2 |
| CT 1235 BG 4 | Babylon | 1 |
| CT 1237.01 BG 1 | Babylon | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1237.01 BG 2 | Babylon | 1 |
| CT 1237.01 BG 3 | Babylon | 1 |
| CT 1237.01 BG 4 | Babylon | 1 |
| CT 1237.02 BG 1 | Babylon | 1 |
| CT 1237.02 BG 2 | Babylon | 1 |
| CT 1237.02 BG 3 | Babylon | 1 |
| CT 1238.01 BG 1 | Babylon | 2 |
| CT 1238.02 BG 1 | Babylon | 2 |
| CT 1238.02 BG 2 | Babylon | 1 |
| CT 1239 BG 1 | Babylon | 2 |
| CT 1239 BG 2 | Babylon | 3 |
| CT 1239 BG 3 | Babylon | 2 |
| CT 1239 BG 5 | Babylon | 1 |
| CT 1240.01 BG 2 | Babylon | 2 |
| CT 1240.02 BG 1 | Babylon | 3 |
| CT 1241.01 BG 1 | Babylon | 2 |
| CT 1241.01 BG 2 | Babylon | 1 |
| CT 1241.02 BG 1 | Babylon | 2 |
| CT 1242 BG 1 | Babylon | 2 |
| CT 1242 BG 3 | Babylon | 2 |
| CT 1242 BG 4 | Babylon | 2 |
| CT 1243 BG 2 | Babylon | 1 |
| CT 1243 BG 3 | Babylon | 2 |
| CT 1243 BG 5 | Babylon | 2 |
| CT 1244.01 BG 1 | Babylon | 2 |
| CT 1245 BG 3 | Babylon | 3 |
| CT 1246.01 BG 3 | Babylon | 2 |
| CT 1246.02 BG 3 | Babylon | 2 |
| CT 1246.02 BG 4 | Babylon | 2 |
| CT 1347.02 BG 3 | Smithtown | 2 |
| CT 1347.02 BG 4 | Smithtown | 2 |
| CT 1347.03 BG 2 | Smithtown | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1347.04 BG 2 | Smithtown | 2 |
| CT 1349.02 BG 2 | Smithtown | 2 |
| CT 1349.04 BG 4 | Smithtown | 2 |
| CT 1349.06 BG 1 | Smithtown | 2 |
| CT 1349.06 BG 4 | Smithtown | 2 |
| CT 1350.03 BG 3 | Smithtown | 2 |
| CT 1350.05 BG 2 | Smithtown | 2 |
| CT 1353.01 BG 3 | Smithtown | 2 |
| CT 1354.02 BG 3 | Smithtown | 3 |
| CT 1354.03 BG 1 | Smithtown | 2 |
| CT 1354.03 BG 3 | Smithtown | 3 |
| CT 1456.02 BG 1 | Islip | 1 |
| CT 1456.02 BG 2 | Islip | 1 |
| CT 1456.02 BG 3 | Islip | 1 |
| CT 1456.03 BG 1 | Islip | 1 |
| CT 1456.03 BG 2 | Islip | 1 |
| CT 1456.03 BG 3 | Islip | 1 |
| CT 1456.04 BG 1 | Islip | 1 |
| CT 1456.04 BG 2 | Islip | 1 |
| CT 1456.05 BG 1 | Islip | 1 |
| CT 1456.05 BG 2 | Islip | 1 |
| CT 1457.01 BG 1 | Islip | 2 |
| CT 1457.01 BG 2 | Islip | 2 |
| CT 1457.01 BG 3 | Islip | 1 |
| CT 1457.01 BG 4 | Islip | 2 |
| CT 1457.02 BG 1 | Islip | 1 |
| CT 1457.02 BG 2 | Islip | 1 |
| CT 1457.02 BG 3 | Islip | 1 |
| CT 1457.03 BG 1 | Islip | 3 |
| CT 1457.03 BG 2 | Islip | 1 |
| CT 1457.03 BG 3 | Islip | 1 |
| CT 1457.04 BG 1 | Islip | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1457.04 BG 2 | Islip | 1 |
| CT 1457.04 BG 3 | Islip | 1 |
| CT 1457.04 BG 4 | Islip | 3 |
| CT 1458.03 BG 1 | Islip | 1 |
| CT 1458.03 BG 2 | Islip | 2 |
| CT 1458.03 BG 3 | Islip | 2 |
| CT 1458.04 BG 1 | Islip | 3 |
| CT 1458.04 BG 2 | Islip | 1 |
| CT 1458.05 BG 1 | Islip | 2 |
| CT 1458.05 BG 2 | Islip | 1 |
| CT 1458.08 BG 2 | Islip | 2 |
| CT 1459.01 BG 1 | Islip | 1 |
| CT 1459.01 BG 2 | Islip | 1 |
| CT 1459.02 BG 1 | Islip | 1 |
| CT 1459.02 BG 2 | Islip | 3 |
| CT 1459.02 BG 3 | Islip | 1 |
| CT 1459.02 BG 4 | Islip | 1 |
| CT 1459.03 BG 1 | Islip | 1 |
| CT 1459.03 BG 2 | Islip | 2 |
| CT 1459.03 BG 3 | Islip | 3 |
| CT 1459.03 BG 4 | Islip | 1 |
| CT 1460.01 BG 1 | Islip | 1 |
| CT 1460.01 BG 2 | Islip | 1 |
| CT 1460.02 BG 1 | Islip | 1 |
| CT 1460.02 BG 2 | Islip | 1 |
| CT 1460.02 BG 3 | Islip | 1 |
| CT 1460.03 BG 1 | Islip | 3 |
| CT 1460.03 BG 2 | Islip | 3 |
| CT 1460.03 BG 3 | Islip | 1 |
| CT 1460.03 BG 4 | Islip | 1 |
| CT 1461.02 BG 1 | Islip | 1 |
| CT 1461.03 BG 2 | Islip | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1461.05 BG 1 | Islip | 1 |
| CT 1461.05 BG 2 | Islip | 1 |
| CT 1461.05 BG 3 | Islip | 1 |
| CT 1461.06 BG 1 | Islip | 1 |
| CT 1461.06 BG 2 | Islip | 1 |
| CT 1462.01 BG 1 | Islip | 1 |
| CT 1462.01 BG 2 | Islip | 1 |
| CT 1462.02 BG 1 | Islip | 1 |
| CT 1462.02 BG 2 | Islip | 1 |
| CT 1462.03 BG 1 | Islip | 1 |
| CT 1462.03 BG 2 | Islip | 1 |
| CT 1462.03 BG 3 | Islip | 1 |
| CT 1462.04 BG 1 | Islip | 1 |
| CT 1462.04 BG 2 | Islip | 1 |
| CT 1462.04 BG 3 | Islip | 1 |
| CT 1462.06 BG 1 | Islip | 1 |
| CT 1463 BG 1 | Islip | 1 |
| CT 1463 BG 2 | Islip | 1 |
| CT 1464.03 BG 1 | Islip | 1 |
| CT 1464.03 BG 2 | Islip | 1 |
| CT 1464.03 BG 3 | Islip | 1 |
| CT 1464.04 BG 1 | Islip | 1 |
| CT 1464.04 BG 2 | Islip | 1 |
| CT 1466.04 BG 1 | Islip | 1 |
| CT 1466.04 BG 2 | Islip | 2 |
| CT 1466.04 BG 3 | Islip | 3 |
| CT 1466.06 BG 2 | Islip | 2 |
| CT 1466.07 BG 1 | Islip | 2 |
| CT 1466.08 BG 1 | Islip | 1 |
| CT 1466.13 BG 1 | Islip | 2 |
| CT 1466.15 BG 3 | Islip | 3 |
| CT 1467.03 BG 1 | Islip | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1467.03 BG 2 | Islip | 3 |
| CT 1467.04 BG 1 | Islip | 2 |
| CT 1468 BG 1 | Islip | 2 |
| CT 1468 BG 4 | Islip | 2 |
| CT 1469.01 BG 3 | Islip | 2 |
| CT 1469.01 BG 4 | Islip | 2 |
| CT 1469.02 BG 2 | Islip | 2 |
| CT 1472 BG 1 | Islip | 1 |
| CT 1472 BG 2 | Islip | 1 |
| CT 1472 BG 4 | Islip | 1 |
| CT 1472 BG 5 | Islip | 1 |
| CT 1473 BG 1 | Islip | 1 |
| CT 1473 BG 2 | Islip | 3 |
| CT 1473 BG 3 | Islip | 3 |
| CT 1473 BG 4 | Islip | 3 |
| CT 1473 BG 5 | Islip | 1 |
| CT 1474.01 BG 4 | Islip | 1 |
| CT 1475.01 BG 2 | Islip | 2 |
| CT 1475.01 BG 5 | Islip | 2 |
| CT 1476.02 BG 3 | Islip | 2 |
| CT 1477.01 BG 2 | Islip | 2 |
| CT 1477.02 BG 4 | Islip | 2 |
| CT 1478.02 BG 1 | Islip | 2 |
| CT 1479.01 BG 2 | Islip | 2 |
| CT 1479.01 BG 3 | Islip | 2 |
| CT 1479.02 BG 1 | Islip | 2 |
| CT 1580.02 BG 3 | Brookhaven | 2 |
| CT 1580.02 BG 4 | Brookhaven | 2 |
| CT 1580.07 BG 1 | Brookhaven | 3 |
| CT 1580.07 BG 2 | Brookhaven | 1 |
| CT 1580.07 BG 3 | Brookhaven | 3 |
| CT 1580.07 BG 4 | Brookhaven | 3 |
| CT 1580.11 BG 3 | Brookhaven | 2 |
| CT 1581.02 BG 2 | Brookhaven | 3 |
| CT 1581.03 BG 1 | Brookhaven | 1 |
| CT 1581.03 BG 2 | Brookhaven | 2 |
| CT 1581.07 BG 1 | Brookhaven | 2 |
| CT 1581.08 BG 1 | Brookhaven | 3 |
| CT 1581.11 BG 2 | Brookhaven | 1 |
| CT 1581.12 BG 1 | Brookhaven | 3 |
| CT 1581.12 BG 2 | Brookhaven | 2 |
| CT 1581.15 BG 3 | Brookhaven | 2 |
| CT 1581.16 BG 1 | Brookhaven | 3 |
| CT 1581.16 BG 2 | Brookhaven | 3 |
| CT 1582.02 BG 2 | Brookhaven | 1 |
| CT 1582.02 BG 5 | Brookhaven | 2 |
| CT 1582.06 BG 2 | Brookhaven | 2 |
| CT 1583.04 BG 2 | Brookhaven | 1 |
| CT 1583.06 BG 2 | Brookhaven | 2 |
| CT 1583.08 BG 1 | Brookhaven | 2 |
| CT 1583.08 BG 2 | Brookhaven | 1 |
| CT 1583.08 BG 4 | Brookhaven | 1 |
| CT 1583.09 BG 1 | Brookhaven | 1 |
| CT 1583.09 BG 2 | Brookhaven | 1 |
| CT 1583.1 BG 1 | Brookhaven | 2 |
| CT 1583.1 BG 2 | Brookhaven | 2 |
| CT 1583.15 BG 1 | Brookhaven | 3 |
| CT 1583.15 BG 2 | Brookhaven | 2 |
| CT 1583.19 BG 2 | Brookhaven | 1 |
| CT 1583.19 BG 3 | Brookhaven | 3 |
| CT 1583.2 BG 4 | Brookhaven | 3 |
| CT 1583.21 BG 1 | Brookhaven | 1 |
| CT 1583.21 BG 3 | Brookhaven | 3 |
| CT 1583.21 BG 4 | Brookhaven | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1583.23 BG 2 | Brookhaven | 2 |
| CT 1584.01 BG 1 | Brookhaven | 2 |
| CT 1584.02 BG 2 | Brookhaven | 2 |
| CT 1584.03 BG 1 | Brookhaven | 2 |
| CT 1584.03 BG 2 | Brookhaven | 2 |
| CT 1584.05 BG 2 | Brookhaven | 2 |
| CT 1584.07 BG 2 | Brookhaven | 2 |
| CT 1584.07 BG 4 | Brookhaven | 1 |
| CT 1584.09 BG 1 | Brookhaven | 1 |
| CT 1584.09 BG 2 | Brookhaven | 2 |
| CT 1584.1 BG 2 | Brookhaven | 2 |
| CT 1584.1 BG 3 | Brookhaven | 2 |
| CT 1585.02 BG 2 | Brookhaven | 2 |
| CT 1585.02 BG 3 | Brookhaven | 2 |
| CT 1585.05 BG 3 | Brookhaven | 1 |
| CT 1585.07 BG 1 | Brookhaven | 3 |
| CT 1585.07 BG 2 | Brookhaven | 2 |
| CT 1585.08 BG 1 | Brookhaven | 3 |
| CT 1585.09 BG 1 | Brookhaven | 2 |
| CT 1585.09 BG 2 | Brookhaven | 3 |
| CT 1585.09 BG 3 | Brookhaven | 2 |
| CT 1585.1 BG 2 | Brookhaven | 2 |
| CT 1585.1 BG 3 | Brookhaven | 2 |
| CT 1585.1 BG 4 | Brookhaven | 2 |
| CT 1585.11 BG 3 | Brookhaven | 1 |
| CT 1586.04 BG 1 | Brookhaven | 2 |
| CT 1586.04 BG 2 | Brookhaven | 1 |
| CT 1586.05 BG 2 | Brookhaven | 3 |
| CT 1586.07 BG 1 | Brookhaven | 3 |
| CT 1586.07 BG 2 | Brookhaven | 2 |
| CT 1586.08 BG 1 | Brookhaven | 2 |
| CT 1586.08 BG 2 | Brookhaven | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1586.08 BG 3 | Brookhaven | 2 |
| CT 1586.09 BG 3 | Brookhaven | 3 |
| CT 1587.04 BG 1 | Brookhaven | 2 |
| CT 1587.04 BG 2 | Brookhaven | 2 |
| CT 1587.04 BG 3 | Brookhaven | 2 |
| CT 1587.04 BG 4 | Brookhaven | 1 |
| CT 1587.05 BG 1 | Brookhaven | 1 |
| CT 1587.05 BG 2 | Brookhaven | 1 |
| CT 1587.05 BG 3 | Brookhaven | 1 |
| CT 1587.08 BG 1 | Brookhaven | 2 |
| CT 1587.08 BG 2 | Brookhaven | 1 |
| CT 1587.08 BG 3 | Brookhaven | 1 |
| CT 1587.1 BG 1 | Brookhaven | 1 |
| CT 1587.1 BG 3 | Brookhaven | 2 |
| CT 1587.1 BG 4 | Brookhaven | 3 |
| CT 1587.11 BG 2 | Brookhaven | 2 |
| CT 1587.11 BG 3 | Brookhaven | 1 |
| CT 1587.12 BG 1 | Brookhaven | 3 |
| CT 1587.12 BG 2 | Brookhaven | 1 |
| CT 1587.12 BG 5 | Brookhaven | 2 |
| CT 1588.02 BG 3 | Brookhaven | 2 |
| CT 1588.03 BG 3 | Brookhaven | 3 |
| CT 1588.04 BG 1 | Brookhaven | 1 |
| CT 1588.04 BG 2 | Brookhaven | 3 |
| CT 1588.04 BG 3 | Brookhaven | 2 |
| CT 1588.04 BG 4 | Brookhaven | 2 |
| CT 1588.04 BG 5 | Brookhaven | 2 |
| CT 1589 BG 1 | Brookhaven | 2 |
| CT 1589 BG 2 | Brookhaven | 1 |
| CT 1589 BG 4 | Brookhaven | 1 |
| CT 1589 BG 5 | Brookhaven | 1 |
| CT 1590 BG 1 | Brookhaven | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1590 BG 2 | Brookhaven | 1 |
| CT 1590 BG 3 | Brookhaven | 2 |
| CT 1591.02 BG 1 | Brookhaven | 1 |
| CT 1591.02 BG 3 | Brookhaven | 1 |
| CT 1591.02 BG 4 | Brookhaven | 1 |
| CT 1591.02 BG 5 | Brookhaven | 2 |
| CT 1591.03 BG 1 | Brookhaven | 1 |
| CT 1591.03 BG 2 | Brookhaven | 1 |
| CT 1591.03 BG 3 | Brookhaven | 1 |
| CT 1591.03 BG 4 | Brookhaven | 1 |
| CT 1591.05 BG 2 | Brookhaven | 1 |
| CT 1591.05 BG 3 | Brookhaven | 1 |
| CT 1591.05 BG 4 | Brookhaven | 2 |
| CT 1591.06 BG 1 | Brookhaven | 1 |
| CT 1591.06 BG 2 | Brookhaven | 1 |
| CT 1591.06 BG 3 | Brookhaven | 3 |
| CT 1591.07 BG 1 | Brookhaven | 2 |
| CT 1591.07 BG 3 | Brookhaven | 2 |
| CT 1591.08 BG 1 | Brookhaven | 3 |
| CT 1591.08 BG 2 | Brookhaven | 3 |
| CT 1591.08 BG 3 | Brookhaven | 2 |
| CT 1591.08 BG 5 | Brookhaven | 3 |
| CT 1592.01 BG 1 | Brookhaven | 2 |
| CT 1592.01 BG 2 | Brookhaven | 2 |
| CT 1592.03 BG 3 | Brookhaven | 2 |
| CT 1592.04 BG 1 | Brookhaven | 1 |
| CT 1592.04 BG 3 | Brookhaven | 2 |
| CT 1594.04 BG 1 | Brookhaven | 1 |
| CT 1594.04 BG 2 | Brookhaven | 2 |
| CT 1594.04 BG 3 | Brookhaven | 1 |
| CT 1594.04 BG 4 | Brookhaven | 1 |
| CT 1594.04 BG 5 | Brookhaven | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1594.06 BG 3 | Brookhaven | 1 |
| CT 1594.07 BG 2 | Brookhaven | 2 |
| CT 1594.08 BG 1 | Brookhaven | 1 |
| CT 1594.1 BG 1 | Brookhaven | 2 |
| CT 1594.1 BG 2 | Brookhaven | 1 |
| CT 1594.11 BG 2 | Brookhaven | 2 |
| CT 1594.12 BG 2 | Brookhaven | 2 |
| CT 1594.12 BG 4 | Brookhaven | 2 |
| CT 1595.05 BG 1 | Brookhaven | 2 |
| CT 1595.05 BG 2 | Brookhaven | 1 |
| CT 1595.05 BG 3 | Brookhaven | 2 |
| CT 1595.05 BG 4 | Brookhaven | 2 |
| CT 1595.05 BG 5 | Brookhaven | 3 |
| CT 1595.06 BG 1 | Brookhaven | 1 |
| CT 1595.06 BG 2 | Brookhaven | 1 |
| CT 1595.06 BG 3 | Brookhaven | 1 |
| CT 1595.06 BG 4 | Brookhaven | 1 |
| CT 1595.08 BG 1 | Brookhaven | 2 |
| CT 1595.08 BG 3 | Brookhaven | 2 |
| CT 1595.08 BG 4 | Brookhaven | 1 |
| CT 1595.09 BG 1 | Brookhaven | 2 |
| CT 1595.09 BG 2 | Brookhaven | 2 |
| CT 1595.09 BG 3 | Brookhaven | 1 |
| CT 1595.1 BG 1 | Brookhaven | 1 |
| CT 1595.1 BG 2 | Brookhaven | 2 |
| CT 1595.11 BG 1 | Brookhaven | 1 |
| CT 1595.11 BG 2 | Brookhaven | 1 |
| CT 1595.11 BG 3 | Brookhaven | 1 |
| CT 1595.12 BG 1 | Brookhaven | 2 |
| CT 1596.01 BG 4 | Brookhaven | 2 |
| CT 1596.02 BG 2 | Brookhaven | 2 |
| CT 1697.01 BG 3 | Riverhead | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1697.04 BG 1 | Riverhead | 2 |
| CT 1697.04 BG 2 | Riverhead | 3 |
| CT 1697.04 BG 3 | Riverhead | 1 |
| CT 1697.04 BG 4 | Riverhead | 2 |
| CT 1697.04 BG 5 | Riverhead | 2 |
| CT 1697.04 BG 6 | Riverhead | 2 |
| CT 1698 BG 1 | Riverhead | 1 |
| CT 1698 BG 2 | Riverhead | 1 |
| CT 1698 BG 3 | Riverhead | 1 |
| CT 1698 BG 4 | Riverhead | 1 |
| CT 1699.01 BG 1 | Riverhead | 2 |
| CT 1699.01 BG 2 | Riverhead | 1 |
| CT 1699.02 BG 3 | Riverhead | 2 |
| CT 1700.02 BG 4 | Southold | 2 |
| CT 1701.01 BG 1 | Southold | 1 |
| CT 1701.01 BG 2 | Southold | 2 |
| CT 1702.01 BG 2 | Southold | 2 |
| CT 1702.01 BG 3 | Southold | 1 |
| CT 1702.02 BG 5 | Southold | 2 |
| CT 1904.01 BG 1 | Southampton | 3 |
| CT 1904.01 BG 2 | Southampton | 1 |
| CT 1904.01 BG 3 | Southampton | 2 |
| CT 1904.01 BG 4 | Southampton | 1 |
| CT 1904.01 BG 5 | Southampton | 2 |
| CT 1904.01 BG 6 | Southampton | 1 |
| CT 1904.01 BG 7 | Southampton | 1 |
| CT 1904.02 BG 1 | Southampton | 1 |
| CT 1904.03 BG 2 | Southampton | 1 |
| CT 1904.03 BG 3 | Southampton | 1 |
| CT 1905.02 BG 1 | Southampton | 1 |
| CT 1905.02 BG 3 | Southampton | 2 |
| CT 1905.03 BG 2 | Southampton | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1905.03 BG 4 | Southampton | 2 |
| CT 1906.01 BG 2 | Southampton | 2 |
| CT 1906.01 BG 4 | Southampton | 1 |
| CT 1906.03 BG 1 | Southampton | 1 |
| CT 1906.03 BG 2 | Southampton | 1 |
| CT 1906.03 BG 3 | Southampton | 1 |
| CT 1906.04 BG 2 | Southampton | 2 |
| CT 1907.04 BG 1 | Southampton | 1 |
| CT 1907.04 BG 3 | Southampton | 2 |
| CT 1907.04 BG 4 | Southampton | 1 |
| CT 1907.04 BG 5 | Southampton | 2 |
| CT 1907.05 BG 1 | Shinnecock Reservation | 1 |
| CT 1907.05 BG 2 | Southampton | 1 |
| CT 1907.05 BG 3 | Southampton | 1 |
| CT 1907.05 BG 4 | Southampton | 1 |
| CT 1907.06 BG 1 | Southampton | 2 |
| CT 1907.06 BG 5 | Southampton | 1 |
| CT 1907.07 BG 2 | Southampton | 2 |
| CT 1907.07 BG 4 | Southampton | 3 |
| CT 1908 BG 2 | Southampton | 1 |
| CT 2009.01 BG 2 | East Hampton | 2 |
| CT 2009.02 BG 2 | East Hampton | 1 |
| CT 2009.02 BG 3 | East Hampton | 3 |
| CT 2009.02 BG 4 | East Hampton | 2 |
| CT 2009.02 BG 7 | East Hampton | 2 |
| CT 2010.01 BG 2 | East Hampton | 2 |
| CT 2010.01 BG 4 | East Hampton | 1 |
| CT 2010.01 BG 5 | East Hampton | 1 |
| CT 2010.03 BG 1 | East Hampton | 1 |
| CT 2010.03 BG 4 | East Hampton | 2 |
| CT 2010.03 BG 5 | East Hampton | 3 |
| CT 2010.04 BG 2 | East Hampton | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 2010.04 BG 4 | East Hampton | 3 |
| CT 2011 BG 1 | Islip | 1 |
| CT 2011 BG 2 | Islip | 1 |
| CT 2011 BG 3 | Islip | 1 |
| CT 2011 BG 4 | Islip | 1 |

### Table G-EJ15. Census Tracts (CT) and Block Groups (BG) in New York County, New York (County ID 36-061) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 10.02 BG 1 | Manhattan | 1 |
| CT 10.02 BG 2 | Manhattan | 1 |
| CT 10.02 BG 3 | Manhattan | 1 |
| CT 101 BG 1 | Manhattan | 3 |
| CT 110 BG 6 | Manhattan | 2 |
| CT 111 BG 1 | Manhattan | 3 |
| CT 111 BG 2 | Manhattan | 2 |
| CT 113 BG 1 | Manhattan | 1 |
| CT 115 BG 1 | Manhattan | 3 |
| CT 115 BG 2 | Manhattan | 1 |
| CT 117 BG 1 | Manhattan | 3 |
| CT 118 BG 5 | Manhattan | 2 |
| CT 119 BG 1 | Manhattan | 1 |
| CT 119 BG 2 | Manhattan | 1 |
| CT 12 BG 1 | Manhattan | 1 |
| CT 12 BG 2 | Manhattan | 2 |
| CT 121 BG 2 | Manhattan | 2 |
| CT 121 BG 6 | Manhattan | 1 |
| CT 124 BG 6 | Manhattan | 1 |
| CT 125 BG 2 | Manhattan | 3 |
| CT 127 BG 1 | Manhattan | 2 |
| CT 127 BG 2 | Manhattan | 3 |
| CT 127 BG 3 | Manhattan | 1 |
| CT 129 BG 1 | Manhattan | 2 |
| CT 131 BG 1 | Manhattan | 1 |
| CT 132 BG 3 | Manhattan | 3 |
| CT 132 BG 5 | Manhattan | 3 |
| CT 132 BG 7 | Manhattan | 3 |
| CT 133 BG 1 | Manhattan | 2 |
| CT 133 BG 2 | Manhattan | 1 |
| CT 133 BG 4 | Manhattan | 3 |
| CT 133 BG 5 | Manhattan | 3 |
| CT 134 BG 3 | Manhattan | 2 |
| CT 134 BG 9 | Manhattan | 1 |
| CT 135 BG 1 | Manhattan | 1 |
| CT 135 BG 2 | Manhattan | 1 |
| CT 137 BG 2 | Manhattan | 2 |
| CT 137 BG 5 | Manhattan | 3 |
| CT 139 BG 2 | Manhattan | 3 |
| CT 139 BG 3 | Manhattan | 1 |
| CT 139 BG 5 | Manhattan | 1 |
| CT 14.02 BG 1 | Manhattan | 1 |
| CT 14.02 BG 2 | Manhattan | 1 |
| CT 143 BG 1 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 145 BG 2 | Manhattan | 3 |
| CT 146.02 BG 4 | Manhattan | 2 |
| CT 149 BG 4 | Manhattan | 2 |
| CT 15.01 BG 3 | Manhattan | 2 |
| CT 151 BG 1 | Manhattan | 1 |
| CT 151 BG 2 | Manhattan | 1 |
| CT 151 BG 3 | Manhattan | 1 |
| CT 152 BG 1 | Manhattan | 1 |
| CT 152 BG 2 | Manhattan | 1 |
| CT 152 BG 3 | Manhattan | 3 |
| CT 154 BG 9 | Manhattan | 3 |
| CT 156.01 BG 2 | Manhattan | 1 |
| CT 156.02 BG 1 | Manhattan | 1 |
| CT 16 BG 1 | Manhattan | 1 |
| CT 16 BG 2 | Manhattan | 1 |
| CT 16 BG 3 | Manhattan | 1 |
| CT 16 BG 4 | Manhattan | 1 |
| CT 16 BG 5 | Manhattan | 1 |
| CT 162 BG 1 | Manhattan | 1 |
| CT 162 BG 2 | Manhattan | 1 |
| CT 162 BG 3 | Manhattan | 1 |
| CT 162 BG 4 | Manhattan | 1 |
| CT 162 BG 5 | Manhattan | 1 |
| CT 164 BG 1 | Manhattan | 1 |
| CT 164 BG 2 | Manhattan | 1 |
| CT 164 BG 3 | Manhattan | 1 |
| CT 164 BG 4 | Manhattan | 1 |
| CT 166 BG 1 | Manhattan | 1 |
| CT 166 BG 2 | Manhattan | 1 |
| CT 166 BG 3 | Manhattan | 1 |
| CT 166 BG 4 | Manhattan | 1 |
| CT 166 BG 5 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 166 BG 6 | Manhattan | 1 |
| CT 168 BG 1 | Manhattan | 1 |
| CT 168 BG 2 | Manhattan | 1 |
| CT 168 BG 3 | Manhattan | 1 |
| CT 169 BG 4 | Manhattan | 2 |
| CT 170 BG 1 | Manhattan | 1 |
| CT 170 BG 2 | Manhattan | 1 |
| CT 170 BG 3 | Manhattan | 1 |
| CT 170 BG 4 | Manhattan | 3 |
| CT 170 BG 5 | Manhattan | 1 |
| CT 172 BG 1 | Manhattan | 1 |
| CT 172 BG 2 | Manhattan | 1 |
| CT 172 BG 3 | Manhattan | 1 |
| CT 172 BG 4 | Manhattan | 1 |
| CT 172 BG 5 | Manhattan | 1 |
| CT 173 BG 2 | Manhattan | 1 |
| CT 173 BG 4 | Manhattan | 3 |
| CT 174.01 BG 1 | Manhattan | 1 |
| CT 174.01 BG 2 | Manhattan | 1 |
| CT 174.01 BG 3 | Manhattan | 3 |
| CT 174.02 BG 1 | Manhattan | 1 |
| CT 175 BG 3 | Manhattan | 2 |
| CT 177 BG 1 | Manhattan | 1 |
| CT 177 BG 2 | Manhattan | 3 |
| CT 177 BG 4 | Manhattan | 1 |
| CT 177 BG 7 | Manhattan | 1 |
| CT 178 BG 1 | Manhattan | 1 |
| CT 178 BG 2 | Manhattan | 1 |
| CT 178 BG 3 | Manhattan | 1 |
| CT 179 BG 6 | Manhattan | 1 |
| CT 18 BG 1 | Manhattan | 1 |
| CT 18 BG 2 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 18 BG 3 | Manhattan | 3 |
| CT 18 BG 4 | Manhattan | 1 |
| CT 18 BG 5 | Manhattan | 1 |
| CT 18 BG 6 | Manhattan | 1 |
| CT 18 BG 7 | Manhattan | 1 |
| CT 180 BG 1 | Manhattan | 1 |
| CT 180 BG 2 | Manhattan | 1 |
| CT 180 BG 3 | Manhattan | 1 |
| CT 180 BG 4 | Manhattan | 1 |
| CT 181 BG 4 | Manhattan | 3 |
| CT 182 BG 1 | Manhattan | 1 |
| CT 182 BG 2 | Manhattan | 1 |
| CT 182 BG 3 | Manhattan | 1 |
| CT 182 BG 4 | Manhattan | 1 |
| CT 182 BG 5 | Manhattan | 1 |
| CT 184 BG 1 | Manhattan | 1 |
| CT 184 BG 2 | Manhattan | 1 |
| CT 184 BG 3 | Manhattan | 1 |
| CT 184 BG 4 | Manhattan | 1 |
| CT 186 BG 1 | Manhattan | 1 |
| CT 186 BG 2 | Manhattan | 1 |
| CT 186 BG 3 | Manhattan | 1 |
| CT 187 BG 5 | Manhattan | 1 |
| CT 188 BG 1 | Manhattan | 1 |
| CT 188 BG 2 | Manhattan | 1 |
| CT 188 BG 3 | Manhattan | 1 |
| CT 188 BG 4 | Manhattan | 1 |
| CT 189 BG 2 | Manhattan | 3 |
| CT 189 BG 3 | Manhattan | 1 |
| CT 189 BG 4 | Manhattan | 1 |
| CT 189 BG 5 | Manhattan | 1 |
| CT 189 BG 6 | Manhattan | 1 |
| CT 190 BG 1 | Manhattan | 1 |
| CT 191 BG 3 | Manhattan | 2 |
| CT 191 BG 5 | Manhattan | 3 |
| CT 191 BG 6 | Manhattan | 1 |
| CT 192 BG 1 | Manhattan | 1 |
| CT 192 BG 2 | Manhattan | 1 |
| CT 192 BG 3 | Manhattan | 1 |
| CT 193 BG 1 | Manhattan | 3 |
| CT 193 BG 2 | Manhattan | 1 |
| CT 193 BG 3 | Manhattan | 1 |
| CT 193 BG 4 | Manhattan | 1 |
| CT 193 BG 5 | Manhattan | 1 |
| CT 193 BG 6 | Manhattan | 1 |
| CT 194 BG 1 | Manhattan | 1 |
| CT 194 BG 2 | Manhattan | 3 |
| CT 194 BG 3 | Manhattan | 1 |
| CT 194 BG 4 | Manhattan | 1 |
| CT 195 BG 3 | Manhattan | 2 |
| CT 195 BG 4 | Manhattan | 1 |
| CT 195 BG 5 | Manhattan | 2 |
| CT 196 BG 1 | Manhattan | 1 |
| CT 196 BG 2 | Manhattan | 1 |
| CT 196 BG 3 | Manhattan | 1 |
| CT 197.01 BG 1 | Manhattan | 1 |
| CT 197.02 BG 1 | Manhattan | 1 |
| CT 198 BG 1 | Manhattan | 3 |
| CT 199 BG 3 | Manhattan | 2 |
| CT 199 BG 5 | Manhattan | 2 |
| CT 2.01 BG 1 | Manhattan | 1 |
| CT 2.01 BG 2 | Manhattan | 1 |
| CT 2.02 BG 1 | Manhattan | 1 |
| CT 2.02 BG 2 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 2.02 BG 3 | Manhattan | 1 |
| CT 2.02 BG 4 | Manhattan | 1 |
| CT 2.02 BG 5 | Manhattan | 1 |
| CT 20 BG 1 | Manhattan | 1 |
| CT 20 BG 2 | Manhattan | 1 |
| CT 20 BG 3 | Manhattan | 1 |
| CT 200 BG 1 | Manhattan | 3 |
| CT 200 BG 2 | Manhattan | 3 |
| CT 201.02 BG 1 | Manhattan | 1 |
| CT 201.02 BG 2 | Manhattan | 1 |
| CT 201.02 BG 3 | Manhattan | 3 |
| CT 201.02 BG 4 | Manhattan | 3 |
| CT 203 BG 1 | Manhattan | 1 |
| CT 206 BG 1 | Manhattan | 1 |
| CT 206 BG 2 | Manhattan | 1 |
| CT 207.01 BG 1 | Manhattan | 1 |
| CT 207.01 BG 2 | Manhattan | 3 |
| CT 208 BG 1 | Manhattan | 1 |
| CT 208 BG 2 | Manhattan | 3 |
| CT 208 BG 3 | Manhattan | 3 |
| CT 209.01 BG 1 | Manhattan | 1 |
| CT 209.01 BG 2 | Manhattan | 1 |
| CT 210 BG 1 | Manhattan | 1 |
| CT 210 BG 2 | Manhattan | 1 |
| CT 210 BG 3 | Manhattan | 1 |
| CT 210 BG 4 | Manhattan | 1 |
| CT 211 BG 1 | Manhattan | 1 |
| CT 211 BG 3 | Manhattan | 1 |
| CT 211 BG 4 | Manhattan | 1 |
| CT 211 BG 5 | Manhattan | 1 |
| CT 211 BG 6 | Manhattan | 3 |
| CT 211 BG 7 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 212 BG 1 | Manhattan | 1 |
| CT 212 BG 2 | Manhattan | 3 |
| CT 212 BG 3 | Manhattan | 3 |
| CT 212 BG 4 | Manhattan | 3 |
| CT 213.03 BG 1 | Manhattan | 1 |
| CT 213.03 BG 2 | Manhattan | 1 |
| CT 213.03 BG 3 | Manhattan | 1 |
| CT 213.03 BG 4 | Manhattan | 1 |
| CT 214 BG 1 | Manhattan | 1 |
| CT 214 BG 2 | Manhattan | 3 |
| CT 215 BG 1 | Manhattan | 1 |
| CT 215 BG 2 | Manhattan | 1 |
| CT 216 BG 1 | Manhattan | 3 |
| CT 216 BG 2 | Manhattan | 1 |
| CT 216 BG 3 | Manhattan | 1 |
| CT 216 BG 4 | Manhattan | 3 |
| CT 216 BG 5 | Manhattan | 1 |
| CT 218 BG 1 | Manhattan | 3 |
| CT 218 BG 2 | Manhattan | 1 |
| CT 218 BG 3 | Manhattan | 1 |
| CT 218 BG 4 | Manhattan | 1 |
| CT 219 BG 1 | Manhattan | 1 |
| CT 219 BG 2 | Manhattan | 1 |
| CT 219 BG 3 | Manhattan | 1 |
| CT 219 BG 4 | Manhattan | 1 |
| CT 22.01 BG 1 | Manhattan | 1 |
| CT 22.01 BG 2 | Manhattan | 1 |
| CT 22.01 BG 3 | Manhattan | 1 |
| CT 22.01 BG 4 | Manhattan | 1 |
| CT 22.02 BG 1 | Manhattan | 2 |
| CT 220 BG 1 | Manhattan | 1 |
| CT 220 BG 2 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 220 BG 3 | Manhattan | 1 |
| CT 220 BG 4 | Manhattan | 3 |
| CT 220 BG 5 | Manhattan | 1 |
| CT 221.02 BG 1 | Manhattan | 1 |
| CT 221.02 BG 2 | Manhattan | 3 |
| CT 222 BG 1 | Manhattan | 1 |
| CT 222 BG 2 | Manhattan | 1 |
| CT 223.01 BG 1 | Manhattan | 1 |
| CT 223.01 BG 2 | Manhattan | 1 |
| CT 223.01 BG 3 | Manhattan | 1 |
| CT 223.01 BG 4 | Manhattan | 1 |
| CT 223.02 BG 1 | Manhattan | 1 |
| CT 224 BG 1 | Manhattan | 1 |
| CT 224 BG 2 | Manhattan | 1 |
| CT 224 BG 3 | Manhattan | 1 |
| CT 224 BG 4 | Manhattan | 1 |
| CT 225 BG 1 | Manhattan | 1 |
| CT 225 BG 2 | Manhattan | 1 |
| CT 225 BG 3 | Manhattan | 1 |
| CT 225 BG 4 | Manhattan | 1 |
| CT 225 BG 5 | Manhattan | 1 |
| CT 226 BG 1 | Manhattan | 1 |
| CT 226 BG 2 | Manhattan | 1 |
| CT 226 BG 3 | Manhattan | 1 |
| CT 227 BG 1 | Manhattan | 1 |
| CT 227 BG 2 | Manhattan | 1 |
| CT 227 BG 3 | Manhattan | 1 |
| CT 228 BG 1 | Manhattan | 1 |
| CT 228 BG 2 | Manhattan | 1 |
| CT 228 BG 3 | Manhattan | 3 |
| CT 228 BG 4 | Manhattan | 3 |
| CT 229 BG 1 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 229 BG 2 | Manhattan | 1 |
| CT 229 BG 3 | Manhattan | 1 |
| CT 229 BG 4 | Manhattan | 1 |
| CT 229 BG 5 | Manhattan | 1 |
| CT 230 BG 1 | Manhattan | 1 |
| CT 230 BG 2 | Manhattan | 1 |
| CT 230 BG 3 | Manhattan | 1 |
| CT 230 BG 4 | Manhattan | 1 |
| CT 230 BG 5 | Manhattan | 1 |
| CT 231 BG 1 | Manhattan | 1 |
| CT 231 BG 2 | Manhattan | 1 |
| CT 231 BG 3 | Manhattan | 1 |
| CT 232 BG 1 | Manhattan | 1 |
| CT 232 BG 2 | Manhattan | 1 |
| CT 232 BG 3 | Manhattan | 1 |
| CT 232 BG 4 | Manhattan | 1 |
| CT 233 BG 1 | Manhattan | 1 |
| CT 233 BG 2 | Manhattan | 1 |
| CT 233 BG 3 | Manhattan | 1 |
| CT 234 BG 1 | Manhattan | 1 |
| CT 234 BG 2 | Manhattan | 1 |
| CT 235.01 BG 1 | Manhattan | 1 |
| CT 235.01 BG 2 | Manhattan | 1 |
| CT 235.01 BG 3 | Manhattan | 1 |
| CT 235.01 BG 4 | Manhattan | 1 |
| CT 235.02 BG 1 | Manhattan | 1 |
| CT 236 BG 1 | Manhattan | 1 |
| CT 236 BG 2 | Manhattan | 3 |
| CT 236 BG 3 | Manhattan | 1 |
| CT 236 BG 4 | Manhattan | 1 |
| CT 237 BG 1 | Manhattan | 1 |
| CT 237 BG 2 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 237 BG 3 | Manhattan | 1 |
| CT 238.01 BG 1 | Manhattan | 3 |
| CT 238.02 BG 1 | Manhattan | 3 |
| CT 238.02 BG 2 | Manhattan | 1 |
| CT 239 BG 1 | Manhattan | 1 |
| CT 239 BG 2 | Manhattan | 1 |
| CT 24 BG 1 | Manhattan | 1 |
| CT 24 BG 2 | Manhattan | 1 |
| CT 240 BG 1 | Manhattan | 1 |
| CT 241 BG 1 | Manhattan | 3 |
| CT 241 BG 2 | Manhattan | 3 |
| CT 241 BG 3 | Manhattan | 1 |
| CT 241 BG 4 | Manhattan | 3 |
| CT 241 BG 5 | Manhattan | 1 |
| CT 242 BG 1 | Manhattan | 1 |
| CT 242 BG 2 | Manhattan | 1 |
| CT 242 BG 3 | Manhattan | 1 |
| CT 243.01 BG 1 | Manhattan | 1 |
| CT 243.01 BG 2 | Manhattan | 1 |
| CT 243.01 BG 3 | Manhattan | 1 |
| CT 243.02 BG 1 | Manhattan | 1 |
| CT 243.02 BG 2 | Manhattan | 1 |
| CT 243.02 BG 3 | Manhattan | 1 |
| CT 245 BG 1 | Manhattan | 1 |
| CT 245 BG 2 | Manhattan | 3 |
| CT 245 BG 3 | Manhattan | 3 |
| CT 245 BG 4 | Manhattan | 1 |
| CT 245 BG 5 | Manhattan | 1 |
| CT 245 BG 6 | Manhattan | 1 |
| CT 245 BG 7 | Manhattan | 1 |
| CT 247 BG 1 | Manhattan | 3 |
| CT 247 BG 2 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 247 BG 3 | Manhattan | 1 |
| CT 247 BG 4 | Manhattan | 1 |
| CT 247 BG 5 | Manhattan | 1 |
| CT 249 BG 1 | Manhattan | 1 |
| CT 25 BG 1 | Manhattan | 1 |
| CT 25 BG 2 | Manhattan | 1 |
| CT 25 BG 3 | Manhattan | 1 |
| CT 251 BG 1 | Manhattan | 1 |
| CT 251 BG 2 | Manhattan | 1 |
| CT 253 BG 1 | Manhattan | 1 |
| CT 253 BG 2 | Manhattan | 1 |
| CT 253 BG 3 | Manhattan | 1 |
| CT 253 BG 4 | Manhattan | 1 |
| CT 253 BG 5 | Manhattan | 1 |
| CT 253 BG 6 | Manhattan | 1 |
| CT 255 BG 1 | Manhattan | 1 |
| CT 255 BG 2 | Manhattan | 1 |
| CT 255 BG 3 | Manhattan | 1 |
| CT 255 BG 4 | Manhattan | 3 |
| CT 257 BG 1 | Manhattan | 1 |
| CT 257 BG 2 | Manhattan | 3 |
| CT 257 BG 3 | Manhattan | 3 |
| CT 259 BG 1 | Manhattan | 1 |
| CT 259 BG 2 | Manhattan | 1 |
| CT 26.01 BG 1 | Manhattan | 1 |
| CT 26.01 BG 2 | Manhattan | 1 |
| CT 26.02 BG 1 | Manhattan | 1 |
| CT 26.02 BG 2 | Manhattan | 2 |
| CT 261 BG 1 | Manhattan | 1 |
| CT 261 BG 2 | Manhattan | 1 |
| CT 261 BG 3 | Manhattan | 1 |
| CT 261 BG 4 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 261 BG 5 | Manhattan | 1 |
| CT 261 BG 6 | Manhattan | 3 |
| CT 261 BG 7 | Manhattan | 1 |
| CT 263 BG 1 | Manhattan | 1 |
| CT 263 BG 2 | Manhattan | 1 |
| CT 263 BG 3 | Manhattan | 1 |
| CT 263 BG 4 | Manhattan | 1 |
| CT 263 BG 5 | Manhattan | 1 |
| CT 265 BG 1 | Manhattan | 1 |
| CT 265 BG 2 | Manhattan | 1 |
| CT 265 BG 3 | Manhattan | 3 |
| CT 265 BG 4 | Manhattan | 3 |
| CT 265 BG 5 | Manhattan | 1 |
| CT 267 BG 1 | Manhattan | 2 |
| CT 269 BG 1 | Manhattan | 1 |
| CT 269 BG 2 | Manhattan | 1 |
| CT 269 BG 3 | Manhattan | 3 |
| CT 269 BG 4 | Manhattan | 1 |
| CT 269 BG 5 | Manhattan | 1 |
| CT 269 BG 6 | Manhattan | 1 |
| CT 27 BG 1 | Manhattan | 1 |
| CT 271 BG 1 | Manhattan | 1 |
| CT 271 BG 2 | Manhattan | 1 |
| CT 271 BG 3 | Manhattan | 1 |
| CT 271 BG 4 | Manhattan | 1 |
| CT 271 BG 5 | Manhattan | 2 |
| CT 277 BG 1 | Manhattan | 1 |
| CT 277 BG 2 | Manhattan | 1 |
| CT 277 BG 3 | Manhattan | 1 |
| CT 277 BG 4 | Manhattan | 1 |
| CT 279 BG 1 | Manhattan | 2 |
| CT 279 BG 2 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 279 BG 3 | Manhattan | 1 |
| CT 279 BG 4 | Manhattan | 1 |
| CT 279 BG 5 | Manhattan | 3 |
| CT 279 BG 6 | Manhattan | 1 |
| CT 279 BG 7 | Manhattan | 1 |
| CT 28 BG 1 | Manhattan | 1 |
| CT 28 BG 2 | Manhattan | 1 |
| CT 28 BG 3 | Manhattan | 1 |
| CT 28 BG 4 | Manhattan | 1 |
| CT 283 BG 1 | Manhattan | 3 |
| CT 283 BG 2 | Manhattan | 3 |
| CT 283 BG 3 | Manhattan | 1 |
| CT 283 BG 4 | Manhattan | 1 |
| CT 285 BG 1 | Manhattan | 1 |
| CT 285 BG 2 | Manhattan | 1 |
| CT 285 BG 3 | Manhattan | 1 |
| CT 285 BG 4 | Manhattan | 1 |
| CT 287 BG 2 | Manhattan | 1 |
| CT 287 BG 3 | Manhattan | 1 |
| CT 29 BG 1 | Manhattan | 1 |
| CT 29 BG 2 | Manhattan | 1 |
| CT 29 BG 3 | Manhattan | 1 |
| CT 29 BG 4 | Manhattan | 1 |
| CT 291 BG 1 | Manhattan | 1 |
| CT 291 BG 2 | Manhattan | 1 |
| CT 291 BG 3 | Manhattan | 1 |
| CT 291 BG 4 | Manhattan | 1 |
| CT 291 BG 5 | Manhattan | 1 |
| CT 291 BG 6 | Manhattan | 1 |
| CT 291 BG 7 | Manhattan | 1 |
| CT 293 BG 1 | Manhattan | 1 |
| CT 293 BG 2 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 293 BG 3 | Manhattan | 1 |
| CT 293 BG 4 | Manhattan | 1 |
| CT 293 BG 5 | Manhattan | 1 |
| CT 295 BG 2 | Manhattan | 1 |
| CT 295 BG 3 | Manhattan | 1 |
| CT 295 BG 4 | Manhattan | 3 |
| CT 297 BG 1 | Manhattan | 3 |
| CT 299 BG 1 | Manhattan | 1 |
| CT 299 BG 2 | Manhattan | 1 |
| CT 30.01 BG 2 | Manhattan | 2 |
| CT 30.01 BG 3 | Manhattan | 1 |
| CT 30.01 BG 4 | Manhattan | 3 |
| CT 30.02 BG 2 | Manhattan | 1 |
| CT 303 BG 1 | Manhattan | 1 |
| CT 303 BG 2 | Manhattan | 1 |
| CT 307 BG 1 | Manhattan | 3 |
| CT 307 BG 3 | Manhattan | 2 |
| CT 309 BG 1 | Manhattan | 1 |
| CT 309 BG 2 | Manhattan | 1 |
| CT 309 BG 3 | Manhattan | 1 |
| CT 309 BG 4 | Manhattan | 3 |
| CT 32 BG 3 | Manhattan | 2 |
| CT 32 BG 5 | Manhattan | 2 |
| CT 34 BG 1 | Manhattan | 2 |
| CT 34 BG 2 | Manhattan | 1 |
| CT 34 BG 3 | Manhattan | 2 |
| CT 34 BG 4 | Manhattan | 2 |
| CT 36.01 BG 1 | Manhattan | 1 |
| CT 36.01 BG 2 | Manhattan | 3 |
| CT 36.01 BG 3 | Manhattan | 1 |
| CT 36.02 BG 2 | Manhattan | 1 |
| CT 38 BG 1 | Manhattan | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 38 BG 3 | Manhattan | 3 |
| CT 40 BG 4 | Manhattan | 1 |
| CT 41 BG 2 | Manhattan | 3 |
| CT 41 BG 3 | Manhattan | 1 |
| CT 41 BG 4 | Manhattan | 1 |
| CT 41 BG 5 | Manhattan | 1 |
| CT 41 BG 6 | Manhattan | 1 |
| CT 43 BG 2 | Manhattan | 1 |
| CT 48 BG 5 | Manhattan | 3 |
| CT 48 BG 6 | Manhattan | 2 |
| CT 56 BG 1 | Manhattan | 2 |
| CT 6 BG 1 | Manhattan | 1 |
| CT 6 BG 2 | Manhattan | 1 |
| CT 6 BG 3 | Manhattan | 1 |
| CT 6 BG 4 | Manhattan | 1 |
| CT 6 BG 5 | Manhattan | 1 |
| CT 6 BG 6 | Manhattan | 1 |
| CT 62 BG 1 | Manhattan | 1 |
| CT 62 BG 2 | Manhattan | 3 |
| CT 64 BG 4 | Manhattan | 2 |
| CT 64 BG 5 | Manhattan | 3 |
| CT 64 BG 6 | Manhattan | 2 |
| CT 66 BG 2 | Manhattan | 1 |
| CT 66 BG 7 | Manhattan | 1 |
| CT 66 BG 8 | Manhattan | 2 |
| CT 66 BG 9 | Manhattan | 1 |
| CT 68 BG 4 | Manhattan | 2 |
| CT 68 BG 5 | Manhattan | 3 |
| CT 72 BG 2 | Manhattan | 2 |
| CT 72 BG 4 | Manhattan | 2 |
| CT 74 BG 1 | Manhattan | 3 |
| CT 76 BG 1 | Manhattan | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 78 BG 6 | Manhattan | 3 |
| CT 78 BG 7 | Manhattan | 2 |
| CT 8 BG 1 | Manhattan | 1 |
| CT 8 BG 2 | Manhattan | 1 |
| CT 8 BG 3 | Manhattan | 1 |
| CT 8 BG 4 | Manhattan | 1 |
| CT 8 BG 5 | Manhattan | 1 |
| CT 8 BG 6 | Manhattan | 1 |
| CT 81 BG 2 | Manhattan | 2 |
| CT 83 BG 3 | Manhattan | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 84 BG 2 | Manhattan | 3 |
| CT 88 BG 5 | Manhattan | 1 |
| CT 89 BG 3 | Manhattan | 1 |
| CT 91 BG 3 | Manhattan | 2 |
| CT 93 BG 1 | Manhattan | 2 |
| CT 93 BG 6 | Manhattan | 1 |
| CT 97 BG 2 | Manhattan | 1 |
| CT 97 BG 3 | Manhattan | 3 |
| CT 97 BG 4 | Manhattan | 1 |

**Table G-EJ16. Census Tracts (CT) and Block Groups (BG) in Kings County, New York (County ID 36-047) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 100 BG 1 | Brooklyn | 1 |
| CT 100 BG 2 | Brooklyn | 1 |
| CT 100 BG 3 | Brooklyn | 1 |
| CT 100 BG 4 | Brooklyn | 1 |
| CT 1004 BG 1 | Brooklyn | 3 |
| CT 1006 BG 1 | Brooklyn | 3 |
| CT 1006 BG 2 | Brooklyn | 3 |
| CT 1008 BG 1 | Brooklyn | 3 |
| CT 1008 BG 2 | Brooklyn | 3 |
| CT 101 BG 1 | Brooklyn | 3 |
| CT 101 BG 2 | Brooklyn | 3 |
| CT 101 BG 3 | Brooklyn | 1 |
| CT 1010 BG 1 | Brooklyn | 3 |
| CT 1010 BG 2 | Brooklyn | 3 |
| CT 1012 BG 1 | Brooklyn | 3 |
| CT 1012 BG 2 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1014 BG 1 | Brooklyn | 3 |
| CT 1014 BG 2 | Brooklyn | 3 |
| CT 1016 BG 1 | Brooklyn | 3 |
| CT 1018 BG 1 | Brooklyn | 3 |
| CT 102 BG 1 | Brooklyn | 1 |
| CT 102 BG 2 | Brooklyn | 1 |
| CT 102 BG 3 | Brooklyn | 1 |
| CT 1020 BG 1 | Brooklyn | 3 |
| CT 1022 BG 1 | Brooklyn | 3 |
| CT 1024 BG 1 | Brooklyn | 3 |
| CT 1026 BG 1 | Brooklyn | 3 |
| CT 1028 BG 1 | Brooklyn | 3 |
| CT 1028 BG 2 | Brooklyn | 3 |
| CT 1034 BG 1 | Brooklyn | 1 |
| CT 104 BG 1 | Brooklyn | 1 |
| CT 104 BG 2 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 104 BG 3 | Brooklyn | 1 |
| CT 1058.01 BG 1 | Brooklyn | 1 |
| CT 1058.01 BG 2 | Brooklyn | 1 |
| CT 1058.01 BG 3 | Brooklyn | 1 |
| CT 1058.04 BG 1 | Brooklyn | 3 |
| CT 1058.04 BG 2 | Brooklyn | 2 |
| CT 1058.04 BG 3 | Brooklyn | 3 |
| CT 1058.04 BG 4 | Brooklyn | 1 |
| CT 106 BG 1 | Brooklyn | 1 |
| CT 106 BG 2 | Brooklyn | 1 |
| CT 106 BG 3 | Brooklyn | 1 |
| CT 1070 BG 1 | Brooklyn | 3 |
| CT 1078 BG 1 | Brooklyn | 1 |
| CT 1078 BG 2 | Brooklyn | 3 |
| CT 1078 BG 3 | Brooklyn | 3 |
| CT 1078 BG 4 | Brooklyn | 3 |
| CT 108 BG 1 | Brooklyn | 1 |
| CT 108 BG 2 | Brooklyn | 1 |
| CT 108 BG 3 | Brooklyn | 1 |
| CT 1098 BG 1 | Brooklyn | 3 |
| CT 1098 BG 2 | Brooklyn | 1 |
| CT 110 BG 1 | Brooklyn | 1 |
| CT 110 BG 2 | Brooklyn | 1 |
| CT 1104 BG 1 | Brooklyn | 3 |
| CT 1104 BG 2 | Brooklyn | 1 |
| CT 1104 BG 3 | Brooklyn | 1 |
| CT 1104 BG 4 | Brooklyn | 3 |
| CT 1106 BG 1 | Brooklyn | 1 |
| CT 1106 BG 2 | Brooklyn | 1 |
| CT 1110 BG 1 | Brooklyn | 1 |
| CT 1110 BG 2 | Brooklyn | 1 |
| CT 1116 BG 1 | Brooklyn | 1 |
| CT 1116 BG 2 | Brooklyn | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1118 BG 1 | Brooklyn | 1 |
| CT 1118 BG 2 | Brooklyn | 1 |
| CT 112 BG 1 | Brooklyn | 1 |
| CT 112 BG 2 | Brooklyn | 2 |
| CT 112 BG 3 | Brooklyn | 1 |
| CT 112 BG 4 | Brooklyn | 1 |
| CT 1120 BG 1 | Brooklyn | 1 |
| CT 1120 BG 2 | Brooklyn | 1 |
| CT 1122 BG 1 | Brooklyn | 1 |
| CT 1122 BG 2 | Brooklyn | 1 |
| CT 1124 BG 1 | Brooklyn | 3 |
| CT 1124 BG 2 | Brooklyn | 3 |
| CT 1124 BG 3 | Brooklyn | 3 |
| CT 1126 BG 1 | Brooklyn | 1 |
| CT 1126 BG 2 | Brooklyn | 1 |
| CT 1126 BG 3 | Brooklyn | 3 |
| CT 1128 BG 1 | Brooklyn | 1 |
| CT 1128 BG 2 | Brooklyn | 3 |
| CT 1128 BG 3 | Brooklyn | 1 |
| CT 1130 BG 1 | Brooklyn | 1 |
| CT 1130 BG 2 | Brooklyn | 1 |
| CT 1130 BG 3 | Brooklyn | 1 |
| CT 1130 BG 4 | Brooklyn | 3 |
| CT 1132 BG 1 | Brooklyn | 3 |
| CT 1132 BG 2 | Brooklyn | 3 |
| CT 1134 BG 1 | Brooklyn | 1 |
| CT 1134 BG 2 | Brooklyn | 1 |
| CT 1134 BG 3 | Brooklyn | 1 |
| CT 114 BG 1 | Brooklyn | 1 |
| CT 114 BG 2 | Brooklyn | 2 |
| CT 114 BG 3 | Brooklyn | 1 |
| CT 1142.01 BG 1 | Brooklyn | 1 |
| CT 1142.01 BG 2 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1142.02 BG 1 | Brooklyn | 1 |
| CT 1142.02 BG 2 | Brooklyn | 3 |
| CT 1144 BG 1 | Brooklyn | 1 |
| CT 1144 BG 2 | Brooklyn | 1 |
| CT 1144 BG 3 | Brooklyn | 3 |
| CT 1144 BG 4 | Brooklyn | 1 |
| CT 1146 BG 1 | Brooklyn | 1 |
| CT 1146 BG 2 | Brooklyn | 1 |
| CT 1150 BG 1 | Brooklyn | 1 |
| CT 1150 BG 2 | Brooklyn | 1 |
| CT 1150 BG 3 | Brooklyn | 1 |
| CT 1152 BG 1 | Brooklyn | 3 |
| CT 1152 BG 2 | Brooklyn | 1 |
| CT 1152 BG 3 | Brooklyn | 1 |
| CT 1156 BG 1 | Brooklyn | 3 |
| CT 1156 BG 2 | Brooklyn | 1 |
| CT 1156 BG 3 | Brooklyn | 1 |
| CT 1156 BG 4 | Brooklyn | 3 |
| CT 1158 BG 1 | Brooklyn | 1 |
| CT 1158 BG 2 | Brooklyn | 3 |
| CT 1158 BG 3 | Brooklyn | 3 |
| CT 116 BG 1 | Brooklyn | 1 |
| CT 116 BG 2 | Brooklyn | 1 |
| CT 116 BG 3 | Brooklyn | 1 |
| CT 1160 BG 1 | Brooklyn | 1 |
| CT 1160 BG 2 | Brooklyn | 1 |
| CT 1160 BG 3 | Brooklyn | 1 |
| CT 1162 BG 1 | Brooklyn | 3 |
| CT 1162 BG 2 | Brooklyn | 1 |
| CT 1162 BG 3 | Brooklyn | 1 |
| CT 1164 BG 1 | Brooklyn | 1 |
| CT 1164 BG 2 | Brooklyn | 3 |
| CT 1164 BG 3 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1166 BG 1 | Brooklyn | 3 |
| CT 1166 BG 2 | Brooklyn | 1 |
| CT 1166 BG 3 | Brooklyn | 1 |
| CT 1168 BG 1 | Brooklyn | 3 |
| CT 1168 BG 2 | Brooklyn | 3 |
| CT 1170 BG 1 | Brooklyn | 1 |
| CT 1170 BG 2 | Brooklyn | 1 |
| CT 1172.01 BG 1 | Brooklyn | 3 |
| CT 1172.01 BG 2 | Brooklyn | 1 |
| CT 1172.02 BG 1 | Brooklyn | 3 |
| CT 1172.02 BG 2 | Brooklyn | 3 |
| CT 1174 BG 1 | Brooklyn | 1 |
| CT 1174 BG 2 | Brooklyn | 1 |
| CT 1176.01 BG 1 | Brooklyn | 3 |
| CT 1176.01 BG 2 | Brooklyn | 1 |
| CT 1176.02 BG 1 | Brooklyn | 1 |
| CT 1176.02 BG 2 | Brooklyn | 1 |
| CT 1178 BG 1 | Brooklyn | 1 |
| CT 118 BG 1 | Brooklyn | 1 |
| CT 118 BG 2 | Brooklyn | 1 |
| CT 1182.01 BG 1 | Brooklyn | 3 |
| CT 1182.01 BG 2 | Brooklyn | 3 |
| CT 1182.02 BG 1 | Brooklyn | 1 |
| CT 1182.02 BG 2 | Brooklyn | 1 |
| CT 1184 BG 1 | Brooklyn | 1 |
| CT 1184 BG 2 | Brooklyn | 3 |
| CT 1184 BG 3 | Brooklyn | 1 |
| CT 1186 BG 1 | Brooklyn | 3 |
| CT 1186 BG 2 | Brooklyn | 3 |
| CT 1188 BG 1 | Brooklyn | 3 |
| CT 1188 BG 2 | Brooklyn | 1 |
| CT 1188 BG 3 | Brooklyn | 1 |
| CT 1190 BG 1 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1190 BG 2 | Brooklyn | 1 |
| CT 1192 BG 1 | Brooklyn | 1 |
| CT 1192 BG 2 | Brooklyn | 3 |
| CT 1192 BG 3 | Brooklyn | 1 |
| CT 1194 BG 1 | Brooklyn | 3 |
| CT 1194 BG 2 | Brooklyn | 1 |
| CT 1194 BG 3 | Brooklyn | 1 |
| CT 1196 BG 1 | Brooklyn | 1 |
| CT 1196 BG 2 | Brooklyn | 1 |
| CT 1196 BG 3 | Brooklyn | 1 |
| CT 1196 BG 4 | Brooklyn | 1 |
| CT 1198 BG 1 | Brooklyn | 1 |
| CT 1198 BG 2 | Brooklyn | 1 |
| CT 1198 BG 3 | Brooklyn | 1 |
| CT 120 BG 1 | Brooklyn | 1 |
| CT 1200 BG 1 | Brooklyn | 1 |
| CT 1200 BG 2 | Brooklyn | 1 |
| CT 1202 BG 1 | Brooklyn | 1 |
| CT 1202 BG 2 | Brooklyn | 1 |
| CT 1208 BG 1 | Brooklyn | 3 |
| CT 1208 BG 2 | Brooklyn | 1 |
| CT 1208 BG 3 | Brooklyn | 1 |
| CT 1208 BG 4 | Brooklyn | 3 |
| CT 1208 BG 5 | Brooklyn | 1 |
| CT 121 BG 2 | Brooklyn | 1 |
| CT 1210 BG 1 | Brooklyn | 1 |
| CT 1210 BG 2 | Brooklyn | 1 |
| CT 1214 BG 1 | Brooklyn | 1 |
| CT 1214 BG 2 | Brooklyn | 1 |
| CT 122 BG 1 | Brooklyn | 1 |
| CT 122 BG 2 | Brooklyn | 1 |
| CT 122 BG 3 | Brooklyn | 1 |
| CT 1220 BG 1 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1220 BG 2 | Brooklyn | 1 |
| CT 1237 BG 1 | Brooklyn | 2 |
| CT 1237 BG 2 | Brooklyn | 2 |
| CT 1237 BG 3 | Brooklyn | 2 |
| CT 126 BG 1 | Brooklyn | 1 |
| CT 126 BG 2 | Brooklyn | 1 |
| CT 126 BG 3 | Brooklyn | 1 |
| CT 127 BG 3 | Brooklyn | 1 |
| CT 128.01 BG 1 | Brooklyn | 1 |
| CT 129.01 BG 1 | Brooklyn | 3 |
| CT 13 BG 2 | Brooklyn | 2 |
| CT 130 BG 1 | Brooklyn | 1 |
| CT 130 BG 2 | Brooklyn | 2 |
| CT 130 BG 4 | Brooklyn | 1 |
| CT 131 BG 4 | Brooklyn | 3 |
| CT 132 BG 1 | Brooklyn | 1 |
| CT 132 BG 2 | Brooklyn | 1 |
| CT 136 BG 3 | Brooklyn | 2 |
| CT 138 BG 2 | Brooklyn | 3 |
| CT 141 BG 1 | Brooklyn | 3 |
| CT 143 BG 1 | Brooklyn | 3 |
| CT 143 BG 3 | Brooklyn | 3 |
| CT 145 BG 1 | Brooklyn | 3 |
| CT 15 BG 1 | Brooklyn | 3 |
| CT 15 BG 2 | Brooklyn | 1 |
| CT 15 BG 3 | Brooklyn | 3 |
| CT 152 BG 3 | Brooklyn | 3 |
| CT 1522 BG 1 | Brooklyn | 3 |
| CT 1522 BG 2 | Brooklyn | 3 |
| CT 153 BG 1 | Brooklyn | 3 |
| CT 160 BG 1 | Brooklyn | 3 |
| CT 160 BG 2 | Brooklyn | 3 |
| CT 160 BG 3 | Brooklyn | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 161 BG 1 | Brooklyn | 3 |
| CT 163 BG 1 | Brooklyn | 3 |
| CT 164 BG 1 | Brooklyn | 3 |
| CT 170 BG 1 | Brooklyn | 3 |
| CT 170 BG 3 | Brooklyn | 3 |
| CT 172 BG 1 | Brooklyn | 3 |
| CT 172 BG 2 | Brooklyn | 3 |
| CT 176 BG 1 | Brooklyn | 3 |
| CT 176 BG 2 | Brooklyn | 2 |
| CT 178 BG 1 | Brooklyn | 1 |
| CT 178 BG 2 | Brooklyn | 3 |
| CT 179 BG 1 | Brooklyn | 1 |
| CT 179 BG 2 | Brooklyn | 3 |
| CT 179 BG 3 | Brooklyn | 3 |
| CT 18 BG 1 | Brooklyn | 3 |
| CT 180 BG 1 | Brooklyn | 3 |
| CT 180 BG 2 | Brooklyn | 3 |
| CT 181 BG 1 | Brooklyn | 3 |
| CT 181 BG 2 | Brooklyn | 3 |
| CT 182 BG 1 | Brooklyn | 1 |
| CT 182 BG 2 | Brooklyn | 3 |
| CT 184 BG 1 | Brooklyn | 3 |
| CT 184 BG 2 | Brooklyn | 3 |
| CT 185.01 BG 1 | Brooklyn | 3 |
| CT 185.01 BG 2 | Brooklyn | 1 |
| CT 185.01 BG 3 | Brooklyn | 1 |
| CT 185.01 BG 4 | Brooklyn | 1 |
| CT 186 BG 1 | Brooklyn | 1 |
| CT 187 BG 1 | Brooklyn | 1 |
| CT 188 BG 2 | Brooklyn | 3 |
| CT 190 BG 1 | Brooklyn | 1 |
| CT 190 BG 2 | Brooklyn | 1 |
| CT 190 BG 3 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 191 BG 1 | Brooklyn | 2 |
| CT 191 BG 3 | Brooklyn | 3 |
| CT 192 BG 1 | Brooklyn | 2 |
| CT 192 BG 2 | Brooklyn | 1 |
| CT 193 BG 1 | Brooklyn | 2 |
| CT 193 BG 2 | Brooklyn | 3 |
| CT 193 BG 3 | Brooklyn | 3 |
| CT 193 BG 4 | Brooklyn | 3 |
| CT 194 BG 1 | Brooklyn | 1 |
| CT 194 BG 2 | Brooklyn | 1 |
| CT 195 BG 2 | Brooklyn | 3 |
| CT 195 BG 3 | Brooklyn | 3 |
| CT 196 BG 1 | Brooklyn | 1 |
| CT 196 BG 2 | Brooklyn | 2 |
| CT 196 BG 3 | Brooklyn | 1 |
| CT 197 BG 1 | Brooklyn | 3 |
| CT 197 BG 4 | Brooklyn | 3 |
| CT 198 BG 1 | Brooklyn | 3 |
| CT 198 BG 2 | Brooklyn | 2 |
| CT 199 BG 3 | Brooklyn | 3 |
| CT 2 BG 1 | Brooklyn | 1 |
| CT 20 BG 1 | Brooklyn | 1 |
| CT 20 BG 2 | Brooklyn | 1 |
| CT 200 BG 1 | Brooklyn | 1 |
| CT 200 BG 2 | Brooklyn | 3 |
| CT 201 BG 1 | Brooklyn | 3 |
| CT 201 BG 4 | Brooklyn | 3 |
| CT 202 BG 1 | Brooklyn | 3 |
| CT 203 BG 1 | Brooklyn | 3 |
| CT 203 BG 2 | Brooklyn | 3 |
| CT 205 BG 2 | Brooklyn | 3 |
| CT 205 BG 3 | Brooklyn | 3 |
| CT 206 BG 1 | Brooklyn | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 208 BG 1 | Brooklyn | 1 |
| CT 208 BG 2 | Brooklyn | 3 |
| CT 208 BG 3 | Brooklyn | 1 |
| CT 210 BG 1 | Brooklyn | 1 |
| CT 210 BG 2 | Brooklyn | 1 |
| CT 210 BG 3 | Brooklyn | 1 |
| CT 211 BG 1 | Brooklyn | 3 |
| CT 211 BG 2 | Brooklyn | 3 |
| CT 212 BG 1 | Brooklyn | 1 |
| CT 212 BG 2 | Brooklyn | 1 |
| CT 212 BG 3 | Brooklyn | 1 |
| CT 213 BG 1 | Brooklyn | 3 |
| CT 213 BG 2 | Brooklyn | 3 |
| CT 213 BG 3 | Brooklyn | 3 |
| CT 214 BG 1 | Brooklyn | 2 |
| CT 214 BG 2 | Brooklyn | 1 |
| CT 215 BG 2 | Brooklyn | 1 |
| CT 215 BG 3 | Brooklyn | 3 |
| CT 215 BG 4 | Brooklyn | 3 |
| CT 216 BG 1 | Brooklyn | 2 |
| CT 216 BG 2 | Brooklyn | 2 |
| CT 216 BG 3 | Brooklyn | 2 |
| CT 217 BG 1 | Brooklyn | 3 |
| CT 217 BG 2 | Brooklyn | 3 |
| CT 218 BG 1 | Brooklyn | 2 |
| CT 218 BG 2 | Brooklyn | 2 |
| CT 218 BG 3 | Brooklyn | 2 |
| CT 219 BG 1 | Brooklyn | 3 |
| CT 219 BG 2 | Brooklyn | 3 |
| CT 219 BG 3 | Brooklyn | 3 |
| CT 22 BG 1 | Brooklyn | 1 |
| CT 22 BG 2 | Brooklyn | 3 |
| CT 22 BG 3 | Brooklyn | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 220 BG 1 | Brooklyn | 2 |
| CT 220 BG 2 | Brooklyn | 2 |
| CT 220 BG 3 | Brooklyn | 2 |
| CT 220 BG 4 | Brooklyn | 2 |
| CT 221 BG 1 | Brooklyn | 1 |
| CT 221 BG 2 | Brooklyn | 3 |
| CT 221 BG 3 | Brooklyn | 3 |
| CT 222 BG 1 | Brooklyn | 2 |
| CT 222 BG 2 | Brooklyn | 2 |
| CT 222 BG 3 | Brooklyn | 2 |
| CT 224 BG 1 | Brooklyn | 2 |
| CT 224 BG 2 | Brooklyn | 2 |
| CT 224 BG 3 | Brooklyn | 2 |
| CT 224 BG 4 | Brooklyn | 2 |
| CT 226 BG 1 | Brooklyn | 1 |
| CT 226 BG 2 | Brooklyn | 1 |
| CT 227 BG 1 | Brooklyn | 3 |
| CT 227 BG 2 | Brooklyn | 3 |
| CT 227 BG 3 | Brooklyn | 3 |
| CT 227 BG 4 | Brooklyn | 3 |
| CT 228 BG 1 | Brooklyn | 1 |
| CT 228 BG 2 | Brooklyn | 2 |
| CT 228 BG 3 | Brooklyn | 2 |
| CT 229 BG 1 | Brooklyn | 3 |
| CT 229 BG 2 | Brooklyn | 3 |
| CT 229 BG 3 | Brooklyn | 1 |
| CT 229 BG 4 | Brooklyn | 3 |
| CT 23 BG 1 | Brooklyn | 1 |
| CT 23 BG 2 | Brooklyn | 1 |
| CT 23 BG 3 | Brooklyn | 1 |
| CT 230 BG 1 | Brooklyn | 2 |
| CT 230 BG 2 | Brooklyn | 2 |
| CT 230 BG 3 | Brooklyn | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 231 BG 1 | Brooklyn | 3 |
| CT 231 BG 2 | Brooklyn | 3 |
| CT 231 BG 3 | Brooklyn | 3 |
| CT 232 BG 1 | Brooklyn | 2 |
| CT 232 BG 2 | Brooklyn | 2 |
| CT 232 BG 3 | Brooklyn | 2 |
| CT 232 BG 4 | Brooklyn | 2 |
| CT 232 BG 5 | Brooklyn | 2 |
| CT 233 BG 2 | Brooklyn | 1 |
| CT 234 BG 1 | Brooklyn | 2 |
| CT 234 BG 2 | Brooklyn | 2 |
| CT 234 BG 3 | Brooklyn | 2 |
| CT 235 BG 1 | Brooklyn | 2 |
| CT 235 BG 2 | Brooklyn | 2 |
| CT 236 BG 1 | Brooklyn | 2 |
| CT 236 BG 2 | Brooklyn | 2 |
| CT 236 BG 3 | Brooklyn | 2 |
| CT 236 BG 4 | Brooklyn | 2 |
| CT 238 BG 1 | Brooklyn | 2 |
| CT 238 BG 2 | Brooklyn | 2 |
| CT 238 BG 3 | Brooklyn | 2 |
| CT 240 BG 1 | Brooklyn | 2 |
| CT 240 BG 2 | Brooklyn | 2 |
| CT 240 BG 3 | Brooklyn | 2 |
| CT 241 BG 2 | Brooklyn | 1 |
| CT 242 BG 1 | Brooklyn | 2 |
| CT 242 BG 2 | Brooklyn | 2 |
| CT 243 BG 1 | Brooklyn | 3 |
| CT 243 BG 2 | Brooklyn | 3 |
| CT 243 BG 3 | Brooklyn | 3 |
| CT 244 BG 1 | Brooklyn | 2 |
| CT 244 BG 2 | Brooklyn | 2 |
| CT 244 BG 3 | Brooklyn | 2 |
| CT 245 BG 1 | Brooklyn | 3 |
| CT 245 BG 2 | Brooklyn | 1 |
| CT 245 BG 3 | Brooklyn | 3 |
| CT 245 BG 4 | Brooklyn | 3 |
| CT 246 BG 2 | Brooklyn | 1 |
| CT 246 BG 3 | Brooklyn | 2 |
| CT 247 BG 1 | Brooklyn | 1 |
| CT 247 BG 2 | Brooklyn | 1 |
| CT 248 BG 1 | Brooklyn | 3 |
| CT 248 BG 2 | Brooklyn | 3 |
| CT 249 BG 1 | Brooklyn | 3 |
| CT 249 BG 2 | Brooklyn | 3 |
| CT 249 BG 3 | Brooklyn | 3 |
| CT 250 BG 1 | Brooklyn | 1 |
| CT 250 BG 2 | Brooklyn | 1 |
| CT 251 BG 1 | Brooklyn | 1 |
| CT 251 BG 2 | Brooklyn | 1 |
| CT 251 BG 3 | Brooklyn | 3 |
| CT 252 BG 1 | Brooklyn | 3 |
| CT 252 BG 2 | Brooklyn | 2 |
| CT 252 BG 3 | Brooklyn | 3 |
| CT 252 BG 4 | Brooklyn | 3 |
| CT 253 BG 1 | Brooklyn | 1 |
| CT 253 BG 2 | Brooklyn | 1 |
| CT 253 BG 3 | Brooklyn | 1 |
| CT 254 BG 1 | Brooklyn | 3 |
| CT 254 BG 3 | Brooklyn | 1 |
| CT 255 BG 1 | Brooklyn | 1 |
| CT 255 BG 2 | Brooklyn | 1 |
| CT 256 BG 1 | Brooklyn | 1 |
| CT 256 BG 2 | Brooklyn | 1 |
| CT 257 BG 1 | Brooklyn | 1 |
| CT 257 BG 2 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 257 BG 3 | Brooklyn | 3 |
| CT 258 BG 1 | Brooklyn | 1 |
| CT 258 BG 2 | Brooklyn | 1 |
| CT 259.01 BG 1 | Brooklyn | 1 |
| CT 259.02 BG 1 | Brooklyn | 1 |
| CT 260 BG 1 | Brooklyn | 1 |
| CT 260 BG 2 | Brooklyn | 1 |
| CT 260 BG 3 | Brooklyn | 3 |
| CT 261 BG 1 | Brooklyn | 1 |
| CT 261 BG 2 | Brooklyn | 3 |
| CT 261 BG 3 | Brooklyn | 1 |
| CT 261 BG 4 | Brooklyn | 1 |
| CT 261 BG 5 | Brooklyn | 3 |
| CT 262 BG 1 | Brooklyn | 1 |
| CT 262 BG 2 | Brooklyn | 1 |
| CT 263 BG 1 | Brooklyn | 1 |
| CT 264 BG 1 | Brooklyn | 1 |
| CT 264 BG 2 | Brooklyn | 3 |
| CT 264 BG 3 | Brooklyn | 1 |
| CT 264 BG 4 | Brooklyn | 3 |
| CT 265 BG 1 | Brooklyn | 3 |
| CT 265 BG 2 | Brooklyn | 3 |
| CT 265 BG 3 | Brooklyn | 3 |
| CT 265 BG 4 | Brooklyn | 3 |
| CT 266 BG 1 | Brooklyn | 1 |
| CT 266 BG 2 | Brooklyn | 1 |
| CT 266 BG 3 | Brooklyn | 1 |
| CT 267 BG 1 | Brooklyn | 1 |
| CT 267 BG 2 | Brooklyn | 3 |
| CT 267 BG 3 | Brooklyn | 3 |
| CT 267 BG 4 | Brooklyn | 3 |
| CT 268 BG 1 | Brooklyn | 1 |
| CT 268 BG 2 | Brooklyn | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 268 BG 3 | Brooklyn | 3 |
| CT 268 BG 4 | Brooklyn | 2 |
| CT 269 BG 1 | Brooklyn | 3 |
| CT 269 BG 2 | Brooklyn | 3 |
| CT 269 BG 3 | Brooklyn | 3 |
| CT 270 BG 2 | Brooklyn | 2 |
| CT 271 BG 1 | Brooklyn | 3 |
| CT 271 BG 2 | Brooklyn | 3 |
| CT 272 BG 1 | Brooklyn | 3 |
| CT 272 BG 2 | Brooklyn | 1 |
| CT 273 BG 1 | Brooklyn | 3 |
| CT 273 BG 2 | Brooklyn | 3 |
| CT 273 BG 3 | Brooklyn | 1 |
| CT 274 BG 1 | Brooklyn | 3 |
| CT 274 BG 2 | Brooklyn | 2 |
| CT 275 BG 1 | Brooklyn | 1 |
| CT 275 BG 2 | Brooklyn | 3 |
| CT 275 BG 3 | Brooklyn | 3 |
| CT 275 BG 4 | Brooklyn | 3 |
| CT 276 BG 1 | Brooklyn | 1 |
| CT 276 BG 2 | Brooklyn | 1 |
| CT 276 BG 3 | Brooklyn | 1 |
| CT 277 BG 1 | Brooklyn | 1 |
| CT 277 BG 2 | Brooklyn | 3 |
| CT 277 BG 3 | Brooklyn | 1 |
| CT 277 BG 4 | Brooklyn | 1 |
| CT 278 BG 2 | Brooklyn | 3 |
| CT 279 BG 1 | Brooklyn | 1 |
| CT 279 BG 2 | Brooklyn | 3 |
| CT 279 BG 3 | Brooklyn | 3 |
| CT 279 BG 4 | Brooklyn | 3 |
| CT 280 BG 1 | Brooklyn | 3 |
| CT 280 BG 2 | Brooklyn | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 281 BG 1 | Brooklyn | 1 |
| CT 281 BG 2 | Brooklyn | 1 |
| CT 281 BG 3 | Brooklyn | 1 |
| CT 282 BG 1 | Brooklyn | 3 |
| CT 282 BG 2 | Brooklyn | 1 |
| CT 282 BG 3 | Brooklyn | 2 |
| CT 283 BG 1 | Brooklyn | 1 |
| CT 283 BG 2 | Brooklyn | 1 |
| CT 283 BG 3 | Brooklyn | 1 |
| CT 284 BG 1 | Brooklyn | 3 |
| CT 284 BG 2 | Brooklyn | 2 |
| CT 284 BG 3 | Brooklyn | 1 |
| CT 285.01 BG 1 | Brooklyn | 1 |
| CT 285.02 BG 1 | Brooklyn | 1 |
| CT 286 BG 2 | Brooklyn | 2 |
| CT 286 BG 3 | Brooklyn | 1 |
| CT 286 BG 4 | Brooklyn | 1 |
| CT 286 BG 5 | Brooklyn | 1 |
| CT 287 BG 1 | Brooklyn | 3 |
| CT 287 BG 2 | Brooklyn | 1 |
| CT 287 BG 3 | Brooklyn | 1 |
| CT 288 BG 1 | Brooklyn | 1 |
| CT 288 BG 2 | Brooklyn | 1 |
| CT 288 BG 3 | Brooklyn | 1 |
| CT 289 BG 1 | Brooklyn | 3 |
| CT 289 BG 2 | Brooklyn | 3 |
| CT 289 BG 3 | Brooklyn | 3 |
| CT 289 BG 4 | Brooklyn | 1 |
| CT 29.01 BG 1 | Brooklyn | 1 |
| CT 29.01 BG 2 | Brooklyn | 1 |
| CT 290 BG 1 | Brooklyn | 2 |
| CT 290 BG 3 | Brooklyn | 3 |
| CT 291 BG 1 | Brooklyn | 3 |
| CT 291 BG 2 | Brooklyn | 1 |
| CT 291 BG 3 | Brooklyn | 3 |
| CT 292 BG 1 | Brooklyn | 1 |
| CT 292 BG 2 | Brooklyn | 3 |
| CT 293 BG 1 | Brooklyn | 1 |
| CT 293 BG 2 | Brooklyn | 1 |
| CT 293 BG 3 | Brooklyn | 3 |
| CT 293 BG 4 | Brooklyn | 3 |
| CT 294 BG 1 | Brooklyn | 1 |
| CT 295 BG 1 | Brooklyn | 3 |
| CT 295 BG 2 | Brooklyn | 3 |
| CT 295 BG 3 | Brooklyn | 3 |
| CT 295 BG 4 | Brooklyn | 3 |
| CT 296 BG 1 | Brooklyn | 2 |
| CT 296 BG 2 | Brooklyn | 3 |
| CT 296 BG 3 | Brooklyn | 3 |
| CT 296 BG 4 | Brooklyn | 1 |
| CT 297 BG 1 | Brooklyn | 3 |
| CT 297 BG 2 | Brooklyn | 1 |
| CT 297 BG 3 | Brooklyn | 3 |
| CT 298 BG 1 | Brooklyn | 3 |
| CT 298 BG 2 | Brooklyn | 3 |
| CT 298 BG 3 | Brooklyn | 2 |
| CT 299 BG 1 | Brooklyn | 1 |
| CT 299 BG 2 | Brooklyn | 1 |
| CT 300 BG 1 | Brooklyn | 1 |
| CT 300 BG 2 | Brooklyn | 1 |
| CT 301 BG 1 | Brooklyn | 1 |
| CT 301 BG 2 | Brooklyn | 1 |
| CT 301 BG 3 | Brooklyn | 3 |
| CT 302 BG 1 | Brooklyn | 3 |
| CT 302 BG 2 | Brooklyn | 3 |
| CT 302 BG 3 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 303 BG 1 | Brooklyn | 3 |
| CT 303 BG 2 | Brooklyn | 1 |
| CT 303 BG 3 | Brooklyn | 1 |
| CT 304 BG 1 | Brooklyn | 3 |
| CT 304 BG 2 | Brooklyn | 2 |
| CT 304 BG 3 | Brooklyn | 1 |
| CT 305 BG 1 | Brooklyn | 3 |
| CT 305 BG 2 | Brooklyn | 3 |
| CT 305 BG 3 | Brooklyn | 3 |
| CT 305 BG 4 | Brooklyn | 3 |
| CT 306 BG 1 | Brooklyn | 1 |
| CT 307 BG 1 | Brooklyn | 1 |
| CT 307 BG 2 | Brooklyn | 1 |
| CT 307 BG 3 | Brooklyn | 1 |
| CT 309 BG 1 | Brooklyn | 1 |
| CT 309 BG 2 | Brooklyn | 3 |
| CT 31 BG 1 | Brooklyn | 3 |
| CT 31 BG 2 | Brooklyn | 3 |
| CT 31 BG 3 | Brooklyn | 3 |
| CT 311 BG 1 | Brooklyn | 1 |
| CT 311 BG 2 | Brooklyn | 1 |
| CT 311 BG 3 | Brooklyn | 3 |
| CT 313 BG 1 | Brooklyn | 1 |
| CT 313 BG 2 | Brooklyn | 3 |
| CT 313 BG 3 | Brooklyn | 1 |
| CT 313 BG 4 | Brooklyn | 3 |
| CT 314 BG 4 | Brooklyn | 3 |
| CT 315 BG 1 | Brooklyn | 3 |
| CT 315 BG 2 | Brooklyn | 3 |
| CT 315 BG 3 | Brooklyn | 3 |
| CT 315 BG 4 | Brooklyn | 3 |
| CT 317.01 BG 1 | Brooklyn | 3 |
| CT 317.01 BG 2 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 317.01 BG 3 | Brooklyn | 3 |
| CT 317.02 BG 1 | Brooklyn | 1 |
| CT 317.02 BG 2 | Brooklyn | 3 |
| CT 317.02 BG 3 | Brooklyn | 3 |
| CT 319 BG 1 | Brooklyn | 1 |
| CT 319 BG 2 | Brooklyn | 2 |
| CT 319 BG 3 | Brooklyn | 1 |
| CT 321 BG 1 | Brooklyn | 1 |
| CT 321 BG 2 | Brooklyn | 3 |
| CT 321 BG 3 | Brooklyn | 3 |
| CT 321 BG 4 | Brooklyn | 3 |
| CT 323 BG 1 | Brooklyn | 3 |
| CT 323 BG 2 | Brooklyn | 3 |
| CT 323 BG 3 | Brooklyn | 3 |
| CT 325 BG 1 | Brooklyn | 3 |
| CT 325 BG 2 | Brooklyn | 1 |
| CT 325 BG 3 | Brooklyn | 1 |
| CT 326 BG 1 | Brooklyn | 1 |
| CT 326 BG 2 | Brooklyn | 1 |
| CT 326 BG 3 | Brooklyn | 1 |
| CT 326 BG 4 | Brooklyn | 1 |
| CT 326 BG 5 | Brooklyn | 1 |
| CT 327 BG 1 | Brooklyn | 3 |
| CT 327 BG 2 | Brooklyn | 3 |
| CT 327 BG 3 | Brooklyn | 1 |
| CT 328 BG 1 | Brooklyn | 3 |
| CT 328 BG 2 | Brooklyn | 1 |
| CT 328 BG 3 | Brooklyn | 1 |
| CT 328 BG 4 | Brooklyn | 3 |
| CT 329 BG 1 | Brooklyn | 2 |
| CT 329 BG 2 | Brooklyn | 1 |
| CT 329 BG 3 | Brooklyn | 1 |
| CT 329 BG 4 | Brooklyn | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 33 BG 2 | Brooklyn | 3 |
| CT 330 BG 1 | Brooklyn | 1 |
| CT 330 BG 2 | Brooklyn | 3 |
| CT 330 BG 3 | Brooklyn | 1 |
| CT 331 BG 1 | Brooklyn | 2 |
| CT 331 BG 2 | Brooklyn | 2 |
| CT 333 BG 2 | Brooklyn | 2 |
| CT 333 BG 3 | Brooklyn | 2 |
| CT 335 BG 1 | Brooklyn | 2 |
| CT 335 BG 2 | Brooklyn | 2 |
| CT 335 BG 3 | Brooklyn | 2 |
| CT 337 BG 1 | Brooklyn | 1 |
| CT 337 BG 2 | Brooklyn | 2 |
| CT 339 BG 1 | Brooklyn | 1 |
| CT 339 BG 2 | Brooklyn | 1 |
| CT 339 BG 3 | Brooklyn | 1 |
| CT 339 BG 4 | Brooklyn | 3 |
| CT 34 BG 2 | Brooklyn | 3 |
| CT 340 BG 1 | Brooklyn | 1 |
| CT 340 BG 2 | Brooklyn | 2 |
| CT 341 BG 1 | Brooklyn | 3 |
| CT 341 BG 2 | Brooklyn | 3 |
| CT 341 BG 3 | Brooklyn | 1 |
| CT 342 BG 1 | Brooklyn | 1 |
| CT 342 BG 2 | Brooklyn | 1 |
| CT 342 BG 3 | Brooklyn | 1 |
| CT 342 BG 4 | Brooklyn | 2 |
| CT 343 BG 1 | Brooklyn | 1 |
| CT 343 BG 2 | Brooklyn | 3 |
| CT 343 BG 3 | Brooklyn | 3 |
| CT 345 BG 1 | Brooklyn | 1 |
| CT 345 BG 2 | Brooklyn | 1 |
| CT 347 BG 1 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 347 BG 2 | Brooklyn | 3 |
| CT 347 BG 3 | Brooklyn | 1 |
| CT 348 BG 1 | Brooklyn | 1 |
| CT 348 BG 2 | Brooklyn | 1 |
| CT 349 BG 1 | Brooklyn | 1 |
| CT 349 BG 2 | Brooklyn | 1 |
| CT 349 BG 3 | Brooklyn | 3 |
| CT 349 BG 4 | Brooklyn | 1 |
| CT 35 BG 2 | Brooklyn | 3 |
| CT 350 BG 1 | Brooklyn | 2 |
| CT 351 BG 1 | Brooklyn | 1 |
| CT 351 BG 2 | Brooklyn | 1 |
| CT 351 BG 3 | Brooklyn | 1 |
| CT 352 BG 1 | Brooklyn | 2 |
| CT 353 BG 1 | Brooklyn | 1 |
| CT 353 BG 2 | Brooklyn | 1 |
| CT 353 BG 3 | Brooklyn | 3 |
| CT 355 BG 1 | Brooklyn | 1 |
| CT 355 BG 2 | Brooklyn | 1 |
| CT 355 BG 3 | Brooklyn | 1 |
| CT 356.02 BG 1 | Brooklyn | 2 |
| CT 357 BG 1 | Brooklyn | 1 |
| CT 359 BG 1 | Brooklyn | 1 |
| CT 359 BG 2 | Brooklyn | 1 |
| CT 359 BG 3 | Brooklyn | 1 |
| CT 359 BG 4 | Brooklyn | 1 |
| CT 360.01 BG 1 | Brooklyn | 2 |
| CT 360.01 BG 2 | Brooklyn | 2 |
| CT 360.01 BG 3 | Brooklyn | 2 |
| CT 360.02 BG 1 | Brooklyn | 2 |
| CT 360.02 BG 2 | Brooklyn | 2 |
| CT 361 BG 1 | Brooklyn | 1 |
| CT 361 BG 2 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 361 BG 3 | Brooklyn | 1 |
| CT 362 BG 1 | Brooklyn | 2 |
| CT 362 BG 2 | Brooklyn | 1 |
| CT 363 BG 1 | Brooklyn | 1 |
| CT 363 BG 2 | Brooklyn | 1 |
| CT 363 BG 3 | Brooklyn | 1 |
| CT 363 BG 4 | Brooklyn | 1 |
| CT 364 BG 1 | Brooklyn | 2 |
| CT 365.01 BG 1 | Brooklyn | 1 |
| CT 365.01 BG 2 | Brooklyn | 3 |
| CT 365.02 BG 1 | Brooklyn | 1 |
| CT 366 BG 1 | Brooklyn | 1 |
| CT 366 BG 2 | Brooklyn | 2 |
| CT 366 BG 3 | Brooklyn | 1 |
| CT 367 BG 1 | Brooklyn | 3 |
| CT 367 BG 2 | Brooklyn | 3 |
| CT 369 BG 1 | Brooklyn | 1 |
| CT 369 BG 2 | Brooklyn | 1 |
| CT 369 BG 3 | Brooklyn | 1 |
| CT 369 BG 4 | Brooklyn | 1 |
| CT 370 BG 1 | Brooklyn | 2 |
| CT 370 BG 3 | Brooklyn | 3 |
| CT 371 BG 1 | Brooklyn | 3 |
| CT 371 BG 2 | Brooklyn | 3 |
| CT 371 BG 3 | Brooklyn | 3 |
| CT 371 BG 4 | Brooklyn | 1 |
| CT 371 BG 5 | Brooklyn | 1 |
| CT 373 BG 1 | Brooklyn | 1 |
| CT 373 BG 2 | Brooklyn | 1 |
| CT 373 BG 3 | Brooklyn | 1 |
| CT 373 BG 4 | Brooklyn | 1 |
| CT 374.01 BG 2 | Brooklyn | 2 |
| CT 374.02 BG 1 | Brooklyn | 1 |
| CT 374.02 BG 2 | Brooklyn | 2 |
| CT 374.02 BG 3 | Brooklyn | 2 |
| CT 374.02 BG 4 | Brooklyn | 2 |
| CT 375 BG 1 | Brooklyn | 3 |
| CT 375 BG 2 | Brooklyn | 1 |
| CT 375 BG 3 | Brooklyn | 3 |
| CT 377 BG 1 | Brooklyn | 1 |
| CT 377 BG 2 | Brooklyn | 1 |
| CT 377 BG 3 | Brooklyn | 3 |
| CT 377 BG 4 | Brooklyn | 3 |
| CT 379 BG 1 | Brooklyn | 3 |
| CT 379 BG 2 | Brooklyn | 1 |
| CT 379 BG 3 | Brooklyn | 3 |
| CT 381 BG 1 | Brooklyn | 3 |
| CT 381 BG 2 | Brooklyn | 1 |
| CT 381 BG 3 | Brooklyn | 3 |
| CT 381 BG 4 | Brooklyn | 1 |
| CT 382 BG 1 | Brooklyn | 1 |
| CT 382 BG 2 | Brooklyn | 1 |
| CT 382 BG 3 | Brooklyn | 1 |
| CT 383 BG 1 | Brooklyn | 3 |
| CT 383 BG 2 | Brooklyn | 1 |
| CT 383 BG 3 | Brooklyn | 3 |
| CT 383 BG 4 | Brooklyn | 3 |
| CT 385 BG 1 | Brooklyn | 3 |
| CT 385 BG 2 | Brooklyn | 3 |
| CT 385 BG 3 | Brooklyn | 1 |
| CT 385 BG 4 | Brooklyn | 3 |
| CT 386 BG 1 | Brooklyn | 3 |
| CT 386 BG 2 | Brooklyn | 3 |
| CT 387 BG 1 | Brooklyn | 3 |
| CT 387 BG 2 | Brooklyn | 1 |
| CT 387 BG 3 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 387 BG 4 | Brooklyn | 3 |
| CT 388 BG 3 | Brooklyn | 2 |
| CT 389 BG 1 | Brooklyn | 3 |
| CT 389 BG 2 | Brooklyn | 3 |
| CT 389 BG 3 | Brooklyn | 1 |
| CT 39 BG 1 | Brooklyn | 3 |
| CT 390 BG 1 | Brooklyn | 2 |
| CT 391 BG 1 | Brooklyn | 1 |
| CT 391 BG 2 | Brooklyn | 1 |
| CT 393 BG 1 | Brooklyn | 3 |
| CT 393 BG 2 | Brooklyn | 3 |
| CT 393 BG 3 | Brooklyn | 1 |
| CT 394 BG 1 | Brooklyn | 2 |
| CT 394 BG 2 | Brooklyn | 2 |
| CT 395 BG 1 | Brooklyn | 3 |
| CT 395 BG 2 | Brooklyn | 1 |
| CT 395 BG 3 | Brooklyn | 1 |
| CT 396 BG 2 | Brooklyn | 2 |
| CT 397 BG 1 | Brooklyn | 1 |
| CT 397 BG 2 | Brooklyn | 1 |
| CT 397 BG 3 | Brooklyn | 1 |
| CT 398 BG 1 | Brooklyn | 3 |
| CT 398 BG 2 | Brooklyn | 1 |
| CT 399 BG 1 | Brooklyn | 1 |
| CT 399 BG 2 | Brooklyn | 3 |
| CT 399 BG 3 | Brooklyn | 1 |
| CT 400 BG 2 | Brooklyn | 3 |
| CT 400 BG 3 | Brooklyn | 1 |
| CT 401 BG 1 | Brooklyn | 1 |
| CT 401 BG 2 | Brooklyn | 1 |
| CT 401 BG 3 | Brooklyn | 1 |
| CT 402 BG 1 | Brooklyn | 3 |
| CT 402 BG 2 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 403 BG 1 | Brooklyn | 1 |
| CT 403 BG 2 | Brooklyn | 3 |
| CT 403 BG 3 | Brooklyn | 1 |
| CT 404 BG 1 | Brooklyn | 3 |
| CT 404 BG 2 | Brooklyn | 1 |
| CT 405 BG 1 | Brooklyn | 1 |
| CT 405 BG 2 | Brooklyn | 1 |
| CT 406 BG 1 | Brooklyn | 1 |
| CT 406 BG 2 | Brooklyn | 1 |
| CT 406 BG 3 | Brooklyn | 3 |
| CT 408 BG 1 | Brooklyn | 3 |
| CT 408 BG 2 | Brooklyn | 3 |
| CT 408 BG 3 | Brooklyn | 3 |
| CT 409 BG 1 | Brooklyn | 1 |
| CT 409 BG 2 | Brooklyn | 3 |
| CT 409 BG 3 | Brooklyn | 1 |
| CT 410 BG 1 | Brooklyn | 2 |
| CT 410 BG 2 | Brooklyn | 2 |
| CT 411 BG 1 | Brooklyn | 1 |
| CT 411 BG 2 | Brooklyn | 1 |
| CT 411 BG 3 | Brooklyn | 3 |
| CT 412 BG 1 | Brooklyn | 2 |
| CT 413 BG 1 | Brooklyn | 1 |
| CT 413 BG 2 | Brooklyn | 3 |
| CT 413 BG 3 | Brooklyn | 1 |
| CT 414.01 BG 1 | Brooklyn | 2 |
| CT 414.02 BG 2 | Brooklyn | 2 |
| CT 415 BG 1 | Brooklyn | 3 |
| CT 415 BG 2 | Brooklyn | 3 |
| CT 415 BG 3 | Brooklyn | 1 |
| CT 416 BG 1 | Brooklyn | 2 |
| CT 416 BG 2 | Brooklyn | 2 |
| CT 417 BG 1 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 417 BG 2 | Brooklyn | 1 |
| CT 417 BG 3 | Brooklyn | 1 |
| CT 417 BG 4 | Brooklyn | 1 |
| CT 418 BG 1 | Brooklyn | 2 |
| CT 418 BG 2 | Brooklyn | 2 |
| CT 419 BG 1 | Brooklyn | 1 |
| CT 419 BG 2 | Brooklyn | 1 |
| CT 419 BG 3 | Brooklyn | 1 |
| CT 420 BG 1 | Brooklyn | 2 |
| CT 421 BG 1 | Brooklyn | 1 |
| CT 421 BG 2 | Brooklyn | 1 |
| CT 421 BG 3 | Brooklyn | 1 |
| CT 421 BG 4 | Brooklyn | 3 |
| CT 422 BG 1 | Brooklyn | 2 |
| CT 423 BG 1 | Brooklyn | 1 |
| CT 423 BG 3 | Brooklyn | 3 |
| CT 424 BG 1 | Brooklyn | 3 |
| CT 424 BG 3 | Brooklyn | 1 |
| CT 425 BG 1 | Brooklyn | 3 |
| CT 425 BG 2 | Brooklyn | 3 |
| CT 425 BG 3 | Brooklyn | 3 |
| CT 426 BG 1 | Brooklyn | 1 |
| CT 426 BG 2 | Brooklyn | 1 |
| CT 426 BG 3 | Brooklyn | 3 |
| CT 427 BG 1 | Brooklyn | 1 |
| CT 427 BG 2 | Brooklyn | 1 |
| CT 427 BG 3 | Brooklyn | 1 |
| CT 427 BG 4 | Brooklyn | 1 |
| CT 428 BG 1 | Brooklyn | 1 |
| CT 429 BG 1 | Brooklyn | 1 |
| CT 429 BG 2 | Brooklyn | 1 |
| CT 429 BG 3 | Brooklyn | 3 |
| CT 429 BG 4 | Brooklyn | 1 |
| CT 43 BG 1 | Brooklyn | 3 |
| CT 430 BG 2 | Brooklyn | 1 |
| CT 430 BG 3 | Brooklyn | 1 |
| CT 431 BG 1 | Brooklyn | 1 |
| CT 431 BG 2 | Brooklyn | 3 |
| CT 431 BG 3 | Brooklyn | 1 |
| CT 431 BG 4 | Brooklyn | 1 |
| CT 432 BG 1 | Brooklyn | 3 |
| CT 432 BG 2 | Brooklyn | 1 |
| CT 432 BG 3 | Brooklyn | 3 |
| CT 433 BG 1 | Brooklyn | 1 |
| CT 433 BG 2 | Brooklyn | 3 |
| CT 433 BG 3 | Brooklyn | 1 |
| CT 434 BG 1 | Brooklyn | 2 |
| CT 434 BG 3 | Brooklyn | 1 |
| CT 435 BG 1 | Brooklyn | 1 |
| CT 435 BG 2 | Brooklyn | 3 |
| CT 435 BG 3 | Brooklyn | 1 |
| CT 436 BG 2 | Brooklyn | 1 |
| CT 437 BG 1 | Brooklyn | 1 |
| CT 437 BG 2 | Brooklyn | 3 |
| CT 437 BG 3 | Brooklyn | 1 |
| CT 437 BG 4 | Brooklyn | 1 |
| CT 438 BG 1 | Brooklyn | 2 |
| CT 438 BG 2 | Brooklyn | 2 |
| CT 439 BG 1 | Brooklyn | 1 |
| CT 439 BG 2 | Brooklyn | 1 |
| CT 439 BG 3 | Brooklyn | 1 |
| CT 440 BG 3 | Brooklyn | 2 |
| CT 441 BG 1 | Brooklyn | 1 |
| CT 441 BG 2 | Brooklyn | 1 |
| CT 441 BG 3 | Brooklyn | 3 |
| CT 442 BG 2 | Brooklyn | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 443 BG 1 | Brooklyn | 1 |
| CT 443 BG 2 | Brooklyn | 3 |
| CT 443 BG 3 | Brooklyn | 3 |
| CT 443 BG 4 | Brooklyn | 1 |
| CT 444 BG 3 | Brooklyn | 2 |
| CT 445 BG 1 | Brooklyn | 3 |
| CT 445 BG 2 | Brooklyn | 1 |
| CT 445 BG 3 | Brooklyn | 1 |
| CT 446 BG 1 | Brooklyn | 3 |
| CT 446 BG 2 | Brooklyn | 3 |
| CT 447 BG 1 | Brooklyn | 1 |
| CT 447 BG 2 | Brooklyn | 1 |
| CT 448 BG 2 | Brooklyn | 2 |
| CT 449 BG 1 | Brooklyn | 1 |
| CT 449 BG 2 | Brooklyn | 1 |
| CT 449 BG 4 | Brooklyn | 2 |
| CT 450 BG 1 | Brooklyn | 2 |
| CT 453 BG 1 | Brooklyn | 1 |
| CT 453 BG 2 | Brooklyn | 2 |
| CT 454 BG 1 | Brooklyn | 2 |
| CT 456 BG 1 | Brooklyn | 2 |
| CT 460 BG 2 | Brooklyn | 1 |
| CT 460 BG 3 | Brooklyn | 1 |
| CT 462.01 BG 1 | Brooklyn | 2 |
| CT 462.01 BG 2 | Brooklyn | 2 |
| CT 462.02 BG 1 | Brooklyn | 2 |
| CT 462.02 BG 2 | Brooklyn | 2 |
| CT 464 BG 1 | Brooklyn | 2 |
| CT 464 BG 2 | Brooklyn | 2 |
| CT 468 BG 1 | Brooklyn | 2 |
| CT 470 BG 1 | Brooklyn | 2 |
| CT 470 BG 2 | Brooklyn | 2 |
| CT 472 BG 1 | Brooklyn | 2 |
| CT 472 BG 2 | Brooklyn | 2 |
| CT 474 BG 1 | Brooklyn | 2 |
| CT 476 BG 1 | Brooklyn | 2 |
| CT 476 BG 2 | Brooklyn | 2 |
| CT 476 BG 3 | Brooklyn | 2 |
| CT 478 BG 1 | Brooklyn | 2 |
| CT 478 BG 3 | Brooklyn | 2 |
| CT 480 BG 1 | Brooklyn | 2 |
| CT 480 BG 2 | Brooklyn | 2 |
| CT 482 BG 1 | Brooklyn | 1 |
| CT 482 BG 2 | Brooklyn | 1 |
| CT 482 BG 3 | Brooklyn | 1 |
| CT 482 BG 4 | Brooklyn | 2 |
| CT 484 BG 1 | Brooklyn | 2 |
| CT 484 BG 2 | Brooklyn | 2 |
| CT 484 BG 3 | Brooklyn | 2 |
| CT 485 BG 1 | Brooklyn | 1 |
| CT 486 BG 1 | Brooklyn | 1 |
| CT 486 BG 2 | Brooklyn | 1 |
| CT 486 BG 3 | Brooklyn | 1 |
| CT 488 BG 2 | Brooklyn | 1 |
| CT 489 BG 1 | Brooklyn | 1 |
| CT 489 BG 2 | Brooklyn | 1 |
| CT 489 BG 3 | Brooklyn | 1 |
| CT 49 BG 1 | Brooklyn | 3 |
| CT 490 BG 1 | Brooklyn | 3 |
| CT 490 BG 3 | Brooklyn | 2 |
| CT 491 BG 1 | Brooklyn | 3 |
| CT 491 BG 2 | Brooklyn | 3 |
| CT 491 BG 3 | Brooklyn | 1 |
| CT 491 BG 4 | Brooklyn | 1 |
| CT 492 BG 1 | Brooklyn | 1 |
| CT 492 BG 2 | Brooklyn | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 492 BG 3 | Brooklyn | 2 |
| CT 493 BG 1 | Brooklyn | 1 |
| CT 493 BG 4 | Brooklyn | 1 |
| CT 493 BG 5 | Brooklyn | 1 |
| CT 494 BG 1 | Brooklyn | 3 |
| CT 494 BG 2 | Brooklyn | 1 |
| CT 494 BG 3 | Brooklyn | 2 |
| CT 495 BG 3 | Brooklyn | 3 |
| CT 496 BG 1 | Brooklyn | 1 |
| CT 496 BG 2 | Brooklyn | 3 |
| CT 496 BG 3 | Brooklyn | 3 |
| CT 498 BG 1 | Brooklyn | 3 |
| CT 498 BG 2 | Brooklyn | 3 |
| CT 498 BG 3 | Brooklyn | 3 |
| CT 500 BG 3 | Brooklyn | 3 |
| CT 503 BG 2 | Brooklyn | 1 |
| CT 504 BG 3 | Brooklyn | 1 |
| CT 505 BG 1 | Brooklyn | 1 |
| CT 505 BG 3 | Brooklyn | 1 |
| CT 506 BG 1 | Brooklyn | 1 |
| CT 506 BG 2 | Brooklyn | 3 |
| CT 506 BG 3 | Brooklyn | 1 |
| CT 506 BG 4 | Brooklyn | 3 |
| CT 507 BG 1 | Brooklyn | 2 |
| CT 508.01 BG 1 | Brooklyn | 3 |
| CT 508.01 BG 2 | Brooklyn | 1 |
| CT 508.03 BG 1 | Brooklyn | 1 |
| CT 508.04 BG 1 | Brooklyn | 3 |
| CT 508.04 BG 2 | Brooklyn | 3 |
| CT 508.04 BG 3 | Brooklyn | 1 |
| CT 509 BG 1 | Brooklyn | 2 |
| CT 509 BG 2 | Brooklyn | 2 |
| CT 510.01 BG 1 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 510.01 BG 2 | Brooklyn | 1 |
| CT 510.02 BG 1 | Brooklyn | 3 |
| CT 510.02 BG 2 | Brooklyn | 1 |
| CT 510.02 BG 3 | Brooklyn | 1 |
| CT 511 BG 1 | Brooklyn | 1 |
| CT 511 BG 3 | Brooklyn | 1 |
| CT 512 BG 1 | Brooklyn | 3 |
| CT 512 BG 2 | Brooklyn | 3 |
| CT 512 BG 3 | Brooklyn | 1 |
| CT 512 BG 4 | Brooklyn | 3 |
| CT 513 BG 2 | Brooklyn | 1 |
| CT 513 BG 3 | Brooklyn | 3 |
| CT 513 BG 4 | Brooklyn | 1 |
| CT 514 BG 1 | Brooklyn | 3 |
| CT 514 BG 2 | Brooklyn | 1 |
| CT 514 BG 3 | Brooklyn | 3 |
| CT 514 BG 4 | Brooklyn | 1 |
| CT 516.01 BG 1 | Brooklyn | 3 |
| CT 516.01 BG 2 | Brooklyn | 3 |
| CT 516.01 BG 3 | Brooklyn | 1 |
| CT 516.02 BG 1 | Brooklyn | 3 |
| CT 516.02 BG 2 | Brooklyn | 3 |
| CT 518 BG 1 | Brooklyn | 3 |
| CT 518 BG 2 | Brooklyn | 3 |
| CT 518 BG 3 | Brooklyn | 1 |
| CT 520 BG 1 | Brooklyn | 3 |
| CT 520 BG 2 | Brooklyn | 1 |
| CT 520 BG 3 | Brooklyn | 1 |
| CT 523 BG 1 | Brooklyn | 1 |
| CT 523 BG 2 | Brooklyn | 1 |
| CT 523 BG 3 | Brooklyn | 2 |
| CT 523 BG 4 | Brooklyn | 1 |
| CT 523 BG 5 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 525 BG 1 | Brooklyn | 2 |
| CT 525 BG 2 | Brooklyn | 2 |
| CT 526 BG 1 | Brooklyn | 3 |
| CT 526 BG 3 | Brooklyn | 1 |
| CT 527 BG 1 | Brooklyn | 3 |
| CT 527 BG 3 | Brooklyn | 1 |
| CT 527 BG 4 | Brooklyn | 1 |
| CT 527 BG 5 | Brooklyn | 3 |
| CT 527 BG 6 | Brooklyn | 3 |
| CT 527 BG 7 | Brooklyn | 1 |
| CT 528 BG 2 | Brooklyn | 3 |
| CT 529 BG 2 | Brooklyn | 2 |
| CT 529 BG 3 | Brooklyn | 2 |
| CT 53 BG 2 | Brooklyn | 3 |
| CT 530 BG 1 | Brooklyn | 1 |
| CT 530 BG 2 | Brooklyn | 2 |
| CT 530 BG 3 | Brooklyn | 2 |
| CT 531 BG 1 | Brooklyn | 2 |
| CT 531 BG 2 | Brooklyn | 2 |
| CT 531 BG 3 | Brooklyn | 2 |
| CT 531 BG 4 | Brooklyn | 2 |
| CT 532 BG 1 | Brooklyn | 3 |
| CT 533 BG 1 | Brooklyn | 2 |
| CT 533 BG 2 | Brooklyn | 2 |
| CT 533 BG 3 | Brooklyn | 2 |
| CT 533 BG 4 | Brooklyn | 2 |
| CT 533 BG 5 | Brooklyn | 2 |
| CT 534 BG 1 | Brooklyn | 2 |
| CT 534 BG 2 | Brooklyn | 2 |
| CT 534 BG 3 | Brooklyn | 2 |
| CT 534 BG 4 | Brooklyn | 1 |
| CT 535 BG 1 | Brooklyn | 2 |
| CT 535 BG 2 | Brooklyn | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 535 BG 3 | Brooklyn | 2 |
| CT 535 BG 4 | Brooklyn | 2 |
| CT 537 BG 1 | Brooklyn | 2 |
| CT 537 BG 2 | Brooklyn | 2 |
| CT 538 BG 1 | Brooklyn | 2 |
| CT 538 BG 3 | Brooklyn | 2 |
| CT 539 BG 1 | Brooklyn | 2 |
| CT 539 BG 2 | Brooklyn | 2 |
| CT 542 BG 1 | Brooklyn | 2 |
| CT 542 BG 2 | Brooklyn | 2 |
| CT 542 BG 3 | Brooklyn | 2 |
| CT 543 BG 2 | Brooklyn | 3 |
| CT 544 BG 1 | Brooklyn | 2 |
| CT 544 BG 2 | Brooklyn | 3 |
| CT 544 BG 3 | Brooklyn | 2 |
| CT 545 BG 1 | Brooklyn | 2 |
| CT 545 BG 2 | Brooklyn | 2 |
| CT 545 BG 3 | Brooklyn | 2 |
| CT 545 BG 5 | Brooklyn | 1 |
| CT 545 BG 6 | Brooklyn | 2 |
| CT 546 BG 2 | Brooklyn | 2 |
| CT 546 BG 3 | Brooklyn | 2 |
| CT 547 BG 1 | Brooklyn | 2 |
| CT 547 BG 2 | Brooklyn | 2 |
| CT 547 BG 3 | Brooklyn | 2 |
| CT 551 BG 1 | Brooklyn | 3 |
| CT 551 BG 2 | Brooklyn | 1 |
| CT 551 BG 4 | Brooklyn | 3 |
| CT 552 BG 2 | Brooklyn | 2 |
| CT 553 BG 2 | Brooklyn | 3 |
| CT 554 BG 1 | Brooklyn | 2 |
| CT 554 BG 2 | Brooklyn | 2 |
| CT 554 BG 3 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 556 BG 1 | Brooklyn | 2 |
| CT 556 BG 2 | Brooklyn | 2 |
| CT 556 BG 3 | Brooklyn | 3 |
| CT 560 BG 2 | Brooklyn | 2 |
| CT 562 BG 2 | Brooklyn | 2 |
| CT 563 BG 2 | Brooklyn | 2 |
| CT 566 BG 1 | Brooklyn | 3 |
| CT 566 BG 2 | Brooklyn | 3 |
| CT 570 BG 4 | Brooklyn | 3 |
| CT 572 BG 1 | Brooklyn | 1 |
| CT 572 BG 2 | Brooklyn | 1 |
| CT 574 BG 1 | Brooklyn | 3 |
| CT 574 BG 2 | Brooklyn | 3 |
| CT 576 BG 1 | Brooklyn | 3 |
| CT 576 BG 2 | Brooklyn | 3 |
| CT 578 BG 1 | Brooklyn | 1 |
| CT 578 BG 2 | Brooklyn | 3 |
| CT 579 BG 1 | Brooklyn | 3 |
| CT 579 BG 2 | Brooklyn | 1 |
| CT 58 BG 3 | Brooklyn | 1 |
| CT 580 BG 1 | Brooklyn | 1 |
| CT 580 BG 2 | Brooklyn | 3 |
| CT 582 BG 1 | Brooklyn | 3 |
| CT 582 BG 2 | Brooklyn | 1 |
| CT 582 BG 3 | Brooklyn | 2 |
| CT 586 BG 1 | Brooklyn | 1 |
| CT 586 BG 2 | Brooklyn | 3 |
| CT 590 BG 1 | Brooklyn | 1 |
| CT 592 BG 2 | Brooklyn | 3 |
| CT 594.01 BG 1 | Brooklyn | 3 |
| CT 594.01 BG 2 | Brooklyn | 2 |
| CT 594.01 BG 4 | Brooklyn | 3 |
| CT 594.01 BG 5 | Brooklyn | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 598 BG 1 | Brooklyn | 2 |
| CT 60 BG 1 | Brooklyn | 3 |
| CT 60 BG 2 | Brooklyn | 3 |
| CT 606 BG 2 | Brooklyn | 3 |
| CT 608 BG 1 | Brooklyn | 2 |
| CT 608 BG 2 | Brooklyn | 2 |
| CT 610.03 BG 1 | Brooklyn | 3 |
| CT 610.03 BG 2 | Brooklyn | 1 |
| CT 610.04 BG 1 | Brooklyn | 2 |
| CT 610.04 BG 2 | Brooklyn | 2 |
| CT 610.04 BG 4 | Brooklyn | 2 |
| CT 610.04 BG 5 | Brooklyn | 2 |
| CT 62 BG 2 | Brooklyn | 2 |
| CT 626 BG 1 | Brooklyn | 3 |
| CT 626 BG 2 | Brooklyn | 1 |
| CT 650 BG 1 | Brooklyn | 3 |
| CT 650 BG 2 | Brooklyn | 1 |
| CT 66 BG 2 | Brooklyn | 2 |
| CT 670 BG 1 | Brooklyn | 3 |
| CT 670 BG 2 | Brooklyn | 3 |
| CT 672 BG 1 | Brooklyn | 3 |
| CT 674 BG 1 | Brooklyn | 1 |
| CT 674 BG 2 | Brooklyn | 3 |
| CT 676 BG 1 | Brooklyn | 3 |
| CT 676 BG 2 | Brooklyn | 3 |
| CT 678 BG 1 | Brooklyn | 3 |
| CT 678 BG 2 | Brooklyn | 3 |
| CT 68 BG 1 | Brooklyn | 1 |
| CT 68 BG 2 | Brooklyn | 2 |
| CT 68 BG 4 | Brooklyn | 1 |
| CT 680 BG 1 | Brooklyn | 3 |
| CT 680 BG 2 | Brooklyn | 3 |
| CT 682 BG 1 | Brooklyn | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 682 BG 2 | Brooklyn | 3 |
| CT 686 BG 1 | Brooklyn | 3 |
| CT 688 BG 1 | Brooklyn | 3 |
| CT 688 BG 2 | Brooklyn | 3 |
| CT 690 BG 1 | Brooklyn | 3 |
| CT 690 BG 2 | Brooklyn | 3 |
| CT 692 BG 1 | Brooklyn | 3 |
| CT 692 BG 2 | Brooklyn | 3 |
| CT 696.01 BG 2 | Brooklyn | 3 |
| CT 696.02 BG 2 | Brooklyn | 3 |
| CT 70 BG 1 | Brooklyn | 3 |
| CT 71 BG 2 | Brooklyn | 3 |
| CT 71 BG 3 | Brooklyn | 1 |
| CT 71 BG 4 | Brooklyn | 1 |
| CT 72 BG 1 | Brooklyn | 1 |
| CT 720 BG 1 | Brooklyn | 3 |
| CT 722 BG 1 | Brooklyn | 3 |
| CT 722 BG 2 | Brooklyn | 3 |
| CT 724 BG 1 | Brooklyn | 3 |
| CT 724 BG 2 | Brooklyn | 3 |
| CT 726 BG 1 | Brooklyn | 3 |
| CT 728 BG 1 | Brooklyn | 3 |
| CT 728 BG 2 | Brooklyn | 3 |
| CT 730 BG 1 | Brooklyn | 3 |
| CT 730 BG 2 | Brooklyn | 3 |
| CT 732 BG 1 | Brooklyn | 3 |
| CT 732 BG 2 | Brooklyn | 3 |
| CT 734 BG 1 | Brooklyn | 3 |
| CT 734 BG 2 | Brooklyn | 3 |
| CT 736 BG 1 | Brooklyn | 1 |
| CT 736 BG 2 | Brooklyn | 3 |
| CT 736 BG 3 | Brooklyn | 1 |
| CT 738 BG 1 | Brooklyn | 1 |
| CT 738 BG 2 | Brooklyn | 3 |
| CT 738 BG 3 | Brooklyn | 1 |
| CT 74 BG 1 | Brooklyn | 1 |
| CT 74 BG 2 | Brooklyn | 1 |
| CT 74 BG 3 | Brooklyn | 1 |
| CT 74 BG 4 | Brooklyn | 1 |
| CT 740 BG 1 | Brooklyn | 3 |
| CT 740 BG 2 | Brooklyn | 3 |
| CT 742 BG 1 | Brooklyn | 3 |
| CT 742 BG 2 | Brooklyn | 3 |
| CT 76 BG 1 | Brooklyn | 1 |
| CT 76 BG 2 | Brooklyn | 1 |
| CT 76 BG 3 | Brooklyn | 1 |
| CT 762 BG 1 | Brooklyn | 1 |
| CT 762 BG 2 | Brooklyn | 1 |
| CT 762 BG 3 | Brooklyn | 2 |
| CT 764 BG 1 | Brooklyn | 3 |
| CT 764 BG 2 | Brooklyn | 1 |
| CT 764 BG 3 | Brooklyn | 3 |
| CT 766 BG 1 | Brooklyn | 3 |
| CT 768 BG 1 | Brooklyn | 2 |
| CT 768 BG 2 | Brooklyn | 2 |
| CT 770 BG 1 | Brooklyn | 3 |
| CT 770 BG 2 | Brooklyn | 1 |
| CT 772 BG 1 | Brooklyn | 3 |
| CT 774 BG 1 | Brooklyn | 1 |
| CT 774 BG 2 | Brooklyn | 3 |
| CT 776 BG 1 | Brooklyn | 3 |
| CT 776 BG 2 | Brooklyn | 3 |
| CT 776 BG 3 | Brooklyn | 3 |
| CT 78 BG 1 | Brooklyn | 1 |
| CT 78 BG 2 | Brooklyn | 1 |
| CT 78 BG 3 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 78 BG 4 | Brooklyn | 1 |
| CT 780 BG 1 | Brooklyn | 3 |
| CT 780 BG 2 | Brooklyn | 3 |
| CT 782 BG 1 | Brooklyn | 3 |
| CT 782 BG 2 | Brooklyn | 1 |
| CT 784 BG 1 | Brooklyn | 3 |
| CT 784 BG 2 | Brooklyn | 3 |
| CT 786 BG 1 | Brooklyn | 1 |
| CT 786 BG 2 | Brooklyn | 1 |
| CT 786 BG 3 | Brooklyn | 3 |
| CT 788 BG 1 | Brooklyn | 1 |
| CT 788 BG 2 | Brooklyn | 1 |
| CT 788 BG 3 | Brooklyn | 3 |
| CT 790 BG 1 | Brooklyn | 3 |
| CT 790 BG 2 | Brooklyn | 1 |
| CT 790 BG 3 | Brooklyn | 3 |
| CT 790 BG 4 | Brooklyn | 3 |
| CT 792 BG 1 | Brooklyn | 1 |
| CT 792 BG 2 | Brooklyn | 3 |
| CT 792 BG 3 | Brooklyn | 1 |
| CT 794 BG 1 | Brooklyn | 1 |
| CT 794 BG 2 | Brooklyn | 1 |
| CT 796.01 BG 1 | Brooklyn | 3 |
| CT 796.01 BG 2 | Brooklyn | 3 |
| CT 796.02 BG 1 | Brooklyn | 1 |
| CT 796.02 BG 2 | Brooklyn | 3 |
| CT 798.01 BG 1 | Brooklyn | 3 |
| CT 798.01 BG 2 | Brooklyn | 3 |
| CT 798.02 BG 1 | Brooklyn | 1 |
| CT 798.02 BG 2 | Brooklyn | 3 |
| CT 798.02 BG 3 | Brooklyn | 3 |
| CT 80 BG 1 | Brooklyn | 3 |
| CT 80 BG 2 | Brooklyn | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 80 BG 3 | Brooklyn | 1 |
| CT 800 BG 1 | Brooklyn | 3 |
| CT 800 BG 2 | Brooklyn | 3 |
| CT 800 BG 3 | Brooklyn | 3 |
| CT 802 BG 1 | Brooklyn | 1 |
| CT 802 BG 2 | Brooklyn | 3 |
| CT 802 BG 3 | Brooklyn | 3 |
| CT 804 BG 1 | Brooklyn | 1 |
| CT 804 BG 2 | Brooklyn | 3 |
| CT 804 BG 3 | Brooklyn | 3 |
| CT 806 BG 1 | Brooklyn | 1 |
| CT 806 BG 2 | Brooklyn | 3 |
| CT 808 BG 1 | Brooklyn | 1 |
| CT 810 BG 1 | Brooklyn | 3 |
| CT 810 BG 2 | Brooklyn | 1 |
| CT 814 BG 1 | Brooklyn | 1 |
| CT 814 BG 2 | Brooklyn | 3 |
| CT 816 BG 1 | Brooklyn | 3 |
| CT 816 BG 2 | Brooklyn | 1 |
| CT 818 BG 1 | Brooklyn | 3 |
| CT 818 BG 2 | Brooklyn | 3 |
| CT 818 BG 3 | Brooklyn | 3 |
| CT 82 BG 1 | Brooklyn | 3 |
| CT 82 BG 2 | Brooklyn | 1 |
| CT 82 BG 3 | Brooklyn | 1 |
| CT 820 BG 1 | Brooklyn | 1 |
| CT 820 BG 2 | Brooklyn | 1 |
| CT 820 BG 3 | Brooklyn | 1 |
| CT 822 BG 1 | Brooklyn | 3 |
| CT 822 BG 2 | Brooklyn | 1 |
| CT 822 BG 3 | Brooklyn | 1 |
| CT 822 BG 4 | Brooklyn | 1 |
| CT 824 BG 1 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 824 BG 2 | Brooklyn | 3 |
| CT 824 BG 3 | Brooklyn | 3 |
| CT 824 BG 4 | Brooklyn | 3 |
| CT 826 BG 1 | Brooklyn | 3 |
| CT 826 BG 2 | Brooklyn | 3 |
| CT 826 BG 3 | Brooklyn | 3 |
| CT 826 BG 4 | Brooklyn | 3 |
| CT 828 BG 1 | Brooklyn | 1 |
| CT 828 BG 2 | Brooklyn | 3 |
| CT 828 BG 3 | Brooklyn | 3 |
| CT 830 BG 1 | Brooklyn | 3 |
| CT 830 BG 2 | Brooklyn | 3 |
| CT 830 BG 3 | Brooklyn | 3 |
| CT 830 BG 4 | Brooklyn | 1 |
| CT 832 BG 1 | Brooklyn | 3 |
| CT 832 BG 2 | Brooklyn | 3 |
| CT 834 BG 1 | Brooklyn | 3 |
| CT 834 BG 2 | Brooklyn | 3 |
| CT 836 BG 1 | Brooklyn | 3 |
| CT 836 BG 2 | Brooklyn | 3 |
| CT 838 BG 1 | Brooklyn | 3 |
| CT 838 BG 2 | Brooklyn | 3 |
| CT 84 BG 1 | Brooklyn | 1 |
| CT 84 BG 2 | Brooklyn | 1 |
| CT 84 BG 3 | Brooklyn | 1 |
| CT 840 BG 1 | Brooklyn | 3 |
| CT 840 BG 2 | Brooklyn | 3 |
| CT 846 BG 1 | Brooklyn | 3 |
| CT 846 BG 2 | Brooklyn | 3 |
| CT 848 BG 1 | Brooklyn | 3 |
| CT 848 BG 2 | Brooklyn | 3 |
| CT 85 BG 1 | Brooklyn | 1 |
| CT 85 BG 2 | Brooklyn | 1 |
| CT 85 BG 3 | Brooklyn | 1 |
| CT 850 BG 1 | Brooklyn | 3 |
| CT 854 BG 1 | Brooklyn | 1 |
| CT 854 BG 2 | Brooklyn | 3 |
| CT 856 BG 1 | Brooklyn | 3 |
| CT 856 BG 2 | Brooklyn | 3 |
| CT 856 BG 3 | Brooklyn | 3 |
| CT 858 BG 1 | Brooklyn | 3 |
| CT 858 BG 2 | Brooklyn | 3 |
| CT 860 BG 1 | Brooklyn | 1 |
| CT 860 BG 2 | Brooklyn | 3 |
| CT 860 BG 3 | Brooklyn | 3 |
| CT 862 BG 1 | Brooklyn | 3 |
| CT 862 BG 2 | Brooklyn | 1 |
| CT 862 BG 3 | Brooklyn | 1 |
| CT 864 BG 1 | Brooklyn | 3 |
| CT 864 BG 2 | Brooklyn | 3 |
| CT 866 BG 1 | Brooklyn | 3 |
| CT 866 BG 2 | Brooklyn | 1 |
| CT 866 BG 3 | Brooklyn | 3 |
| CT 868 BG 1 | Brooklyn | 3 |
| CT 868 BG 2 | Brooklyn | 1 |
| CT 868 BG 3 | Brooklyn | 1 |
| CT 870 BG 1 | Brooklyn | 1 |
| CT 870 BG 2 | Brooklyn | 1 |
| CT 870 BG 3 | Brooklyn | 3 |
| CT 872 BG 1 | Brooklyn | 1 |
| CT 872 BG 2 | Brooklyn | 3 |
| CT 872 BG 3 | Brooklyn | 1 |
| CT 874.01 BG 1 | Brooklyn | 1 |
| CT 874.01 BG 2 | Brooklyn | 1 |
| CT 876 BG 1 | Brooklyn | 1 |
| CT 876 BG 2 | Brooklyn | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 878 BG 1 | Brooklyn | 1 |
| CT 878 BG 2 | Brooklyn | 3 |
| CT 878 BG 3 | Brooklyn | 3 |
| CT 88 BG 1 | Brooklyn | 3 |
| CT 88 BG 2 | Brooklyn | 3 |
| CT 880 BG 1 | Brooklyn | 3 |
| CT 880 BG 2 | Brooklyn | 3 |
| CT 880 BG 3 | Brooklyn | 3 |
| CT 882 BG 1 | Brooklyn | 3 |
| CT 882 BG 2 | Brooklyn | 3 |
| CT 882 BG 3 | Brooklyn | 3 |
| CT 882 BG 4 | Brooklyn | 3 |
| CT 884 BG 1 | Brooklyn | 1 |
| CT 884 BG 2 | Brooklyn | 3 |
| CT 884 BG 3 | Brooklyn | 1 |
| CT 886 BG 1 | Brooklyn | 1 |
| CT 886 BG 2 | Brooklyn | 1 |
| CT 886 BG 3 | Brooklyn | 1 |
| CT 888 BG 1 | Brooklyn | 1 |
| CT 888 BG 2 | Brooklyn | 3 |
| CT 888 BG 3 | Brooklyn | 1 |
| CT 890 BG 1 | Brooklyn | 1 |
| CT 890 BG 2 | Brooklyn | 1 |
| CT 890 BG 3 | Brooklyn | 1 |
| CT 890 BG 4 | Brooklyn | 1 |
| CT 890 BG 5 | Brooklyn | 3 |
| CT 890 BG 6 | Brooklyn | 1 |
| CT 892 BG 1 | Brooklyn | 3 |
| CT 892 BG 2 | Brooklyn | 1 |
| CT 892 BG 3 | Brooklyn | 1 |
| CT 892 BG 4 | Brooklyn | 1 |
| CT 894 BG 1 | Brooklyn | 3 |
| CT 894 BG 2 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 894 BG 3 | Brooklyn | 1 |
| CT 894 BG 4 | Brooklyn | 1 |
| CT 896 BG 1 | Brooklyn | 3 |
| CT 896 BG 2 | Brooklyn | 3 |
| CT 896 BG 3 | Brooklyn | 1 |
| CT 898 BG 1 | Brooklyn | 3 |
| CT 898 BG 2 | Brooklyn | 1 |
| CT 90 BG 1 | Brooklyn | 1 |
| CT 90 BG 2 | Brooklyn | 1 |
| CT 900 BG 1 | Brooklyn | 3 |
| CT 900 BG 2 | Brooklyn | 1 |
| CT 900 BG 3 | Brooklyn | 1 |
| CT 900 BG 4 | Brooklyn | 1 |
| CT 900 BG 5 | Brooklyn | 1 |
| CT 900 BG 6 | Brooklyn | 1 |
| CT 900 BG 7 | Brooklyn | 1 |
| CT 902 BG 1 | Brooklyn | 1 |
| CT 902 BG 2 | Brooklyn | 1 |
| CT 902 BG 3 | Brooklyn | 1 |
| CT 902 BG 4 | Brooklyn | 3 |
| CT 902 BG 5 | Brooklyn | 1 |
| CT 906 BG 1 | Brooklyn | 1 |
| CT 906 BG 2 | Brooklyn | 1 |
| CT 906 BG 3 | Brooklyn | 1 |
| CT 908 BG 1 | Brooklyn | 1 |
| CT 908 BG 2 | Brooklyn | 1 |
| CT 908 BG 3 | Brooklyn | 1 |
| CT 910 BG 1 | Brooklyn | 1 |
| CT 910 BG 2 | Brooklyn | 1 |
| CT 910 BG 3 | Brooklyn | 1 |
| CT 910 BG 4 | Brooklyn | 1 |
| CT 912 BG 1 | Brooklyn | 1 |
| CT 912 BG 2 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 912 BG 3 | Brooklyn | 1 |
| CT 916 BG 1 | Brooklyn | 1 |
| CT 916 BG 2 | Brooklyn | 1 |
| CT 916 BG 3 | Brooklyn | 3 |
| CT 916 BG 4 | Brooklyn | 1 |
| CT 918 BG 1 | Brooklyn | 1 |
| CT 918 BG 2 | Brooklyn | 3 |
| CT 92 BG 1 | Brooklyn | 1 |
| CT 92 BG 2 | Brooklyn | 1 |
| CT 92 BG 3 | Brooklyn | 1 |
| CT 920 BG 1 | Brooklyn | 1 |
| CT 920 BG 2 | Brooklyn | 1 |
| CT 920 BG 3 | Brooklyn | 3 |
| CT 922 BG 1 | Brooklyn | 3 |
| CT 922 BG 2 | Brooklyn | 1 |
| CT 924 BG 1 | Brooklyn | 1 |
| CT 924 BG 2 | Brooklyn | 1 |
| CT 924 BG 3 | Brooklyn | 1 |
| CT 928 BG 1 | Brooklyn | 3 |
| CT 928 BG 2 | Brooklyn | 3 |
| CT 930 BG 1 | Brooklyn | 3 |
| CT 930 BG 2 | Brooklyn | 3 |
| CT 932 BG 1 | Brooklyn | 3 |
| CT 934 BG 1 | Brooklyn | 3 |
| CT 934 BG 2 | Brooklyn | 3 |
| CT 936 BG 1 | Brooklyn | 3 |
| CT 936 BG 2 | Brooklyn | 3 |
| CT 938 BG 1 | Brooklyn | 3 |
| CT 938 BG 2 | Brooklyn | 3 |
| CT 94 BG 1 | Brooklyn | 1 |
| CT 94 BG 2 | Brooklyn | 1 |
| CT 94 BG 3 | Brooklyn | 1 |
| CT 944.01 BG 1 | Brooklyn | 3 |
| CT 944.01 BG 2 | Brooklyn | 3 |
| CT 944.01 BG 3 | Brooklyn | 3 |
| CT 944.01 BG 4 | Brooklyn | 3 |
| CT 944.02 BG 1 | Brooklyn | 1 |
| CT 946 BG 1 | Brooklyn | 3 |
| CT 946 BG 2 | Brooklyn | 3 |
| CT 946 BG 3 | Brooklyn | 3 |
| CT 950 BG 1 | Brooklyn | 3 |
| CT 950 BG 2 | Brooklyn | 3 |
| CT 954 BG 1 | Brooklyn | 3 |
| CT 954 BG 2 | Brooklyn | 3 |
| CT 954 BG 3 | Brooklyn | 3 |
| CT 956 BG 1 | Brooklyn | 3 |
| CT 956 BG 2 | Brooklyn | 3 |
| CT 958 BG 1 | Brooklyn | 3 |
| CT 958 BG 2 | Brooklyn | 3 |
| CT 96 BG 1 | Brooklyn | 1 |
| CT 96 BG 2 | Brooklyn | 1 |
| CT 96 BG 3 | Brooklyn | 1 |
| CT 96 BG 4 | Brooklyn | 1 |
| CT 962 BG 1 | Brooklyn | 3 |
| CT 964 BG 1 | Brooklyn | 3 |
| CT 964 BG 2 | Brooklyn | 3 |
| CT 966 BG 1 | Brooklyn | 3 |
| CT 966 BG 2 | Brooklyn | 3 |
| CT 968 BG 1 | Brooklyn | 3 |
| CT 968 BG 2 | Brooklyn | 3 |
| CT 970 BG 1 | Brooklyn | 3 |
| CT 970 BG 2 | Brooklyn | 3 |
| CT 974 BG 1 | Brooklyn | 1 |
| CT 974 BG 2 | Brooklyn | 3 |
| CT 98 BG 1 | Brooklyn | 1 |
| CT 98 BG 2 | Brooklyn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 98 BG 3 | Brooklyn | 1 |
| CT 98 BG 4 | Brooklyn | 1 |
| CT 982 BG 1 | Brooklyn | 1 |
| CT 982 BG 2 | Brooklyn | 1 |
| CT 984 BG 1 | Brooklyn | 3 |
| CT 986 BG 1 | Brooklyn | 3 |
| CT 986 BG 2 | Brooklyn | 3 |
| CT 988 BG 1 | Brooklyn | 3 |
| CT 988 BG 2 | Brooklyn | 3 |
| CT 990 BG 1 | Brooklyn | 3 |
| CT 992 BG 1 | Brooklyn | 3 |
| CT 994 BG 1 | Brooklyn | 3 |
| CT 996 BG 1 | Brooklyn | 3 |
| CT 996 BG 2 | Brooklyn | 3 |
| CT 998 BG 1 | Brooklyn | 3 |
| CT 998 BG 2 | Brooklyn | 3 |

### Table G-EJ17. Census Tracts (CT) and Block Groups (BG) in Richmond County, New York (County ID 36-085) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 105 BG 1 | Staten Island | 1 |
| CT 105 BG 4 | Staten Island | 1 |
| CT 105 BG 5 | Staten Island | 3 |
| CT 11 BG 1 | Staten Island | 1 |
| CT 11 BG 2 | Staten Island | 1 |
| CT 11 BG 3 | Staten Island | 1 |
| CT 112.01 BG 2 | Staten Island | 2 |
| CT 112.02 BG 2 | Staten Island | 1 |
| CT 112.02 BG 3 | Staten Island | 3 |
| CT 112.02 BG 4 | Staten Island | 1 |
| CT 114.01 BG 2 | Staten Island | 1 |
| CT 121 BG 2 | Staten Island | 1 |
| CT 125 BG 1 | Staten Island | 1 |
| CT 125 BG 2 | Staten Island | 1 |
| CT 128.04 BG 2 | Staten Island | 2 |
| CT 128.05 BG 1 | Staten Island | 2 |
| CT 128.06 BG 2 | Staten Island | 2 |
| CT 128.06 BG 3 | Staten Island | 1 |
| CT 132.03 BG 2 | Staten Island | 1 |
| CT 132.04 BG 3 | Staten Island | 2 |
| CT 133.01 BG 1 | Staten Island | 1 |
| CT 133.02 BG 1 | Staten Island | 1 |
| CT 133.02 BG 2 | Staten Island | 1 |
| CT 133.02 BG 3 | Staten Island | 1 |
| CT 134 BG 1 | Staten Island | 1 |
| CT 138 BG 3 | Staten Island | 2 |
| CT 138 BG 4 | Staten Island | 2 |
| CT 141 BG 1 | Staten Island | 3 |
| CT 141 BG 2 | Staten Island | 3 |
| CT 146.04 BG 2 | Staten Island | 2 |
| CT 151 BG 1 | Staten Island | 1 |
| CT 151 BG 2 | Staten Island | 2 |
| CT 151 BG 3 | Staten Island | 3 |
| CT 156.02 BG 1 | Staten Island | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 156.03 BG 1 | Staten Island | 2 |
| CT 156.03 BG 2 | Staten Island | 2 |
| CT 169.01 BG 2 | Staten Island | 2 |
| CT 17 BG 1 | Staten Island | 1 |
| CT 17 BG 2 | Staten Island | 1 |
| CT 170.07 BG 2 | Staten Island | 3 |
| CT 170.09 BG 1 | Staten Island | 2 |
| CT 170.1 BG 2 | Staten Island | 2 |
| CT 170.1 BG 3 | Staten Island | 2 |
| CT 170.12 BG 3 | Staten Island | 2 |
| CT 173 BG 1 | Staten Island | 3 |
| CT 173 BG 2 | Staten Island | 1 |
| CT 176 BG 3 | Staten Island | 2 |
| CT 181 BG 1 | Staten Island | 2 |
| CT 187.01 BG 1 | Staten Island | 3 |
| CT 187.02 BG 1 | Staten Island | 3 |
| CT 187.02 BG 3 | Staten Island | 3 |
| CT 187.02 BG 4 | Staten Island | 1 |
| CT 189.01 BG 2 | Staten Island | 2 |
| CT 189.02 BG 1 | Staten Island | 1 |
| CT 189.02 BG 3 | Staten Island | 1 |
| CT 198 BG 4 | Staten Island | 2 |
| CT 20.01 BG 1 | Staten Island | 1 |
| CT 20.02 BG 2 | Staten Island | 2 |
| CT 201 BG 1 | Staten Island | 3 |
| CT 201 BG 2 | Staten Island | 3 |
| CT 207 BG 1 | Staten Island | 1 |
| CT 207 BG 2 | Staten Island | 1 |
| CT 207 BG 3 | Staten Island | 3 |
| CT 207 BG 4 | Staten Island | 1 |
| CT 208.01 BG 1 | Staten Island | 2 |
| CT 208.01 BG 3 | Staten Island | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 208.03 BG 1 | Staten Island | 2 |
| CT 21 BG 1 | Staten Island | 1 |
| CT 21 BG 2 | Staten Island | 3 |
| CT 21 BG 3 | Staten Island | 1 |
| CT 213 BG 1 | Staten Island | 1 |
| CT 213 BG 2 | Staten Island | 1 |
| CT 213 BG 3 | Staten Island | 1 |
| CT 213 BG 4 | Staten Island | 1 |
| CT 213 BG 5 | Staten Island | 1 |
| CT 223 BG 1 | Staten Island | 1 |
| CT 223 BG 2 | Staten Island | 1 |
| CT 226 BG 1 | Staten Island | 2 |
| CT 231 BG 1 | Staten Island | 1 |
| CT 231 BG 2 | Staten Island | 1 |
| CT 239 BG 1 | Staten Island | 1 |
| CT 239 BG 2 | Staten Island | 1 |
| CT 247 BG 1 | Staten Island | 1 |
| CT 247 BG 2 | Staten Island | 3 |
| CT 248 BG 3 | Staten Island | 2 |
| CT 27 BG 1 | Staten Island | 1 |
| CT 273.01 BG 1 | Staten Island | 1 |
| CT 273.01 BG 2 | Staten Island | 3 |
| CT 273.02 BG 2 | Staten Island | 2 |
| CT 277.02 BG 2 | Staten Island | 1 |
| CT 277.02 BG 3 | Staten Island | 3 |
| CT 277.05 BG 1 | Staten Island | 2 |
| CT 277.05 BG 2 | Staten Island | 2 |
| CT 277.06 BG 1 | Staten Island | 3 |
| CT 277.06 BG 2 | Staten Island | 1 |
| CT 277.06 BG 3 | Staten Island | 3 |
| CT 29 BG 1 | Staten Island | 1 |
| CT 29 BG 2 | Staten Island | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 29 BG 3 | Staten Island | 1 |
| CT 29 BG 4 | Staten Island | 3 |
| CT 291.02 BG 1 | Staten Island | 3 |
| CT 291.02 BG 2 | Staten Island | 3 |
| CT 291.03 BG 1 | Staten Island | 2 |
| CT 291.03 BG 3 | Staten Island | 1 |
| CT 291.04 BG 1 | Staten Island | 3 |
| CT 291.04 BG 4 | Staten Island | 1 |
| CT 3 BG 1 | Staten Island | 1 |
| CT 3 BG 2 | Staten Island | 1 |
| CT 303.01 BG 1 | Staten Island | 3 |
| CT 303.01 BG 2 | Staten Island | 3 |
| CT 303.02 BG 1 | Staten Island | 3 |
| CT 303.02 BG 2 | Staten Island | 3 |
| CT 303.02 BG 3 | Staten Island | 1 |
| CT 303.02 BG 4 | Staten Island | 3 |
| CT 319.01 BG 1 | Staten Island | 1 |
| CT 319.01 BG 2 | Staten Island | 3 |
| CT 319.02 BG 1 | Staten Island | 1 |
| CT 319.02 BG 2 | Staten Island | 1 |
| CT 319.02 BG 3 | Staten Island | 1 |
| CT 323 BG 1 | Staten Island | 1 |
| CT 33 BG 1 | Staten Island | 1 |
| CT 33 BG 2 | Staten Island | 3 |
| CT 36 BG 1 | Staten Island | 3 |
| CT 36 BG 2 | Staten Island | 1 |
| CT 39 BG 1 | Staten Island | 2 |
| CT 39 BG 2 | Staten Island | 3 |
| CT 40 BG 1 | Staten Island | 1 |
| CT 40 BG 2 | Staten Island | 1 |
| CT 40 BG 3 | Staten Island | 1 |
| CT 40 BG 4 | Staten Island | 3 |
| CT 40 BG 5 | Staten Island | 3 |
| CT 40 BG 6 | Staten Island | 1 |
| CT 40 BG 7 | Staten Island | 1 |
| CT 50 BG 2 | Staten Island | 1 |
| CT 50 BG 3 | Staten Island | 1 |
| CT 59 BG 1 | Staten Island | 2 |
| CT 59 BG 2 | Staten Island | 2 |
| CT 6 BG 1 | Staten Island | 1 |
| CT 6 BG 2 | Staten Island | 1 |
| CT 64 BG 2 | Staten Island | 2 |
| CT 64 BG 3 | Staten Island | 1 |
| CT 7 BG 1 | Staten Island | 1 |
| CT 7 BG 2 | Staten Island | 1 |
| CT 7 BG 3 | Staten Island | 1 |
| CT 7 BG 4 | Staten Island | 1 |
| CT 70 BG 1 | Staten Island | 2 |
| CT 70 BG 2 | Staten Island | 3 |
| CT 70 BG 3 | Staten Island | 2 |
| CT 74 BG 1 | Staten Island | 1 |
| CT 74 BG 2 | Staten Island | 1 |
| CT 75 BG 1 | Staten Island | 1 |
| CT 75 BG 2 | Staten Island | 3 |
| CT 75 BG 3 | Staten Island | 1 |
| CT 77 BG 1 | Staten Island | 1 |
| CT 8 BG 1 | Staten Island | 1 |
| CT 8 BG 2 | Staten Island | 1 |
| CT 8 BG 3 | Staten Island | 3 |
| CT 81 BG 1 | Staten Island | 1 |
| CT 81 BG 2 | Staten Island | 3 |
| CT 81 BG 3 | Staten Island | 1 |
| CT 9 BG 1 | Staten Island | 1 |
| CT 9 BG 2 | Staten Island | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 97 BG 1 | Staten Island | 1 |
| CT 97 BG 2 | Staten Island | 3 |
| CT 97 BG 3 | Staten Island | 3 |

**Table G-EJ18. Census Tracts (CT) and Block Groups (BG) in Hudson County, New Jersey (County ID 34-017) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1 BG 1 | Jersey City | 1 |
| CT 1 BG 2 | Jersey City | 1 |
| CT 1 BG 3 | Jersey City | 3 |
| CT 10 BG 1 | Jersey City | 3 |
| CT 10 BG 2 | Jersey City | 1 |
| CT 101 BG 1 | Bayonne | 1 |
| CT 101 BG 2 | Bayonne | 1 |
| CT 101 BG 3 | Bayonne | 1 |
| CT 101 BG 4 | Bayonne | 3 |
| CT 102 BG 3 | Bayonne | 1 |
| CT 103 BG 1 | Bayonne | 2 |
| CT 103 BG 2 | Bayonne | 2 |
| CT 103 BG 3 | Bayonne | 1 |
| CT 104 BG 1 | Bayonne | 3 |
| CT 104 BG 2 | Bayonne | 3 |
| CT 104 BG 3 | Bayonne | 3 |
| CT 105 BG 1 | Bayonne | 3 |
| CT 105 BG 2 | Bayonne | 2 |
| CT 105 BG 4 | Bayonne | 3 |
| CT 106 BG 2 | Bayonne | 1 |
| CT 106 BG 3 | Bayonne | 1 |
| CT 106 BG 4 | Bayonne | 1 |
| CT 107 BG 2 | Bayonne | 1 |
| CT 107 BG 3 | Bayonne | 2 |
| CT 108 BG 1 | Bayonne | 3 |
| CT 108 BG 2 | Bayonne | 3 |
| CT 108 BG 3 | Bayonne | 2 |
| CT 109 BG 1 | Bayonne | 1 |
| CT 11 BG 1 | Jersey City | 3 |
| CT 11 BG 2 | Jersey City | 3 |
| CT 11 BG 3 | Jersey City | 3 |
| CT 110 BG 1 | Bayonne | 1 |
| CT 111 BG 1 | Bayonne | 1 |
| CT 111 BG 2 | Bayonne | 1 |
| CT 111 BG 3 | Bayonne | 1 |
| CT 112 BG 1 | Bayonne | 2 |
| CT 112 BG 2 | Bayonne | 3 |
| CT 113 BG 1 | Bayonne | 1 |
| CT 113 BG 2 | Bayonne | 1 |
| CT 113 BG 3 | Bayonne | 3 |
| CT 114 BG 1 | Bayonne | 3 |
| CT 115 BG 1 | Bayonne | 3 |
| CT 116 BG 1 | Bayonne | 2 |
| CT 116 BG 2 | Bayonne | 3 |
| CT 116 BG 4 | Bayonne | 3 |
| CT 12.01 BG 1 | Jersey City | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 12.02 BG 1 | Jersey City | 1 |
| CT 123 BG 1 | Kearny | 3 |
| CT 123 BG 2 | Kearny | 1 |
| CT 125 BG 1 | Kearny | 3 |
| CT 125 BG 3 | Kearny | 3 |
| CT 126 BG 1 | Kearny | 3 |
| CT 126 BG 2 | Kearny | 3 |
| CT 126 BG 3 | Kearny | 1 |
| CT 127 BG 1 | Kearny | 3 |
| CT 127 BG 3 | Kearny | 3 |
| CT 127 BG 5 | Kearny | 3 |
| CT 128 BG 1 | Kearny | 3 |
| CT 128 BG 2 | Kearny | 3 |
| CT 128 BG 3 | Kearny | 1 |
| CT 129 BG 1 | Kearny | 3 |
| CT 129 BG 2 | Kearny | 1 |
| CT 13 BG 1 | Jersey City | 1 |
| CT 13 BG 2 | Jersey City | 1 |
| CT 130 BG 1 | Kearny | 3 |
| CT 130 BG 2 | Kearny | 1 |
| CT 130 BG 3 | Kearny | 3 |
| CT 131 BG 1 | Kearny | 1 |
| CT 132 BG 1 | Kearny | 1 |
| CT 132 BG 2 | Kearny | 1 |
| CT 132 BG 3 | Kearny | 1 |
| CT 133 BG 1 | Kearny | 3 |
| CT 133 BG 2 | Kearny | 1 |
| CT 133 BG 3 | Kearny | 3 |
| CT 134 BG 1 | East Newark | 1 |
| CT 134 BG 2 | East Newark | 1 |
| CT 135 BG 1 | Harrison | 1 |
| CT 135 BG 2 | Harrison | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 135 BG 3 | Harrison | 2 |
| CT 136 BG 1 | Harrison | 1 |
| CT 136 BG 2 | Harrison | 1 |
| CT 137 BG 1 | Harrison | 1 |
| CT 137 BG 2 | Harrison | 1 |
| CT 138 BG 1 | Harrison | 3 |
| CT 139 BG 1 | Harrison | 3 |
| CT 139 BG 2 | Harrison | 3 |
| CT 14 BG 1 | Jersey City | 1 |
| CT 14 BG 2 | Jersey City | 1 |
| CT 140 BG 1 | North Bergen | 1 |
| CT 140 BG 2 | North Bergen | 3 |
| CT 140 BG 3 | North Bergen | 3 |
| CT 140 BG 4 | North Bergen | 1 |
| CT 141.01 BG 1 | North Bergen | 3 |
| CT 141.01 BG 2 | North Bergen | 3 |
| CT 141.02 BG 1 | North Bergen | 3 |
| CT 141.02 BG 2 | North Bergen | 3 |
| CT 141.02 BG 3 | North Bergen | 3 |
| CT 141.02 BG 4 | North Bergen | 3 |
| CT 142 BG 1 | North Bergen | 1 |
| CT 142 BG 2 | North Bergen | 3 |
| CT 142 BG 3 | North Bergen | 1 |
| CT 142 BG 4 | North Bergen | 1 |
| CT 143 BG 1 | North Bergen | 3 |
| CT 143 BG 2 | North Bergen | 3 |
| CT 143 BG 3 | North Bergen | 1 |
| CT 143 BG 4 | North Bergen | 3 |
| CT 144 BG 1 | North Bergen | 3 |
| CT 144 BG 2 | North Bergen | 3 |
| CT 144 BG 3 | North Bergen | 3 |
| CT 144 BG 4 | North Bergen | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 144 BG 5 | North Bergen | 1 |
| CT 145.01 BG 1 | North Bergen | 1 |
| CT 145.01 BG 2 | North Bergen | 1 |
| CT 145.01 BG 3 | North Bergen | 1 |
| CT 145.02 BG 1 | North Bergen | 1 |
| CT 145.02 BG 2 | North Bergen | 1 |
| CT 145.02 BG 3 | North Bergen | 1 |
| CT 146 BG 1 | North Bergen | 3 |
| CT 146 BG 2 | North Bergen | 3 |
| CT 147 BG 1 | North Bergen | 1 |
| CT 147 BG 2 | North Bergen | 3 |
| CT 147 BG 3 | North Bergen | 1 |
| CT 148 BG 1 | North Bergen | 3 |
| CT 148 BG 2 | North Bergen | 1 |
| CT 148 BG 3 | North Bergen | 1 |
| CT 149 BG 1 | North Bergen | 3 |
| CT 149 BG 2 | North Bergen | 3 |
| CT 150.01 BG 1 | Guttenberg | 3 |
| CT 150.02 BG 1 | Guttenberg | 1 |
| CT 150.02 BG 2 | Guttenberg | 1 |
| CT 150.02 BG 3 | Guttenberg | 1 |
| CT 151 BG 1 | Guttenberg | 1 |
| CT 151 BG 2 | Guttenberg | 3 |
| CT 152.01 BG 1 | West New York | 3 |
| CT 152.01 BG 2 | West New York | 3 |
| CT 152.02 BG 1 | West New York | 1 |
| CT 152.02 BG 2 | West New York | 3 |
| CT 152.02 BG 3 | West New York | 1 |
| CT 152.02 BG 4 | West New York | 1 |
| CT 153 BG 1 | West New York | 1 |
| CT 153 BG 2 | West New York | 1 |
| CT 153 BG 3 | West New York | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 155 BG 1 | West New York | 3 |
| CT 155 BG 2 | West New York | 1 |
| CT 155 BG 3 | West New York | 1 |
| CT 156 BG 1 | West New York | 1 |
| CT 156 BG 2 | West New York | 1 |
| CT 157 BG 1 | West New York | 1 |
| CT 157 BG 2 | West New York | 1 |
| CT 158.01 BG 1 | West New York | 3 |
| CT 158.01 BG 2 | West New York | 3 |
| CT 158.02 BG 1 | West New York | 3 |
| CT 158.02 BG 2 | West New York | 1 |
| CT 158.02 BG 3 | West New York | 1 |
| CT 159 BG 1 | West New York | 1 |
| CT 159 BG 2 | West New York | 1 |
| CT 159 BG 3 | West New York | 1 |
| CT 159 BG 4 | West New York | 1 |
| CT 160 BG 1 | West New York | 3 |
| CT 160 BG 2 | West New York | 1 |
| CT 161 BG 1 | Union City | 1 |
| CT 161 BG 2 | Union City | 1 |
| CT 162 BG 1 | Union City | 1 |
| CT 162 BG 2 | Union City | 1 |
| CT 162 BG 3 | Union City | 1 |
| CT 163 BG 1 | Union City | 3 |
| CT 163 BG 2 | Union City | 1 |
| CT 163 BG 3 | Union City | 1 |
| CT 164 BG 1 | Union City | 1 |
| CT 164 BG 2 | Union City | 1 |
| CT 164 BG 3 | Union City | 1 |
| CT 165 BG 1 | Union City | 1 |
| CT 165 BG 2 | Union City | 1 |
| CT 165 BG 3 | Union City | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 166 BG 1 | Union City | 1 |
| CT 166 BG 2 | Union City | 1 |
| CT 167 BG 1 | Union City | 1 |
| CT 168 BG 1 | Union City | 1 |
| CT 168 BG 2 | Union City | 1 |
| CT 168 BG 3 | Union City | 1 |
| CT 169 BG 1 | Union City | 1 |
| CT 169 BG 2 | Union City | 1 |
| CT 17.01 BG 1 | Jersey City | 1 |
| CT 17.01 BG 2 | Jersey City | 1 |
| CT 170 BG 1 | Union City | 1 |
| CT 170 BG 2 | Union City | 1 |
| CT 170 BG 3 | Union City | 1 |
| CT 171 BG 1 | Union City | 3 |
| CT 171 BG 2 | Union City | 1 |
| CT 171 BG 3 | Union City | 1 |
| CT 171 BG 4 | Union City | 1 |
| CT 172 BG 1 | Union City | 1 |
| CT 172 BG 2 | Union City | 1 |
| CT 173 BG 1 | Union City | 1 |
| CT 174 BG 1 | Union City | 1 |
| CT 174 BG 2 | Union City | 1 |
| CT 175 BG 1 | Union City | 1 |
| CT 175 BG 2 | Union City | 1 |
| CT 176 BG 1 | Union City | 1 |
| CT 176 BG 2 | Union City | 1 |
| CT 177 BG 1 | Union City | 1 |
| CT 177 BG 2 | Union City | 1 |
| CT 178 BG 1 | Union City | 3 |
| CT 178 BG 2 | Union City | 1 |
| CT 178 BG 3 | Union City | 1 |
| CT 178 BG 4 | Union City | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 18 BG 1 | Jersey City | 1 |
| CT 18 BG 2 | Jersey City | 1 |
| CT 180 BG 1 | Weehawken | 1 |
| CT 180 BG 2 | Weehawken | 3 |
| CT 181 BG 1 | Weehawken | 3 |
| CT 181 BG 2 | Weehawken | 1 |
| CT 182 BG 2 | Weehawken | 1 |
| CT 184 BG 3 | Hoboken | 2 |
| CT 185 BG 4 | Hoboken | 3 |
| CT 187.02 BG 4 | Hoboken | 2 |
| CT 19 BG 1 | Jersey City | 1 |
| CT 190 BG 3 | Hoboken | 1 |
| CT 190 BG 4 | Hoboken | 1 |
| CT 193 BG 2 | Hoboken | 2 |
| CT 198 BG 1 | Secaucus | 3 |
| CT 199 BG 1 | Secaucus | 3 |
| CT 199 BG 3 | Secaucus | 1 |
| CT 2 BG 1 | Jersey City | 1 |
| CT 2 BG 2 | Jersey City | 3 |
| CT 2 BG 3 | Jersey City | 1 |
| CT 20 BG 1 | Jersey City | 3 |
| CT 20 BG 2 | Jersey City | 1 |
| CT 20 BG 3 | Jersey City | 1 |
| CT 200 BG 4 | Secaucus | 2 |
| CT 201 BG 1 | Secaucus | 3 |
| CT 22 BG 1 | Jersey City | 3 |
| CT 23 BG 2 | Jersey City | 3 |
| CT 27 BG 1 | Jersey City | 1 |
| CT 27 BG 2 | Jersey City | 1 |
| CT 27 BG 3 | Jersey City | 1 |
| CT 28 BG 1 | Jersey City | 1 |
| CT 28 BG 3 | Jersey City | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 28 BG 4 | Jersey City | 3 |
| CT 28 BG 5 | Jersey City | 1 |
| CT 29 BG 1 | Jersey City | 3 |
| CT 29 BG 2 | Jersey City | 2 |
| CT 29 BG 3 | Jersey City | 1 |
| CT 3 BG 1 | Jersey City | 1 |
| CT 3 BG 2 | Jersey City | 1 |
| CT 3 BG 3 | Jersey City | 3 |
| CT 30 BG 1 | Jersey City | 1 |
| CT 30 BG 2 | Jersey City | 3 |
| CT 31 BG 1 | Jersey City | 1 |
| CT 31 BG 2 | Jersey City | 1 |
| CT 31 BG 3 | Jersey City | 3 |
| CT 324 BG 1 | West New York | 1 |
| CT 324 BG 2 | West New York | 1 |
| CT 324 BG 3 | West New York | 1 |
| CT 324 BG 4 | West New York | 1 |
| CT 35 BG 2 | Jersey City | 1 |
| CT 4 BG 1 | Jersey City | 3 |
| CT 4 BG 2 | Jersey City | 1 |
| CT 40 BG 1 | Jersey City | 3 |
| CT 40 BG 2 | Jersey City | 3 |
| CT 40 BG 3 | Jersey City | 3 |
| CT 40 BG 4 | Jersey City | 3 |
| CT 41.01 BG 1 | Jersey City | 3 |
| CT 41.01 BG 2 | Jersey City | 3 |
| CT 41.01 BG 3 | Jersey City | 1 |
| CT 41.01 BG 4 | Jersey City | 3 |
| CT 41.02 BG 1 | Jersey City | 1 |
| CT 41.02 BG 2 | Jersey City | 3 |
| CT 42 BG 1 | Jersey City | 1 |
| CT 42 BG 2 | Jersey City | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 42 BG 3 | Jersey City | 3 |
| CT 43 BG 1 | Jersey City | 3 |
| CT 43 BG 2 | Jersey City | 1 |
| CT 44 BG 1 | Jersey City | 1 |
| CT 45 BG 1 | Jersey City | 1 |
| CT 45 BG 2 | Jersey City | 1 |
| CT 45 BG 3 | Jersey City | 1 |
| CT 46 BG 1 | Jersey City | 1 |
| CT 46 BG 2 | Jersey City | 1 |
| CT 47 BG 1 | Jersey City | 3 |
| CT 47 BG 2 | Jersey City | 1 |
| CT 48 BG 1 | Jersey City | 1 |
| CT 48 BG 2 | Jersey City | 1 |
| CT 48 BG 3 | Jersey City | 1 |
| CT 49 BG 1 | Jersey City | 3 |
| CT 49 BG 2 | Jersey City | 1 |
| CT 49 BG 3 | Jersey City | 1 |
| CT 49 BG 4 | Jersey City | 3 |
| CT 5 BG 1 | Jersey City | 1 |
| CT 5 BG 2 | Jersey City | 1 |
| CT 5 BG 3 | Jersey City | 1 |
| CT 52 BG 1 | Jersey City | 1 |
| CT 52 BG 2 | Jersey City | 3 |
| CT 53 BG 1 | Jersey City | 1 |
| CT 53 BG 2 | Jersey City | 1 |
| CT 54 BG 1 | Jersey City | 3 |
| CT 54 BG 2 | Jersey City | 1 |
| CT 54 BG 3 | Jersey City | 1 |
| CT 55 BG 1 | Jersey City | 1 |
| CT 56 BG 1 | Jersey City | 1 |
| CT 56 BG 2 | Jersey City | 3 |
| CT 56 BG 3 | Jersey City | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 58.01 BG 1 | Jersey City | 1 |
| CT 58.01 BG 2 | Jersey City | 1 |
| CT 58.01 BG 3 | Jersey City | 1 |
| CT 58.01 BG 4 | Jersey City | 1 |
| CT 59 BG 1 | Jersey City | 3 |
| CT 59 BG 2 | Jersey City | 3 |
| CT 59 BG 3 | Jersey City | 3 |
| CT 59 BG 4 | Jersey City | 3 |
| CT 59 BG 5 | Jersey City | 1 |
| CT 6 BG 1 | Jersey City | 3 |
| CT 6 BG 2 | Jersey City | 1 |
| CT 6 BG 3 | Jersey City | 1 |
| CT 6 BG 4 | Jersey City | 3 |
| CT 60 BG 1 | Jersey City | 1 |
| CT 60 BG 2 | Jersey City | 1 |
| CT 61 BG 1 | Jersey City | 3 |
| CT 61 BG 2 | Jersey City | 1 |
| CT 61 BG 3 | Jersey City | 1 |
| CT 61 BG 4 | Jersey City | 3 |
| CT 62 BG 1 | Jersey City | 1 |
| CT 62 BG 2 | Jersey City | 1 |
| CT 63 BG 1 | Jersey City | 1 |
| CT 63 BG 2 | Jersey City | 3 |
| CT 63 BG 3 | Jersey City | 1 |
| CT 64 BG 1 | Jersey City | 3 |
| CT 65 BG 1 | Jersey City | 1 |
| CT 65 BG 2 | Jersey City | 1 |
| CT 66 BG 1 | Jersey City | 3 |
| CT 67 BG 1 | Jersey City | 1 |
| CT 67 BG 2 | Jersey City | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 67 BG 3 | Jersey City | 1 |
| CT 68 BG 1 | Jersey City | 3 |
| CT 68 BG 2 | Jersey City | 1 |
| CT 69 BG 1 | Jersey City | 2 |
| CT 7 BG 2 | Jersey City | 1 |
| CT 7 BG 3 | Jersey City | 3 |
| CT 70 BG 1 | Jersey City | 1 |
| CT 70 BG 2 | Jersey City | 3 |
| CT 70 BG 3 | Jersey City | 3 |
| CT 71 BG 1 | Jersey City | 1 |
| CT 71 BG 2 | Jersey City | 3 |
| CT 71 BG 3 | Jersey City | 1 |
| CT 72 BG 2 | Jersey City | 3 |
| CT 73 BG 1 | Jersey City | 3 |
| CT 75 BG 1 | Jersey City | 3 |
| CT 75 BG 2 | Jersey City | 3 |
| CT 75 BG 4 | Jersey City | 3 |
| CT 76 BG 1 | Jersey City | 3 |
| CT 76 BG 2 | Jersey City | 3 |
| CT 77 BG 2 | Jersey City | 3 |
| CT 77 BG 3 | Jersey City | 3 |
| CT 77 BG 4 | Jersey City | 3 |
| CT 78 BG 1 | Jersey City | 1 |
| CT 8 BG 1 | Jersey City | 1 |
| CT 8 BG 2 | Jersey City | 1 |
| CT 9.02 BG 1 | Jersey City | 3 |
| CT 9.02 BG 2 | Jersey City | 3 |
| CT 9.02 BG 3 | Jersey City | 3 |
| CT 9.02 BG 4 | Jersey City | 1 |

**Table G-EJ19. Census Tracts (CT) and Block Groups (BG) in Gloucester County, New Jersey (County ID 34-015) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 5001 BG 1 | Westville | 2 |
| CT 5001 BG 2 | Westville | 2 |
| CT 5001 BG 3 | Westville | 1 |
| CT 5001 BG 4 | Westville | 1 |
| CT 5002.01 BG 2 | West Deptford | 2 |
| CT 5002.02 BG 2 | West Deptford | 2 |
| CT 5002.02 BG 3 | West Deptford | 2 |
| CT 5002.02 BG 4 | West Deptford | 1 |
| CT 5002.03 BG 2 | West Deptford | 2 |
| CT 5002.03 BG 3 | West Deptford | 2 |
| CT 5002.04 BG 1 | West Deptford | 3 |
| CT 5002.04 BG 3 | West Deptford | 3 |
| CT 5002.05 BG 2 | West Deptford | 2 |
| CT 5002.05 BG 3 | West Deptford | 2 |
| CT 5003 BG 1 | National Park | 2 |
| CT 5003 BG 3 | National Park | 2 |
| CT 5004 BG 2 | Paulsboro | 1 |
| CT 5004 BG 3 | Paulsboro | 1 |
| CT 5004 BG 4 | Paulsboro | 1 |
| CT 5004 BG 5 | Paulsboro | 1 |
| CT 5004 BG 6 | Paulsboro | 1 |
| CT 5004 BG 7 | Paulsboro | 2 |
| CT 5005 BG 3 | Greenwich | 2 |
| CT 5005 BG 4 | Greenwich | 2 |
| CT 5005 BG 5 | Greenwich | 2 |
| CT 5006 BG 1 | East Greenwich | 3 |
| CT 5006 BG 2 | East Greenwich | 2 |
| CT 5006 BG 3 | East Greenwich | 3 |
| CT 5007.01 BG 1 | Mantua | 2 |
| CT 5007.01 BG 2 | Mantua | 2 |
| CT 5007.01 BG 3 | Mantua | 2 |
| CT 5007.01 BG 5 | Mantua | 2 |
| CT 5010.01 BG 1 | Woodbury | 3 |
| CT 5010.01 BG 2 | Woodbury | 1 |
| CT 5010.02 BG 1 | Woodbury | 1 |
| CT 5010.02 BG 2 | Woodbury | 3 |
| CT 5010.02 BG 3 | Woodbury | 1 |
| CT 5010.03 BG 1 | Woodbury | 1 |
| CT 5010.03 BG 2 | Woodbury | 3 |
| CT 5010.03 BG 3 | Woodbury | 1 |
| CT 5011.01 BG 1 | Deptford | 1 |
| CT 5011.01 BG 2 | Deptford | 1 |
| CT 5011.01 BG 3 | Deptford | 2 |
| CT 5011.02 BG 1 | Deptford | 3 |
| CT 5011.02 BG 2 | Deptford | 1 |
| CT 5011.03 BG 2 | Deptford | 2 |
| CT 5011.03 BG 3 | Deptford | 3 |
| CT 5011.04 BG 1 | Deptford | 1 |
| CT 5011.04 BG 3 | Deptford | 1 |
| CT 5011.05 BG 1 | Deptford | 1 |
| CT 5011.06 BG 1 | Deptford | 1 |
| CT 5011.06 BG 2 | Deptford | 2 |
| CT 5011.06 BG 3 | Deptford | 1 |
| CT 5011.07 BG 2 | Deptford | 1 |
| CT 5011.07 BG 3 | Deptford | 2 |
| CT 5012.04 BG 1 | Washington | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 5012.05 BG 1 | Washington | 2 |
| CT 5012.06 BG 2 | Washington | 1 |
| CT 5012.06 BG 3 | Washington | 2 |
| CT 5012.08 BG 3 | Washington | 2 |
| CT 5012.09 BG 1 | Washington | 1 |
| CT 5012.09 BG 3 | Washington | 3 |
| CT 5012.12 BG 1 | Washington | 1 |
| CT 5012.13 BG 3 | Washington | 3 |
| CT 5013.01 BG 2 | Pitman | 2 |
| CT 5013.01 BG 3 | Pitman | 2 |
| CT 5013.02 BG 1 | Pitman | 2 |
| CT 5013.03 BG 1 | Pitman | 3 |
| CT 5013.03 BG 2 | Pitman | 2 |
| CT 5013.03 BG 3 | Pitman | 2 |
| CT 5014.02 BG 1 | Glassboro | 1 |
| CT 5014.02 BG 2 | Glassboro | 2 |
| CT 5014.02 BG 3 | Glassboro | 2 |
| CT 5014.03 BG 2 | Glassboro | 1 |
| CT 5014.04 BG 1 | Glassboro | 3 |
| CT 5014.04 BG 2 | Glassboro | 2 |
| CT 5014.05 BG 1 | Glassboro | 1 |
| CT 5014.05 BG 2 | Glassboro | 1 |
| CT 5014.06 BG 1 | Glassboro | 1 |
| CT 5014.06 BG 2 | Glassboro | 2 |
| CT 5015 BG 1 | Clayton | 1 |
| CT 5015 BG 2 | Clayton | 2 |
| CT 5015 BG 4 | Clayton | 1 |
| CT 5015 BG 6 | Clayton | 3 |
| CT 5016.03 BG 3 | Monroe | 1 |
| CT 5016.04 BG 1 | Monroe | 2 |
| CT 5016.04 BG 2 | Monroe | 2 |
| CT 5016.04 BG 3 | Monroe | 3 |
| CT 5016.04 BG 4 | Monroe | 1 |
| CT 5016.04 BG 5 | Monroe | 1 |
| CT 5016.05 BG 1 | Monroe | 3 |
| CT 5016.05 BG 2 | Monroe | 1 |
| CT 5016.05 BG 3 | Monroe | 2 |
| CT 5016.06 BG 1 | Monroe | 3 |
| CT 5016.06 BG 2 | Monroe | 2 |
| CT 5016.06 BG 4 | Monroe | 1 |
| CT 5016.08 BG 1 | Monroe | 3 |
| CT 5016.08 BG 2 | Monroe | 1 |
| CT 5016.09 BG 1 | Monroe | 3 |
| CT 5016.09 BG 2 | Monroe | 3 |
| CT 5017.02 BG 1 | Franklin | 2 |
| CT 5017.03 BG 3 | Franklin | 2 |
| CT 5017.03 BG 4 | Franklin | 1 |
| CT 5017.04 BG 1 | Franklin | 1 |
| CT 5017.04 BG 2 | Franklin | 2 |
| CT 5017.04 BG 3 | Franklin | 1 |
| CT 5018 BG 1 | Newfield | 2 |
| CT 5018 BG 2 | Newfield | 2 |
| CT 5019 BG 2 | Elk | 1 |
| CT 5019 BG 3 | Elk | 2 |
| CT 5022 BG 2 | Woolwich | 3 |
| CT 5023 BG 1 | Swedesboro | 1 |
| CT 5023 BG 2 | Swedesboro | 1 |
| CT 5024 BG 2 | Logan | 2 |
| CT 5024 BG 3 | Logan | 3 |

## Table G-EJ20. Census Tracts (CT) and Block Groups (BG) in Philadelphia County, Pennsylvania (County ID 42-101) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 100 BG 1 | Philadelphia | 1 |
| CT 100 BG 2 | Philadelphia | 1 |
| CT 100 BG 3 | Philadelphia | 3 |
| CT 100 BG 4 | Philadelphia | 3 |
| CT 101 BG 1 | Philadelphia | 3 |
| CT 101 BG 2 | Philadelphia | 3 |
| CT 101 BG 3 | Philadelphia | 1 |
| CT 101 BG 4 | Philadelphia | 1 |
| CT 101 BG 5 | Philadelphia | 1 |
| CT 101 BG 6 | Philadelphia | 3 |
| CT 101 BG 7 | Philadelphia | 1 |
| CT 102 BG 1 | Philadelphia | 1 |
| CT 102 BG 2 | Philadelphia | 1 |
| CT 102 BG 3 | Philadelphia | 1 |
| CT 103 BG 1 | Philadelphia | 1 |
| CT 103 BG 2 | Philadelphia | 3 |
| CT 104 BG 1 | Philadelphia | 1 |
| CT 104 BG 2 | Philadelphia | 1 |
| CT 104 BG 3 | Philadelphia | 1 |
| CT 104 BG 4 | Philadelphia | 1 |
| CT 105 BG 1 | Philadelphia | 1 |
| CT 105 BG 2 | Philadelphia | 1 |
| CT 105 BG 3 | Philadelphia | 1 |
| CT 106 BG 1 | Philadelphia | 1 |
| CT 106 BG 2 | Philadelphia | 1 |
| CT 107 BG 1 | Philadelphia | 1 |
| CT 107 BG 2 | Philadelphia | 1 |
| CT 107 BG 3 | Philadelphia | 1 |
| CT 107 BG 4 | Philadelphia | 1 |
| CT 108 BG 1 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 108 BG 2 | Philadelphia | 3 |
| CT 108 BG 3 | Philadelphia | 1 |
| CT 108 BG 4 | Philadelphia | 1 |
| CT 108 BG 5 | Philadelphia | 1 |
| CT 109 BG 1 | Philadelphia | 1 |
| CT 109 BG 2 | Philadelphia | 1 |
| CT 109 BG 3 | Philadelphia | 1 |
| CT 110 BG 1 | Philadelphia | 1 |
| CT 110 BG 2 | Philadelphia | 1 |
| CT 110 BG 3 | Philadelphia | 1 |
| CT 110 BG 4 | Philadelphia | 1 |
| CT 111 BG 1 | Philadelphia | 1 |
| CT 111 BG 2 | Philadelphia | 1 |
| CT 111 BG 3 | Philadelphia | 1 |
| CT 111 BG 4 | Philadelphia | 1 |
| CT 111 BG 5 | Philadelphia | 1 |
| CT 112 BG 1 | Philadelphia | 1 |
| CT 112 BG 2 | Philadelphia | 3 |
| CT 112 BG 3 | Philadelphia | 1 |
| CT 112 BG 4 | Philadelphia | 1 |
| CT 112 BG 5 | Philadelphia | 1 |
| CT 112 BG 6 | Philadelphia | 3 |
| CT 112 BG 7 | Philadelphia | 1 |
| CT 113 BG 1 | Philadelphia | 3 |
| CT 113 BG 2 | Philadelphia | 1 |
| CT 113 BG 3 | Philadelphia | 1 |
| CT 114 BG 1 | Philadelphia | 3 |
| CT 114 BG 2 | Philadelphia | 3 |
| CT 114 BG 3 | Philadelphia | 1 |
| CT 114 BG 4 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 114 BG 5 | Philadelphia | 3 |
| CT 114 BG 6 | Philadelphia | 3 |
| CT 115 BG 1 | Philadelphia | 3 |
| CT 115 BG 2 | Philadelphia | 3 |
| CT 115 BG 3 | Philadelphia | 3 |
| CT 115 BG 4 | Philadelphia | 1 |
| CT 117 BG 1 | Philadelphia | 3 |
| CT 118 BG 1 | Philadelphia | 3 |
| CT 118 BG 2 | Philadelphia | 1 |
| CT 118 BG 3 | Philadelphia | 1 |
| CT 118 BG 4 | Philadelphia | 3 |
| CT 118 BG 5 | Philadelphia | 1 |
| CT 118 BG 6 | Philadelphia | 3 |
| CT 119 BG 1 | Philadelphia | 1 |
| CT 119 BG 2 | Philadelphia | 1 |
| CT 119 BG 3 | Philadelphia | 1 |
| CT 119 BG 4 | Philadelphia | 3 |
| CT 119 BG 5 | Philadelphia | 3 |
| CT 120 BG 1 | Philadelphia | 3 |
| CT 120 BG 2 | Philadelphia | 3 |
| CT 121 BG 1 | Philadelphia | 3 |
| CT 121 BG 2 | Philadelphia | 3 |
| CT 122.01 BG 1 | Philadelphia | 1 |
| CT 122.01 BG 2 | Philadelphia | 1 |
| CT 122.03 BG 1 | Philadelphia | 1 |
| CT 122.04 BG 1 | Philadelphia | 3 |
| CT 122.04 BG 2 | Philadelphia | 3 |
| CT 13 BG 3 | Philadelphia | 3 |
| CT 13 BG 4 | Philadelphia | 3 |
| CT 131 BG 1 | Philadelphia | 1 |
| CT 131 BG 2 | Philadelphia | 3 |
| CT 132 BG 1 | Philadelphia | 1 |
| CT 132 BG 2 | Philadelphia | 1 |
| CT 133 BG 2 | Philadelphia | 1 |
| CT 135 BG 4 | Philadelphia | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 137 BG 1 | Philadelphia | 1 |
| CT 137 BG 2 | Philadelphia | 1 |
| CT 137 BG 3 | Philadelphia | 1 |
| CT 137 BG 4 | Philadelphia | 3 |
| CT 137 BG 5 | Philadelphia | 3 |
| CT 138 BG 1 | Philadelphia | 1 |
| CT 138 BG 2 | Philadelphia | 1 |
| CT 139 BG 1 | Philadelphia | 1 |
| CT 139 BG 2 | Philadelphia | 1 |
| CT 139 BG 3 | Philadelphia | 3 |
| CT 140 BG 1 | Philadelphia | 1 |
| CT 140 BG 2 | Philadelphia | 1 |
| CT 140 BG 3 | Philadelphia | 1 |
| CT 141 BG 1 | Philadelphia | 1 |
| CT 141 BG 2 | Philadelphia | 1 |
| CT 144 BG 1 | Philadelphia | 1 |
| CT 144 BG 3 | Philadelphia | 1 |
| CT 145 BG 1 | Philadelphia | 1 |
| CT 145 BG 2 | Philadelphia | 1 |
| CT 146 BG 1 | Philadelphia | 1 |
| CT 146 BG 2 | Philadelphia | 3 |
| CT 146 BG 3 | Philadelphia | 1 |
| CT 147 BG 1 | Philadelphia | 1 |
| CT 147 BG 2 | Philadelphia | 1 |
| CT 148 BG 1 | Philadelphia | 1 |
| CT 149 BG 1 | Philadelphia | 1 |
| CT 149 BG 2 | Philadelphia | 1 |
| CT 149 BG 3 | Philadelphia | 1 |
| CT 149 BG 4 | Philadelphia | 1 |
| CT 149 BG 5 | Philadelphia | 1 |
| CT 149 BG 6 | Philadelphia | 1 |
| CT 151.01 BG 1 | Philadelphia | 1 |
| CT 151.01 BG 2 | Philadelphia | 1 |
| CT 151.02 BG 1 | Philadelphia | 1 |
| CT 151.02 BG 2 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 151.02 BG 3 | Philadelphia | 1 |
| CT 152 BG 1 | Philadelphia | 1 |
| CT 152 BG 2 | Philadelphia | 1 |
| CT 152 BG 3 | Philadelphia | 1 |
| CT 152 BG 4 | Philadelphia | 1 |
| CT 152 BG 5 | Philadelphia | 3 |
| CT 153 BG 1 | Philadelphia | 2 |
| CT 153 BG 2 | Philadelphia | 1 |
| CT 153 BG 3 | Philadelphia | 1 |
| CT 153 BG 4 | Philadelphia | 1 |
| CT 156 BG 1 | Philadelphia | 1 |
| CT 156 BG 2 | Philadelphia | 1 |
| CT 157 BG 1 | Philadelphia | 3 |
| CT 157 BG 2 | Philadelphia | 1 |
| CT 157 BG 3 | Philadelphia | 1 |
| CT 160 BG 2 | Philadelphia | 2 |
| CT 160 BG 7 | Philadelphia | 2 |
| CT 161 BG 2 | Philadelphia | 1 |
| CT 161 BG 3 | Philadelphia | 3 |
| CT 161 BG 4 | Philadelphia | 1 |
| CT 162 BG 1 | Philadelphia | 1 |
| CT 162 BG 2 | Philadelphia | 1 |
| CT 162 BG 3 | Philadelphia | 1 |
| CT 163 BG 1 | Philadelphia | 1 |
| CT 163 BG 2 | Philadelphia | 1 |
| CT 163 BG 3 | Philadelphia | 3 |
| CT 163 BG 4 | Philadelphia | 1 |
| CT 164 BG 1 | Philadelphia | 1 |
| CT 164 BG 2 | Philadelphia | 1 |
| CT 164 BG 3 | Philadelphia | 3 |
| CT 164 BG 4 | Philadelphia | 1 |
| CT 165 BG 1 | Philadelphia | 1 |
| CT 165 BG 2 | Philadelphia | 1 |
| CT 165 BG 3 | Philadelphia | 1 |
| CT 166 BG 1 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 166 BG 2 | Philadelphia | 1 |
| CT 167.01 BG 1 | Philadelphia | 1 |
| CT 167.01 BG 2 | Philadelphia | 1 |
| CT 167.01 BG 3 | Philadelphia | 1 |
| CT 167.02 BG 1 | Philadelphia | 1 |
| CT 167.02 BG 2 | Philadelphia | 1 |
| CT 167.02 BG 3 | Philadelphia | 1 |
| CT 167.02 BG 4 | Philadelphia | 1 |
| CT 168 BG 1 | Philadelphia | 3 |
| CT 168 BG 2 | Philadelphia | 1 |
| CT 168 BG 3 | Philadelphia | 1 |
| CT 168 BG 4 | Philadelphia | 1 |
| CT 168 BG 5 | Philadelphia | 1 |
| CT 168 BG 6 | Philadelphia | 1 |
| CT 169.01 BG 1 | Philadelphia | 1 |
| CT 169.01 BG 2 | Philadelphia | 1 |
| CT 169.01 BG 3 | Philadelphia | 1 |
| CT 169.02 BG 1 | Philadelphia | 1 |
| CT 169.02 BG 2 | Philadelphia | 1 |
| CT 169.02 BG 3 | Philadelphia | 1 |
| CT 169.02 BG 4 | Philadelphia | 1 |
| CT 170 BG 1 | Philadelphia | 3 |
| CT 170 BG 2 | Philadelphia | 1 |
| CT 170 BG 3 | Philadelphia | 1 |
| CT 171 BG 1 | Philadelphia | 1 |
| CT 171 BG 2 | Philadelphia | 1 |
| CT 171 BG 3 | Philadelphia | 3 |
| CT 171 BG 4 | Philadelphia | 1 |
| CT 172.01 BG 1 | Philadelphia | 1 |
| CT 172.01 BG 2 | Philadelphia | 1 |
| CT 172.01 BG 3 | Philadelphia | 3 |
| CT 172.02 BG 1 | Philadelphia | 1 |
| CT 172.02 BG 2 | Philadelphia | 1 |
| CT 172.02 BG 3 | Philadelphia | 1 |
| CT 172.02 BG 4 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 173 BG 1 | Philadelphia | 1 |
| CT 173 BG 2 | Philadelphia | 1 |
| CT 174 BG 1 | Philadelphia | 1 |
| CT 174 BG 2 | Philadelphia | 1 |
| CT 175 BG 1 | Philadelphia | 1 |
| CT 175 BG 2 | Philadelphia | 1 |
| CT 175 BG 3 | Philadelphia | 1 |
| CT 175 BG 4 | Philadelphia | 1 |
| CT 175 BG 5 | Philadelphia | 1 |
| CT 175 BG 6 | Philadelphia | 1 |
| CT 176.01 BG 1 | Philadelphia | 1 |
| CT 176.01 BG 2 | Philadelphia | 1 |
| CT 176.01 BG 3 | Philadelphia | 1 |
| CT 176.01 BG 4 | Philadelphia | 1 |
| CT 176.01 BG 5 | Philadelphia | 1 |
| CT 176.02 BG 1 | Philadelphia | 1 |
| CT 176.02 BG 2 | Philadelphia | 1 |
| CT 176.02 BG 3 | Philadelphia | 1 |
| CT 177.01 BG 1 | Philadelphia | 1 |
| CT 177.01 BG 2 | Philadelphia | 1 |
| CT 177.01 BG 3 | Philadelphia | 1 |
| CT 177.02 BG 1 | Philadelphia | 1 |
| CT 177.02 BG 2 | Philadelphia | 1 |
| CT 177.02 BG 3 | Philadelphia | 1 |
| CT 177.02 BG 4 | Philadelphia | 1 |
| CT 177.02 BG 5 | Philadelphia | 1 |
| CT 178 BG 1 | Philadelphia | 1 |
| CT 178 BG 2 | Philadelphia | 1 |
| CT 178 BG 3 | Philadelphia | 1 |
| CT 178 BG 4 | Philadelphia | 1 |
| CT 178 BG 5 | Philadelphia | 1 |
| CT 178 BG 6 | Philadelphia | 1 |
| CT 178 BG 7 | Philadelphia | 1 |
| CT 179 BG 1 | Philadelphia | 1 |
| CT 179 BG 2 | Philadelphia | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 179 BG 3 | Philadelphia | 1 |
| CT 179 BG 4 | Philadelphia | 2 |
| CT 179 BG 5 | Philadelphia | 1 |
| CT 180.02 BG 1 | Philadelphia | 2 |
| CT 180.02 BG 3 | Philadelphia | 2 |
| CT 180.02 BG 4 | Philadelphia | 2 |
| CT 188 BG 1 | Philadelphia | 1 |
| CT 188 BG 2 | Philadelphia | 1 |
| CT 188 BG 3 | Philadelphia | 1 |
| CT 188 BG 4 | Philadelphia | 1 |
| CT 188 BG 5 | Philadelphia | 1 |
| CT 188 BG 6 | Philadelphia | 1 |
| CT 188 BG 7 | Philadelphia | 1 |
| CT 19 BG 3 | Philadelphia | 3 |
| CT 190 BG 1 | Philadelphia | 1 |
| CT 190 BG 2 | Philadelphia | 1 |
| CT 190 BG 3 | Philadelphia | 1 |
| CT 190 BG 4 | Philadelphia | 3 |
| CT 190 BG 5 | Philadelphia | 1 |
| CT 191 BG 1 | Philadelphia | 1 |
| CT 191 BG 2 | Philadelphia | 1 |
| CT 191 BG 3 | Philadelphia | 1 |
| CT 191 BG 4 | Philadelphia | 3 |
| CT 191 BG 5 | Philadelphia | 1 |
| CT 191 BG 6 | Philadelphia | 1 |
| CT 192 BG 1 | Philadelphia | 1 |
| CT 192 BG 2 | Philadelphia | 1 |
| CT 192 BG 3 | Philadelphia | 1 |
| CT 192 BG 4 | Philadelphia | 1 |
| CT 192 BG 5 | Philadelphia | 1 |
| CT 192 BG 6 | Philadelphia | 1 |
| CT 195.01 BG 1 | Philadelphia | 1 |
| CT 195.01 BG 2 | Philadelphia | 1 |
| CT 195.01 BG 3 | Philadelphia | 1 |
| CT 195.02 BG 1 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 195.02 BG 2 | Philadelphia | 1 |
| CT 195.02 BG 3 | Philadelphia | 1 |
| CT 197 BG 1 | Philadelphia | 1 |
| CT 197 BG 2 | Philadelphia | 1 |
| CT 197 BG 3 | Philadelphia | 1 |
| CT 197 BG 4 | Philadelphia | 1 |
| CT 197 BG 5 | Philadelphia | 1 |
| CT 197 BG 6 | Philadelphia | 1 |
| CT 198 BG 1 | Philadelphia | 1 |
| CT 198 BG 2 | Philadelphia | 1 |
| CT 198 BG 3 | Philadelphia | 1 |
| CT 198 BG 4 | Philadelphia | 1 |
| CT 198 BG 5 | Philadelphia | 1 |
| CT 198 BG 6 | Philadelphia | 1 |
| CT 199 BG 1 | Philadelphia | 1 |
| CT 199 BG 2 | Philadelphia | 1 |
| CT 199 BG 3 | Philadelphia | 1 |
| CT 199 BG 4 | Philadelphia | 1 |
| CT 2 BG 1 | Philadelphia | 1 |
| CT 20 BG 1 | Philadelphia | 1 |
| CT 20 BG 2 | Philadelphia | 3 |
| CT 200 BG 1 | Philadelphia | 1 |
| CT 200 BG 2 | Philadelphia | 1 |
| CT 201.01 BG 1 | Philadelphia | 1 |
| CT 201.01 BG 2 | Philadelphia | 1 |
| CT 201.01 BG 3 | Philadelphia | 1 |
| CT 201.02 BG 1 | Philadelphia | 3 |
| CT 201.02 BG 2 | Philadelphia | 3 |
| CT 201.02 BG 3 | Philadelphia | 3 |
| CT 201.02 BG 4 | Philadelphia | 3 |
| CT 202 BG 1 | Philadelphia | 1 |
| CT 202 BG 2 | Philadelphia | 1 |
| CT 202 BG 3 | Philadelphia | 1 |
| CT 202 BG 4 | Philadelphia | 1 |
| CT 202 BG 5 | Philadelphia | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 202 BG 6 | Philadelphia | 1 |
| CT 203 BG 1 | Philadelphia | 1 |
| CT 203 BG 2 | Philadelphia | 1 |
| CT 204 BG 1 | Philadelphia | 1 |
| CT 204 BG 2 | Philadelphia | 1 |
| CT 204 BG 3 | Philadelphia | 3 |
| CT 204 BG 4 | Philadelphia | 1 |
| CT 205 BG 1 | Philadelphia | 1 |
| CT 205 BG 2 | Philadelphia | 1 |
| CT 206 BG 1 | Philadelphia | 3 |
| CT 207 BG 4 | Philadelphia | 3 |
| CT 208 BG 1 | Philadelphia | 3 |
| CT 21 BG 1 | Philadelphia | 1 |
| CT 21 BG 2 | Philadelphia | 3 |
| CT 213 BG 5 | Philadelphia | 2 |
| CT 214 BG 3 | Philadelphia | 2 |
| CT 218 BG 2 | Philadelphia | 1 |
| CT 218 BG 3 | Philadelphia | 3 |
| CT 22 BG 2 | Philadelphia | 3 |
| CT 22 BG 3 | Philadelphia | 1 |
| CT 236 BG 2 | Philadelphia | 3 |
| CT 237 BG 1 | Philadelphia | 1 |
| CT 237 BG 2 | Philadelphia | 3 |
| CT 237 BG 3 | Philadelphia | 3 |
| CT 237 BG 4 | Philadelphia | 3 |
| CT 238 BG 1 | Philadelphia | 3 |
| CT 238 BG 2 | Philadelphia | 3 |
| CT 238 BG 3 | Philadelphia | 3 |
| CT 238 BG 4 | Philadelphia | 3 |
| CT 238 BG 5 | Philadelphia | 3 |
| CT 239 BG 1 | Philadelphia | 1 |
| CT 239 BG 2 | Philadelphia | 3 |
| CT 24 BG 5 | Philadelphia | 3 |
| CT 240 BG 1 | Philadelphia | 3 |
| CT 240 BG 2 | Philadelphia | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 240 BG 3 | Philadelphia | 1 |
| CT 240 BG 4 | Philadelphia | 1 |
| CT 241 BG 1 | Philadelphia | 1 |
| CT 242 BG 1 | Philadelphia | 3 |
| CT 242 BG 2 | Philadelphia | 1 |
| CT 242 BG 3 | Philadelphia | 1 |
| CT 242 BG 4 | Philadelphia | 3 |
| CT 243 BG 1 | Philadelphia | 1 |
| CT 243 BG 2 | Philadelphia | 1 |
| CT 243 BG 3 | Philadelphia | 3 |
| CT 243 BG 4 | Philadelphia | 3 |
| CT 244 BG 1 | Philadelphia | 1 |
| CT 244 BG 2 | Philadelphia | 1 |
| CT 244 BG 3 | Philadelphia | 1 |
| CT 245 BG 1 | Philadelphia | 1 |
| CT 245 BG 2 | Philadelphia | 1 |
| CT 245 BG 3 | Philadelphia | 1 |
| CT 245 BG 4 | Philadelphia | 1 |
| CT 246 BG 1 | Philadelphia | 1 |
| CT 246 BG 2 | Philadelphia | 1 |
| CT 246 BG 3 | Philadelphia | 1 |
| CT 247 BG 1 | Philadelphia | 1 |
| CT 247 BG 2 | Philadelphia | 1 |
| CT 247 BG 3 | Philadelphia | 3 |
| CT 247 BG 4 | Philadelphia | 1 |
| CT 247 BG 5 | Philadelphia | 3 |
| CT 248 BG 1 | Philadelphia | 3 |
| CT 248 BG 2 | Philadelphia | 1 |
| CT 249 BG 1 | Philadelphia | 1 |
| CT 249 BG 2 | Philadelphia | 1 |
| CT 249 BG 3 | Philadelphia | 1 |
| CT 249 BG 4 | Philadelphia | 1 |
| CT 25 BG 3 | Philadelphia | 3 |
| CT 25 BG 4 | Philadelphia | 1 |
| CT 252 BG 1 | Philadelphia | 1 |
| CT 252 BG 2 | Philadelphia | 1 |
| CT 252 BG 3 | Philadelphia | 3 |
| CT 252 BG 4 | Philadelphia | 3 |
| CT 252 BG 5 | Philadelphia | 1 |
| CT 252 BG 6 | Philadelphia | 1 |
| CT 252 BG 7 | Philadelphia | 1 |
| CT 253 BG 1 | Philadelphia | 1 |
| CT 253 BG 2 | Philadelphia | 3 |
| CT 253 BG 3 | Philadelphia | 3 |
| CT 253 BG 4 | Philadelphia | 3 |
| CT 253 BG 5 | Philadelphia | 1 |
| CT 254 BG 1 | Philadelphia | 3 |
| CT 254 BG 2 | Philadelphia | 3 |
| CT 254 BG 3 | Philadelphia | 3 |
| CT 254 BG 4 | Philadelphia | 3 |
| CT 255 BG 1 | Philadelphia | 3 |
| CT 255 BG 2 | Philadelphia | 3 |
| CT 255 BG 3 | Philadelphia | 3 |
| CT 256 BG 1 | Philadelphia | 3 |
| CT 257 BG 1 | Philadelphia | 3 |
| CT 258 BG 1 | Philadelphia | 3 |
| CT 259 BG 1 | Philadelphia | 3 |
| CT 259 BG 2 | Philadelphia | 3 |
| CT 259 BG 3 | Philadelphia | 1 |
| CT 259 BG 4 | Philadelphia | 3 |
| CT 259 BG 5 | Philadelphia | 3 |
| CT 259 BG 6 | Philadelphia | 1 |
| CT 260 BG 1 | Philadelphia | 3 |
| CT 260 BG 2 | Philadelphia | 1 |
| CT 260 BG 3 | Philadelphia | 3 |
| CT 261 BG 1 | Philadelphia | 3 |
| CT 261 BG 2 | Philadelphia | 1 |
| CT 261 BG 3 | Philadelphia | 1 |
| CT 262 BG 1 | Philadelphia | 3 |
| CT 262 BG 2 | Philadelphia | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 262 BG 3 | Philadelphia | 3 |
| CT 262 BG 4 | Philadelphia | 3 |
| CT 263.01 BG 1 | Philadelphia | 3 |
| CT 263.01 BG 2 | Philadelphia | 3 |
| CT 263.01 BG 3 | Philadelphia | 3 |
| CT 263.01 BG 4 | Philadelphia | 3 |
| CT 263.02 BG 1 | Philadelphia | 3 |
| CT 263.02 BG 2 | Philadelphia | 1 |
| CT 263.02 BG 3 | Philadelphia | 3 |
| CT 263.02 BG 4 | Philadelphia | 3 |
| CT 264 BG 1 | Philadelphia | 3 |
| CT 264 BG 2 | Philadelphia | 3 |
| CT 264 BG 3 | Philadelphia | 1 |
| CT 264 BG 4 | Philadelphia | 3 |
| CT 264 BG 5 | Philadelphia | 3 |
| CT 264 BG 6 | Philadelphia | 3 |
| CT 264 BG 7 | Philadelphia | 3 |
| CT 265 BG 1 | Philadelphia | 3 |
| CT 265 BG 2 | Philadelphia | 1 |
| CT 265 BG 3 | Philadelphia | 1 |
| CT 265 BG 4 | Philadelphia | 1 |
| CT 265 BG 5 | Philadelphia | 3 |
| CT 265 BG 6 | Philadelphia | 3 |
| CT 266 BG 1 | Philadelphia | 1 |
| CT 266 BG 2 | Philadelphia | 1 |
| CT 266 BG 3 | Philadelphia | 3 |
| CT 266 BG 4 | Philadelphia | 1 |
| CT 266 BG 5 | Philadelphia | 1 |
| CT 266 BG 6 | Philadelphia | 3 |
| CT 266 BG 7 | Philadelphia | 1 |
| CT 266 BG 8 | Philadelphia | 3 |
| CT 267 BG 1 | Philadelphia | 3 |
| CT 267 BG 2 | Philadelphia | 3 |
| CT 267 BG 3 | Philadelphia | 3 |
| CT 267 BG 4 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 267 BG 5 | Philadelphia | 3 |
| CT 267 BG 6 | Philadelphia | 3 |
| CT 267 BG 7 | Philadelphia | 3 |
| CT 268 BG 1 | Philadelphia | 1 |
| CT 268 BG 2 | Philadelphia | 1 |
| CT 268 BG 3 | Philadelphia | 3 |
| CT 268 BG 4 | Philadelphia | 3 |
| CT 269 BG 1 | Philadelphia | 3 |
| CT 269 BG 2 | Philadelphia | 3 |
| CT 27.01 BG 1 | Philadelphia | 3 |
| CT 27.01 BG 2 | Philadelphia | 1 |
| CT 27.01 BG 3 | Philadelphia | 1 |
| CT 27.02 BG 3 | Philadelphia | 2 |
| CT 270 BG 1 | Philadelphia | 3 |
| CT 270 BG 2 | Philadelphia | 3 |
| CT 271 BG 1 | Philadelphia | 3 |
| CT 271 BG 2 | Philadelphia | 1 |
| CT 271 BG 3 | Philadelphia | 3 |
| CT 272 BG 1 | Philadelphia | 3 |
| CT 272 BG 2 | Philadelphia | 3 |
| CT 272 BG 3 | Philadelphia | 1 |
| CT 273 BG 1 | Philadelphia | 3 |
| CT 273 BG 2 | Philadelphia | 1 |
| CT 273 BG 3 | Philadelphia | 1 |
| CT 273 BG 4 | Philadelphia | 3 |
| CT 273 BG 5 | Philadelphia | 3 |
| CT 274.01 BG 1 | Philadelphia | 1 |
| CT 274.01 BG 2 | Philadelphia | 1 |
| CT 274.01 BG 3 | Philadelphia | 1 |
| CT 274.02 BG 1 | Philadelphia | 3 |
| CT 274.02 BG 2 | Philadelphia | 3 |
| CT 274.02 BG 3 | Philadelphia | 3 |
| CT 274.02 BG 4 | Philadelphia | 1 |
| CT 274.02 BG 5 | Philadelphia | 1 |
| CT 275 BG 1 | Philadelphia | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 275 BG 2 | Philadelphia | 3 |
| CT 275 BG 3 | Philadelphia | 1 |
| CT 275 BG 4 | Philadelphia | 1 |
| CT 276 BG 1 | Philadelphia | 1 |
| CT 276 BG 2 | Philadelphia | 3 |
| CT 276 BG 3 | Philadelphia | 1 |
| CT 276 BG 4 | Philadelphia | 1 |
| CT 277 BG 1 | Philadelphia | 1 |
| CT 277 BG 2 | Philadelphia | 1 |
| CT 277 BG 3 | Philadelphia | 1 |
| CT 277 BG 4 | Philadelphia | 3 |
| CT 277 BG 5 | Philadelphia | 3 |
| CT 277 BG 6 | Philadelphia | 1 |
| CT 278 BG 1 | Philadelphia | 3 |
| CT 278 BG 2 | Philadelphia | 1 |
| CT 278 BG 3 | Philadelphia | 3 |
| CT 278 BG 4 | Philadelphia | 1 |
| CT 279.01 BG 1 | Philadelphia | 3 |
| CT 279.01 BG 2 | Philadelphia | 1 |
| CT 279.01 BG 3 | Philadelphia | 3 |
| CT 279.01 BG 4 | Philadelphia | 1 |
| CT 279.02 BG 1 | Philadelphia | 1 |
| CT 279.02 BG 2 | Philadelphia | 1 |
| CT 28.01 BG 1 | Philadelphia | 1 |
| CT 28.01 BG 2 | Philadelphia | 1 |
| CT 28.01 BG 3 | Philadelphia | 3 |
| CT 28.02 BG 1 | Philadelphia | 1 |
| CT 280 BG 1 | Philadelphia | 1 |
| CT 280 BG 2 | Philadelphia | 1 |
| CT 280 BG 3 | Philadelphia | 1 |
| CT 280 BG 4 | Philadelphia | 1 |
| CT 281 BG 1 | Philadelphia | 3 |
| CT 281 BG 2 | Philadelphia | 1 |
| CT 281 BG 3 | Philadelphia | 1 |
| CT 282 BG 1 | Philadelphia | 1 |
| CT 282 BG 2 | Philadelphia | 1 |
| CT 282 BG 3 | Philadelphia | 1 |
| CT 283 BG 1 | Philadelphia | 1 |
| CT 283 BG 2 | Philadelphia | 1 |
| CT 283 BG 3 | Philadelphia | 3 |
| CT 283 BG 4 | Philadelphia | 1 |
| CT 283 BG 5 | Philadelphia | 3 |
| CT 283 BG 6 | Philadelphia | 1 |
| CT 283 BG 7 | Philadelphia | 1 |
| CT 284 BG 1 | Philadelphia | 1 |
| CT 284 BG 2 | Philadelphia | 1 |
| CT 284 BG 3 | Philadelphia | 1 |
| CT 284 BG 4 | Philadelphia | 3 |
| CT 285 BG 1 | Philadelphia | 1 |
| CT 286 BG 1 | Philadelphia | 1 |
| CT 286 BG 2 | Philadelphia | 1 |
| CT 286 BG 3 | Philadelphia | 1 |
| CT 286 BG 4 | Philadelphia | 3 |
| CT 286 BG 5 | Philadelphia | 1 |
| CT 286 BG 6 | Philadelphia | 1 |
| CT 287 BG 1 | Philadelphia | 1 |
| CT 287 BG 2 | Philadelphia | 1 |
| CT 288 BG 1 | Philadelphia | 1 |
| CT 288 BG 2 | Philadelphia | 1 |
| CT 288 BG 3 | Philadelphia | 1 |
| CT 289.01 BG 1 | Philadelphia | 1 |
| CT 289.01 BG 2 | Philadelphia | 1 |
| CT 289.01 BG 3 | Philadelphia | 1 |
| CT 289.02 BG 1 | Philadelphia | 1 |
| CT 289.02 BG 2 | Philadelphia | 1 |
| CT 289.02 BG 3 | Philadelphia | 1 |
| CT 289.02 BG 4 | Philadelphia | 1 |
| CT 289.02 BG 5 | Philadelphia | 1 |
| CT 29 BG 1 | Philadelphia | 2 |
| CT 290 BG 1 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 290 BG 2 | Philadelphia | 1 |
| CT 290 BG 3 | Philadelphia | 1 |
| CT 290 BG 4 | Philadelphia | 1 |
| CT 291 BG 1 | Philadelphia | 1 |
| CT 291 BG 2 | Philadelphia | 1 |
| CT 291 BG 3 | Philadelphia | 1 |
| CT 291 BG 4 | Philadelphia | 3 |
| CT 292 BG 1 | Philadelphia | 3 |
| CT 292 BG 2 | Philadelphia | 1 |
| CT 292 BG 3 | Philadelphia | 3 |
| CT 293 BG 1 | Philadelphia | 1 |
| CT 293 BG 2 | Philadelphia | 1 |
| CT 294 BG 1 | Philadelphia | 1 |
| CT 294 BG 2 | Philadelphia | 1 |
| CT 294 BG 3 | Philadelphia | 1 |
| CT 298 BG 1 | Philadelphia | 1 |
| CT 298 BG 2 | Philadelphia | 1 |
| CT 298 BG 3 | Philadelphia | 3 |
| CT 298 BG 4 | Philadelphia | 1 |
| CT 298 BG 5 | Philadelphia | 1 |
| CT 299 BG 1 | Philadelphia | 1 |
| CT 299 BG 2 | Philadelphia | 1 |
| CT 299 BG 3 | Philadelphia | 1 |
| CT 299 BG 4 | Philadelphia | 1 |
| CT 30.01 BG 1 | Philadelphia | 1 |
| CT 30.01 BG 3 | Philadelphia | 3 |
| CT 30.01 BG 4 | Philadelphia | 1 |
| CT 30.01 BG 5 | Philadelphia | 1 |
| CT 30.02 BG 1 | Philadelphia | 3 |
| CT 30.02 BG 2 | Philadelphia | 1 |
| CT 30.02 BG 3 | Philadelphia | 3 |
| CT 30.02 BG 4 | Philadelphia | 1 |
| CT 300 BG 1 | Philadelphia | 1 |
| CT 300 BG 2 | Philadelphia | 1 |
| CT 300 BG 3 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 300 BG 4 | Philadelphia | 1 |
| CT 300 BG 5 | Philadelphia | 1 |
| CT 300 BG 6 | Philadelphia | 1 |
| CT 300 BG 7 | Philadelphia | 1 |
| CT 301 BG 1 | Philadelphia | 1 |
| CT 301 BG 2 | Philadelphia | 1 |
| CT 301 BG 4 | Philadelphia | 3 |
| CT 301 BG 5 | Philadelphia | 1 |
| CT 302 BG 1 | Philadelphia | 1 |
| CT 302 BG 2 | Philadelphia | 3 |
| CT 302 BG 3 | Philadelphia | 3 |
| CT 302 BG 4 | Philadelphia | 3 |
| CT 302 BG 5 | Philadelphia | 1 |
| CT 305.01 BG 1 | Philadelphia | 1 |
| CT 305.01 BG 2 | Philadelphia | 1 |
| CT 305.01 BG 3 | Philadelphia | 1 |
| CT 305.02 BG 1 | Philadelphia | 3 |
| CT 305.02 BG 2 | Philadelphia | 1 |
| CT 305.02 BG 3 | Philadelphia | 1 |
| CT 305.02 BG 4 | Philadelphia | 1 |
| CT 305.02 BG 5 | Philadelphia | 3 |
| CT 306 BG 2 | Philadelphia | 3 |
| CT 306 BG 3 | Philadelphia | 3 |
| CT 306 BG 4 | Philadelphia | 3 |
| CT 306 BG 5 | Philadelphia | 3 |
| CT 306 BG 6 | Philadelphia | 3 |
| CT 306 BG 7 | Philadelphia | 3 |
| CT 307 BG 1 | Philadelphia | 1 |
| CT 307 BG 2 | Philadelphia | 1 |
| CT 307 BG 3 | Philadelphia | 3 |
| CT 308 BG 3 | Philadelphia | 1 |
| CT 308 BG 4 | Philadelphia | 3 |
| CT 309 BG 1 | Philadelphia | 1 |
| CT 309 BG 2 | Philadelphia | 1 |
| CT 309 BG 3 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 31 BG 1 | Philadelphia | 3 |
| CT 31 BG 2 | Philadelphia | 1 |
| CT 31 BG 3 | Philadelphia | 1 |
| CT 31 BG 4 | Philadelphia | 1 |
| CT 31 BG 5 | Philadelphia | 1 |
| CT 31 BG 6 | Philadelphia | 3 |
| CT 310 BG 1 | Philadelphia | 3 |
| CT 310 BG 2 | Philadelphia | 3 |
| CT 310 BG 4 | Philadelphia | 3 |
| CT 310 BG 5 | Philadelphia | 1 |
| CT 310 BG 6 | Philadelphia | 3 |
| CT 310 BG 7 | Philadelphia | 3 |
| CT 311.01 BG 1 | Philadelphia | 1 |
| CT 311.01 BG 2 | Philadelphia | 1 |
| CT 311.01 BG 3 | Philadelphia | 3 |
| CT 311.01 BG 4 | Philadelphia | 1 |
| CT 311.02 BG 1 | Philadelphia | 3 |
| CT 311.02 BG 2 | Philadelphia | 1 |
| CT 311.02 BG 3 | Philadelphia | 1 |
| CT 311.02 BG 4 | Philadelphia | 1 |
| CT 312 BG 1 | Philadelphia | 1 |
| CT 312 BG 2 | Philadelphia | 1 |
| CT 312 BG 3 | Philadelphia | 1 |
| CT 313 BG 1 | Philadelphia | 1 |
| CT 313 BG 2 | Philadelphia | 1 |
| CT 313 BG 3 | Philadelphia | 3 |
| CT 313 BG 4 | Philadelphia | 1 |
| CT 313 BG 5 | Philadelphia | 1 |
| CT 313 BG 6 | Philadelphia | 1 |
| CT 314.01 BG 1 | Philadelphia | 1 |
| CT 314.01 BG 2 | Philadelphia | 1 |
| CT 314.01 BG 3 | Philadelphia | 1 |
| CT 314.01 BG 4 | Philadelphia | 1 |
| CT 314.01 BG 5 | Philadelphia | 1 |
| CT 314.02 BG 1 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 314.02 BG 2 | Philadelphia | 1 |
| CT 314.02 BG 3 | Philadelphia | 1 |
| CT 315.01 BG 3 | Philadelphia | 2 |
| CT 315.02 BG 1 | Philadelphia | 1 |
| CT 315.02 BG 2 | Philadelphia | 2 |
| CT 316 BG 2 | Philadelphia | 2 |
| CT 316 BG 3 | Philadelphia | 1 |
| CT 316 BG 5 | Philadelphia | 2 |
| CT 316 BG 7 | Philadelphia | 3 |
| CT 317 BG 1 | Philadelphia | 3 |
| CT 317 BG 2 | Philadelphia | 3 |
| CT 317 BG 3 | Philadelphia | 1 |
| CT 317 BG 4 | Philadelphia | 3 |
| CT 317 BG 5 | Philadelphia | 1 |
| CT 318 BG 1 | Philadelphia | 3 |
| CT 318 BG 2 | Philadelphia | 1 |
| CT 318 BG 3 | Philadelphia | 1 |
| CT 318 BG 4 | Philadelphia | 3 |
| CT 319 BG 1 | Philadelphia | 1 |
| CT 319 BG 2 | Philadelphia | 3 |
| CT 319 BG 3 | Philadelphia | 2 |
| CT 319 BG 4 | Philadelphia | 1 |
| CT 319 BG 5 | Philadelphia | 3 |
| CT 32 BG 1 | Philadelphia | 1 |
| CT 32 BG 2 | Philadelphia | 1 |
| CT 32 BG 3 | Philadelphia | 1 |
| CT 32 BG 4 | Philadelphia | 1 |
| CT 32 BG 5 | Philadelphia | 3 |
| CT 32 BG 6 | Philadelphia | 1 |
| CT 320 BG 1 | Philadelphia | 2 |
| CT 320 BG 3 | Philadelphia | 3 |
| CT 320 BG 4 | Philadelphia | 1 |
| CT 320 BG 5 | Philadelphia | 3 |
| CT 320 BG 6 | Philadelphia | 3 |
| CT 320 BG 7 | Philadelphia | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 321 BG 1 | Philadelphia | 1 |
| CT 321 BG 2 | Philadelphia | 1 |
| CT 321 BG 3 | Philadelphia | 2 |
| CT 323 BG 1 | Philadelphia | 1 |
| CT 323 BG 2 | Philadelphia | 1 |
| CT 325 BG 1 | Philadelphia | 3 |
| CT 325 BG 3 | Philadelphia | 1 |
| CT 325 BG 4 | Philadelphia | 2 |
| CT 326 BG 1 | Philadelphia | 1 |
| CT 326 BG 3 | Philadelphia | 3 |
| CT 326 BG 4 | Philadelphia | 3 |
| CT 326 BG 5 | Philadelphia | 3 |
| CT 326 BG 6 | Philadelphia | 2 |
| CT 329 BG 1 | Philadelphia | 1 |
| CT 329 BG 3 | Philadelphia | 1 |
| CT 329 BG 4 | Philadelphia | 2 |
| CT 33 BG 1 | Philadelphia | 1 |
| CT 33 BG 2 | Philadelphia | 1 |
| CT 33 BG 3 | Philadelphia | 1 |
| CT 33 BG 4 | Philadelphia | 1 |
| CT 33 BG 5 | Philadelphia | 2 |
| CT 33 BG 6 | Philadelphia | 1 |
| CT 330 BG 1 | Philadelphia | 3 |
| CT 330 BG 3 | Philadelphia | 2 |
| CT 330 BG 4 | Philadelphia | 1 |
| CT 330 BG 6 | Philadelphia | 1 |
| CT 331.02 BG 1 | Philadelphia | 2 |
| CT 331.02 BG 2 | Philadelphia | 2 |
| CT 334 BG 3 | Philadelphia | 1 |
| CT 334 BG 4 | Philadelphia | 3 |
| CT 335 BG 1 | Philadelphia | 1 |
| CT 335 BG 2 | Philadelphia | 1 |
| CT 335 BG 3 | Philadelphia | 3 |
| CT 336 BG 2 | Philadelphia | 2 |
| CT 336 BG 3 | Philadelphia | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 336 BG 4 | Philadelphia | 2 |
| CT 337.01 BG 1 | Philadelphia | 1 |
| CT 337.01 BG 3 | Philadelphia | 1 |
| CT 337.02 BG 2 | Philadelphia | 2 |
| CT 338 BG 1 | Philadelphia | 2 |
| CT 338 BG 3 | Philadelphia | 2 |
| CT 339 BG 2 | Philadelphia | 1 |
| CT 340 BG 2 | Philadelphia | 3 |
| CT 345.01 BG 1 | Philadelphia | 2 |
| CT 345.02 BG 3 | Philadelphia | 1 |
| CT 346 BG 1 | Philadelphia | 1 |
| CT 347.01 BG 1 | Philadelphia | 3 |
| CT 348.02 BG 1 | Philadelphia | 3 |
| CT 349 BG 1 | Philadelphia | 3 |
| CT 349 BG 2 | Philadelphia | 3 |
| CT 349 BG 4 | Philadelphia | 2 |
| CT 356.01 BG 4 | Philadelphia | 2 |
| CT 357.01 BG 1 | Philadelphia | 2 |
| CT 357.01 BG 2 | Philadelphia | 3 |
| CT 357.02 BG 1 | Philadelphia | 2 |
| CT 357.02 BG 2 | Philadelphia | 2 |
| CT 358 BG 1 | Philadelphia | 3 |
| CT 358 BG 3 | Philadelphia | 2 |
| CT 36 BG 1 | Philadelphia | 3 |
| CT 36 BG 2 | Philadelphia | 1 |
| CT 36 BG 3 | Philadelphia | 1 |
| CT 36 BG 4 | Philadelphia | 1 |
| CT 361 BG 1 | Philadelphia | 3 |
| CT 364 BG 1 | Philadelphia | 2 |
| CT 365.01 BG 3 | Philadelphia | 3 |
| CT 369 BG 3 | Philadelphia | 2 |
| CT 37.01 BG 1 | Philadelphia | 1 |
| CT 37.01 BG 2 | Philadelphia | 1 |
| CT 37.01 BG 3 | Philadelphia | 1 |
| CT 37.01 BG 4 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 37.01 BG 5 | Philadelphia | 3 |
| CT 37.02 BG 1 | Philadelphia | 1 |
| CT 37.02 BG 2 | Philadelphia | 1 |
| CT 37.02 BG 3 | Philadelphia | 1 |
| CT 372 BG 4 | Philadelphia | 1 |
| CT 373 BG 3 | Philadelphia | 3 |
| CT 375 BG 1 | Philadelphia | 3 |
| CT 375 BG 2 | Philadelphia | 3 |
| CT 376 BG 1 | Philadelphia | 1 |
| CT 377 BG 1 | Philadelphia | 1 |
| CT 377 BG 2 | Philadelphia | 1 |
| CT 377 BG 3 | Philadelphia | 1 |
| CT 378 BG 2 | Philadelphia | 2 |
| CT 380 BG 2 | Philadelphia | 2 |
| CT 381 BG 1 | Philadelphia | 2 |
| CT 381 BG 2 | Philadelphia | 1 |
| CT 382 BG 1 | Philadelphia | 1 |
| CT 382 BG 3 | Philadelphia | 1 |
| CT 383 BG 1 | Philadelphia | 1 |
| CT 383 BG 2 | Philadelphia | 1 |
| CT 383 BG 3 | Philadelphia | 1 |
| CT 389 BG 1 | Philadelphia | 1 |
| CT 389 BG 2 | Philadelphia | 3 |
| CT 389 BG 3 | Philadelphia | 1 |
| CT 39.01 BG 1 | Philadelphia | 2 |
| CT 39.01 BG 4 | Philadelphia | 3 |
| CT 390 BG 1 | Philadelphia | 1 |
| CT 390 BG 2 | Philadelphia | 3 |
| CT 390 BG 3 | Philadelphia | 1 |
| CT 390 BG 4 | Philadelphia | 1 |
| CT 390 BG 5 | Philadelphia | 1 |
| CT 390 BG 6 | Philadelphia | 3 |
| CT 390 BG 7 | Philadelphia | 1 |
| CT 390 BG 8 | Philadelphia | 1 |
| CT 40.01 BG 3 | Philadelphia | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 41.01 BG 1 | Philadelphia | 1 |
| CT 41.01 BG 2 | Philadelphia | 1 |
| CT 41.01 BG 3 | Philadelphia | 1 |
| CT 41.01 BG 4 | Philadelphia | 1 |
| CT 41.02 BG 1 | Philadelphia | 1 |
| CT 41.02 BG 2 | Philadelphia | 1 |
| CT 41.02 BG 3 | Philadelphia | 2 |
| CT 41.02 BG 4 | Philadelphia | 2 |
| CT 42.02 BG 2 | Philadelphia | 1 |
| CT 5 BG 1 | Philadelphia | 3 |
| CT 54 BG 1 | Philadelphia | 3 |
| CT 55 BG 1 | Philadelphia | 1 |
| CT 55 BG 2 | Philadelphia | 3 |
| CT 55 BG 3 | Philadelphia | 3 |
| CT 56 BG 1 | Philadelphia | 1 |
| CT 60 BG 1 | Philadelphia | 1 |
| CT 60 BG 2 | Philadelphia | 1 |
| CT 60 BG 3 | Philadelphia | 1 |
| CT 60 BG 4 | Philadelphia | 1 |
| CT 60 BG 5 | Philadelphia | 3 |
| CT 61 BG 1 | Philadelphia | 1 |
| CT 61 BG 2 | Philadelphia | 1 |
| CT 62 BG 1 | Philadelphia | 3 |
| CT 62 BG 2 | Philadelphia | 1 |
| CT 62 BG 3 | Philadelphia | 1 |
| CT 62 BG 4 | Philadelphia | 1 |
| CT 63 BG 1 | Philadelphia | 1 |
| CT 63 BG 2 | Philadelphia | 1 |
| CT 63 BG 3 | Philadelphia | 1 |
| CT 63 BG 4 | Philadelphia | 1 |
| CT 64 BG 1 | Philadelphia | 1 |
| CT 64 BG 2 | Philadelphia | 1 |
| CT 64 BG 3 | Philadelphia | 1 |
| CT 65 BG 1 | Philadelphia | 1 |
| CT 65 BG 2 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 65 BG 3 | Philadelphia | 1 |
| CT 65 BG 4 | Philadelphia | 1 |
| CT 65 BG 5 | Philadelphia | 3 |
| CT 65 BG 6 | Philadelphia | 1 |
| CT 66 BG 1 | Philadelphia | 1 |
| CT 66 BG 2 | Philadelphia | 1 |
| CT 66 BG 3 | Philadelphia | 1 |
| CT 66 BG 4 | Philadelphia | 1 |
| CT 67 BG 1 | Philadelphia | 3 |
| CT 67 BG 2 | Philadelphia | 3 |
| CT 67 BG 3 | Philadelphia | 1 |
| CT 67 BG 4 | Philadelphia | 1 |
| CT 67 BG 5 | Philadelphia | 1 |
| CT 67 BG 6 | Philadelphia | 3 |
| CT 67 BG 7 | Philadelphia | 1 |
| CT 69 BG 1 | Philadelphia | 1 |
| CT 69 BG 2 | Philadelphia | 1 |
| CT 69 BG 3 | Philadelphia | 1 |
| CT 7 BG 3 | Philadelphia | 3 |
| CT 70 BG 1 | Philadelphia | 1 |
| CT 70 BG 2 | Philadelphia | 1 |
| CT 70 BG 3 | Philadelphia | 1 |
| CT 70 BG 4 | Philadelphia | 3 |
| CT 70 BG 5 | Philadelphia | 1 |
| CT 71.01 BG 1 | Philadelphia | 1 |
| CT 71.01 BG 2 | Philadelphia | 1 |
| CT 71.01 BG 3 | Philadelphia | 1 |
| CT 71.02 BG 1 | Philadelphia | 1 |
| CT 71.02 BG 2 | Philadelphia | 1 |
| CT 71.02 BG 3 | Philadelphia | 1 |
| CT 71.02 BG 4 | Philadelphia | 1 |
| CT 71.02 BG 5 | Philadelphia | 1 |
| CT 72 BG 1 | Philadelphia | 1 |
| CT 72 BG 2 | Philadelphia | 1 |
| CT 72 BG 3 | Philadelphia | 1 |
| CT 72 BG 4 | Philadelphia | 1 |
| CT 72 BG 5 | Philadelphia | 3 |
| CT 72 BG 6 | Philadelphia | 1 |
| CT 73 BG 1 | Philadelphia | 1 |
| CT 73 BG 2 | Philadelphia | 1 |
| CT 73 BG 3 | Philadelphia | 3 |
| CT 73 BG 4 | Philadelphia | 1 |
| CT 74 BG 1 | Philadelphia | 1 |
| CT 74 BG 2 | Philadelphia | 1 |
| CT 74 BG 3 | Philadelphia | 1 |
| CT 74 BG 4 | Philadelphia | 1 |
| CT 74 BG 5 | Philadelphia | 1 |
| CT 77 BG 1 | Philadelphia | 1 |
| CT 77 BG 2 | Philadelphia | 1 |
| CT 78 BG 1 | Philadelphia | 1 |
| CT 78 BG 2 | Philadelphia | 1 |
| CT 78 BG 3 | Philadelphia | 1 |
| CT 79 BG 1 | Philadelphia | 3 |
| CT 79 BG 3 | Philadelphia | 3 |
| CT 79 BG 4 | Philadelphia | 3 |
| CT 80 BG 1 | Philadelphia | 3 |
| CT 80 BG 2 | Philadelphia | 3 |
| CT 80 BG 3 | Philadelphia | 3 |
| CT 80 BG 4 | Philadelphia | 1 |
| CT 81.01 BG 1 | Philadelphia | 1 |
| CT 81.01 BG 2 | Philadelphia | 1 |
| CT 81.01 BG 3 | Philadelphia | 1 |
| CT 81.02 BG 1 | Philadelphia | 1 |
| CT 81.02 BG 2 | Philadelphia | 1 |
| CT 81.02 BG 3 | Philadelphia | 1 |
| CT 81.02 BG 4 | Philadelphia | 1 |
| CT 81.02 BG 5 | Philadelphia | 1 |
| CT 82 BG 1 | Philadelphia | 1 |
| CT 82 BG 2 | Philadelphia | 1 |
| CT 82 BG 3 | Philadelphia | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 82 BG 4 | Philadelphia | 3 |
| CT 82 BG 5 | Philadelphia | 3 |
| CT 82 BG 6 | Philadelphia | 3 |
| CT 82 BG 7 | Philadelphia | 1 |
| CT 83.01 BG 1 | Philadelphia | 1 |
| CT 83.01 BG 2 | Philadelphia | 3 |
| CT 83.01 BG 3 | Philadelphia | 1 |
| CT 83.02 BG 1 | Philadelphia | 1 |
| CT 83.02 BG 2 | Philadelphia | 1 |
| CT 83.02 BG 3 | Philadelphia | 1 |
| CT 83.02 BG 4 | Philadelphia | 3 |
| CT 84 BG 1 | Philadelphia | 1 |
| CT 84 BG 2 | Philadelphia | 1 |
| CT 84 BG 3 | Philadelphia | 3 |
| CT 84 BG 4 | Philadelphia | 1 |
| CT 84 BG 5 | Philadelphia | 1 |
| CT 84 BG 6 | Philadelphia | 3 |
| CT 85 BG 1 | Philadelphia | 1 |
| CT 85 BG 2 | Philadelphia | 1 |
| CT 85 BG 3 | Philadelphia | 3 |
| CT 85 BG 4 | Philadelphia | 1 |
| CT 85 BG 5 | Philadelphia | 1 |
| CT 85 BG 6 | Philadelphia | 1 |
| CT 85 BG 7 | Philadelphia | 1 |
| CT 86.01 BG 1 | Philadelphia | 3 |
| CT 86.02 BG 1 | Philadelphia | 1 |
| CT 86.02 BG 2 | Philadelphia | 1 |
| CT 86.02 BG 3 | Philadelphia | 3 |
| CT 87.01 BG 2 | Philadelphia | 1 |
| CT 87.01 BG 3 | Philadelphia | 1 |
| CT 87.02 BG 1 | Philadelphia | 1 |
| CT 88.01 BG 1 | Philadelphia | 2 |
| CT 88.01 BG 2 | Philadelphia | 1 |
| CT 88.02 BG 1 | Philadelphia | 1 |
| CT 88.02 BG 2 | Philadelphia | 1 |
| CT 88.02 BG 3 | Philadelphia | 2 |
| CT 88.02 BG 4 | Philadelphia | 2 |
| CT 90 BG 2 | Philadelphia | 2 |
| CT 90 BG 3 | Philadelphia | 2 |
| CT 90 BG 4 | Philadelphia | 2 |
| CT 91 BG 1 | Philadelphia | 3 |
| CT 91 BG 2 | Philadelphia | 3 |
| CT 91 BG 3 | Philadelphia | 1 |
| CT 92 BG 1 | Philadelphia | 1 |
| CT 92 BG 2 | Philadelphia | 1 |
| CT 93 BG 1 | Philadelphia | 1 |
| CT 93 BG 2 | Philadelphia | 1 |
| CT 93 BG 3 | Philadelphia | 1 |
| CT 93 BG 4 | Philadelphia | 1 |
| CT 93 BG 5 | Philadelphia | 1 |
| CT 94 BG 1 | Philadelphia | 1 |
| CT 94 BG 2 | Philadelphia | 1 |
| CT 94 BG 3 | Philadelphia | 3 |
| CT 94 BG 4 | Philadelphia | 1 |
| CT 95 BG 1 | Philadelphia | 1 |
| CT 95 BG 2 | Philadelphia | 1 |
| CT 95 BG 3 | Philadelphia | 3 |
| CT 95 BG 4 | Philadelphia | 1 |
| CT 96 BG 1 | Philadelphia | 1 |
| CT 96 BG 2 | Philadelphia | 1 |
| CT 96 BG 3 | Philadelphia | 1 |
| CT 96 BG 4 | Philadelphia | 1 |
| CT 96 BG 5 | Philadelphia | 3 |
| CT 98.01 BG 1 | Philadelphia | 3 |
| CT 98.01 BG 2 | Philadelphia | 1 |
| CT 98.02 BG 1 | Philadelphia | 3 |
| CT 98.02 BG 2 | Philadelphia | 3 |
| CT 98.02 BG 3 | Philadelphia | 1 |
| CT 9800 BG 1 | Philadelphia | 3 |
| CT 9891 BG 1 | Philadelphia | 1 |

### Table G-EJ21. Census Tracts (CT) and Block Groups (BG) in Delaware County, Pennsylvania (County ID 42-045) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4003.01 BG 1 | Upper Darby | 1 |
| CT 4003.01 BG 2 | Upper Darby | 1 |
| CT 4003.01 BG 3 | Upper Darby | 1 |
| CT 4003.01 BG 4 | Upper Darby | 1 |
| CT 4003.02 BG 1 | Upper Darby | 1 |
| CT 4003.02 BG 2 | Upper Darby | 1 |
| CT 4003.02 BG 3 | Upper Darby | 1 |
| CT 4004.01 BG 1 | Upper Darby | 1 |
| CT 4004.01 BG 2 | Upper Darby | 1 |
| CT 4004.01 BG 3 | Upper Darby | 1 |
| CT 4004.02 BG 1 | Upper Darby | 1 |
| CT 4004.02 BG 2 | Upper Darby | 1 |
| CT 4004.02 BG 3 | Upper Darby | 1 |
| CT 4004.02 BG 4 | Upper Darby | 1 |
| CT 4005 BG 1 | Upper Darby | 1 |
| CT 4005 BG 2 | Upper Darby | 3 |
| CT 4005 BG 3 | Upper Darby | 1 |
| CT 4005 BG 4 | Upper Darby | 1 |
| CT 4006 BG 1 | Upper Darby | 1 |
| CT 4006 BG 2 | Upper Darby | 2 |
| CT 4006 BG 3 | Upper Darby | 3 |
| CT 4006 BG 4 | Upper Darby | 3 |
| CT 4006 BG 5 | Upper Darby | 1 |
| CT 4007 BG 1 | Upper Darby | 1 |
| CT 4007 BG 2 | Upper Darby | 1 |
| CT 4007 BG 3 | Upper Darby | 3 |
| CT 4007 BG 4 | Upper Darby | 1 |
| CT 4008.01 BG 1 | Upper Darby | 1 |
| CT 4008.02 BG 1 | Upper Darby | 1 |
| CT 4008.02 BG 3 | Upper Darby | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4010 BG 2 | Upper Darby | 3 |
| CT 4011.01 BG 1 | Upper Darby | 3 |
| CT 4011.01 BG 3 | Upper Darby | 2 |
| CT 4011.03 BG 2 | Upper Darby | 3 |
| CT 4011.04 BG 1 | Upper Darby | 2 |
| CT 4012 BG 2 | Upper Darby | 2 |
| CT 4012 BG 3 | Upper Darby | 2 |
| CT 4012 BG 4 | Upper Darby | 2 |
| CT 4013.01 BG 1 | Upper Darby | 3 |
| CT 4013.02 BG 1 | Upper Darby | 2 |
| CT 4014.01 BG 1 | Upper Darby | 2 |
| CT 4014.01 BG 2 | Upper Darby | 2 |
| CT 4014.02 BG 2 | Upper Darby | 3 |
| CT 4014.02 BG 3 | Upper Darby | 2 |
| CT 4014.02 BG 4 | Upper Darby | 1 |
| CT 4015.01 BG 2 | Upper Darby | 2 |
| CT 4015.02 BG 1 | Upper Darby | 1 |
| CT 4015.02 BG 3 | Upper Darby | 1 |
| CT 4016 BG 1 | Upper Darby | 1 |
| CT 4016 BG 2 | Upper Darby | 1 |
| CT 4017 BG 1 | East Lansdowne | 1 |
| CT 4018 BG 1 | Lansdowne | 3 |
| CT 4018 BG 2 | Lansdowne | 1 |
| CT 4018 BG 3 | Lansdowne | 1 |
| CT 4019 BG 1 | Lansdowne | 1 |
| CT 4019 BG 3 | Lansdowne | 1 |
| CT 4019 BG 4 | Lansdowne | 3 |
| CT 4019 BG 5 | Lansdowne | 1 |
| CT 4020 BG 1 | Lansdowne | 1 |
| CT 4020 BG 2 | Lansdowne | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4021 BG 1 | Yeadon | 1 |
| CT 4021 BG 2 | Yeadon | 1 |
| CT 4021 BG 3 | Yeadon | 3 |
| CT 4021 BG 4 | Yeadon | 1 |
| CT 4022 BG 1 | Yeadon | 1 |
| CT 4022 BG 2 | Yeadon | 1 |
| CT 4023 BG 1 | Yeadon | 1 |
| CT 4023 BG 2 | Yeadon | 1 |
| CT 4023 BG 3 | Yeadon | 1 |
| CT 4024 BG 1 | Darby | 1 |
| CT 4024 BG 2 | Darby | 1 |
| CT 4024 BG 3 | Darby | 1 |
| CT 4025 BG 1 | Darby | 1 |
| CT 4025 BG 2 | Darby | 1 |
| CT 4025 BG 3 | Darby | 1 |
| CT 4026 BG 1 | Darby | 1 |
| CT 4026 BG 2 | Darby | 1 |
| CT 4027 BG 1 | Colwyn | 1 |
| CT 4027 BG 2 | Colwyn | 1 |
| CT 4028 BG 1 | Sharon Hill | 1 |
| CT 4028 BG 2 | Sharon Hill | 1 |
| CT 4028 BG 3 | Sharon Hill | 3 |
| CT 4028 BG 4 | Sharon Hill | 3 |
| CT 4028 BG 5 | Sharon Hill | 1 |
| CT 4029 BG 1 | Darby | 1 |
| CT 4029 BG 2 | Darby | 1 |
| CT 4029 BG 3 | Darby | 1 |
| CT 4030.01 BG 2 | Darby | 2 |
| CT 4030.02 BG 1 | Darby | 2 |
| CT 4030.02 BG 2 | Darby | 2 |
| CT 4031.01 BG 1 | Collingdale | 1 |
| CT 4031.01 BG 2 | Collingdale | 1 |
| CT 4031.01 BG 3 | Collingdale | 1 |
| CT 4031.03 BG 1 | Collingdale | 1 |
| CT 4031.03 BG 2 | Collingdale | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4031.04 BG 1 | Collingdale | 1 |
| CT 4031.04 BG 2 | Collingdale | 1 |
| CT 4032 BG 1 | Aldan | 3 |
| CT 4032 BG 4 | Aldan | 1 |
| CT 4033 BG 1 | Clifton Heights | 2 |
| CT 4033 BG 2 | Clifton Heights | 1 |
| CT 4033 BG 3 | Clifton Heights | 1 |
| CT 4033 BG 4 | Clifton Heights | 2 |
| CT 4033 BG 5 | Clifton Heights | 3 |
| CT 4034.01 BG 2 | Folcroft | 1 |
| CT 4034.02 BG 1 | Folcroft | 1 |
| CT 4034.02 BG 2 | Folcroft | 1 |
| CT 4035.01 BG 3 | Glenolden | 2 |
| CT 4035.02 BG 1 | Glenolden | 2 |
| CT 4035.02 BG 2 | Glenolden | 1 |
| CT 4036.01 BG 3 | Norwood | 2 |
| CT 4036.01 BG 4 | Norwood | 2 |
| CT 4037.01 BG 1 | Tinicum | 2 |
| CT 4037.02 BG 1 | Tinicum | 2 |
| CT 4037.02 BG 2 | Tinicum | 2 |
| CT 4038 BG 3 | Prospect Park | 3 |
| CT 4038 BG 5 | Prospect Park | 2 |
| CT 4039.01 BG 2 | Ridley Park | 2 |
| CT 4040.04 BG 3 | Ridley | 2 |
| CT 4041.01 BG 4 | Ridley | 2 |
| CT 4041.02 BG 3 | Ridley | 2 |
| CT 4041.02 BG 4 | Ridley | 1 |
| CT 4041.03 BG 1 | Ridley | 2 |
| CT 4041.03 BG 2 | Ridley | 2 |
| CT 4043 BG 1 | Eddystone | 2 |
| CT 4043 BG 2 | Eddystone | 1 |
| CT 4043 BG 3 | Eddystone | 2 |
| CT 4044 BG 1 | Chester | 3 |
| CT 4044 BG 2 | Chester | 1 |
| CT 4045 BG 1 | Chester | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4045 BG 2 | Chester | 1 |
| CT 4045 BG 3 | Chester | 1 |
| CT 4045 BG 4 | Chester | 1 |
| CT 4046 BG 1 | Chester | 1 |
| CT 4046 BG 2 | Chester | 1 |
| CT 4046 BG 3 | Chester | 3 |
| CT 4047 BG 1 | Chester | 1 |
| CT 4047 BG 2 | Chester | 1 |
| CT 4048 BG 1 | Chester | 1 |
| CT 4048 BG 2 | Chester | 1 |
| CT 4048 BG 3 | Chester | 1 |
| CT 4049 BG 1 | Chester | 1 |
| CT 4049 BG 2 | Chester | 1 |
| CT 4050 BG 1 | Chester | 1 |
| CT 4050 BG 2 | Chester | 1 |
| CT 4050 BG 3 | Chester | 1 |
| CT 4051 BG 1 | Chester | 1 |
| CT 4051 BG 2 | Chester | 1 |
| CT 4052 BG 1 | Chester | 1 |
| CT 4052 BG 2 | Chester | 1 |
| CT 4052 BG 3 | Chester | 1 |
| CT 4053 BG 1 | Chester | 1 |
| CT 4053 BG 2 | Chester | 1 |
| CT 4054 BG 1 | Chester | 1 |
| CT 4054 BG 2 | Chester | 1 |
| CT 4061 BG 1 | Parkside | 2 |
| CT 4061 BG 2 | Parkside | 2 |
| CT 4062.02 BG 4 | Brookhaven | 2 |
| CT 4063 BG 1 | Upland | 1 |
| CT 4063 BG 2 | Upland | 1 |
| CT 4063 BG 3 | Upland | 1 |
| CT 4064.01 BG 1 | Chester | 1 |
| CT 4064.01 BG 2 | Chester | 1 |
| CT 4064.02 BG 1 | Chester | 1 |
| CT 4064.02 BG 2 | Chester | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4065 BG 1 | Trainer | 1 |
| CT 4065 BG 2 | Trainer | 1 |
| CT 4066 BG 1 | Marcus Hook | 2 |
| CT 4066 BG 2 | Marcus Hook | 1 |
| CT 4067 BG 1 | Lower Chichester | 2 |
| CT 4067 BG 2 | Lower Chichester | 2 |
| CT 4068.01 BG 1 | Upper Chichester | 2 |
| CT 4068.01 BG 3 | Upper Chichester | 2 |
| CT 4068.02 BG 2 | Upper Chichester | 1 |
| CT 4068.02 BG 3 | Upper Chichester | 2 |
| CT 4068.02 BG 4 | Upper Chichester | 2 |
| CT 4068.03 BG 4 | Upper Chichester | 2 |
| CT 4069.03 BG 2 | Aston | 2 |
| CT 4074.01 BG 4 | Nether Providence | 3 |
| CT 4075.01 BG 1 | Media | 2 |
| CT 4077 BG 2 | Springfield | 1 |
| CT 4078.06 BG 1 | Springfield | 3 |
| CT 4079.03 BG 1 | Upper Providence | 3 |
| CT 4085 BG 1 | Haverford | 3 |
| CT 4088 BG 1 | Haverford | 2 |
| CT 4088 BG 5 | Haverford | 2 |
| CT 4096.02 BG 1 | Radnor | 1 |
| CT 4096.02 BG 3 | Radnor | 2 |
| CT 4098.02 BG 2 | Radnor | 2 |
| CT 4098.03 BG 2 | Radnor | 2 |
| CT 4098.03 BG 5 | Radnor | 2 |
| CT 4099.02 BG 1 | Newtown | 2 |
| CT 4101 BG 3 | Thornbury | 2 |
| CT 4103.01 BG 2 | Concord | 3 |
| CT 4105 BG 1 | Millbourne | 1 |
| CT 4105 BG 2 | Upper Darby | 1 |
| CT 4105 BG 3 | Upper Darby | 1 |
| CT 4105 BG 4 | Upper Darby | 1 |
| CT 4105 BG 5 | Upper Darby | 1 |
| CT 4107 BG 1 | Chester | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4107 BG 2 | Chester | 1 |
| CT 4107 BG 3 | Chester | 1 |
| CT 4107 BG 4 | Chester | 1 |
| CT 4107 BG 5 | Chester | 1 |
| CT 4108 BG 2 | Nether Providence | 2 |
| CT 4108 BG 7 | Nether Providence | 3 |

## Table G-EJ22. Census Tracts (CT) and Block Groups (BG) in Baltimore County, Maryland (County ID 24-005) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4001 BG 1 | Catonsville | 3 |
| CT 4001 BG 3 | Catonsville | 2 |
| CT 4002 BG 1 | Catonsville | 2 |
| CT 4004 BG 2 | Catonsville | 2 |
| CT 4006 BG 2 | Catonsville | 1 |
| CT 4006 BG 3 | Catonsville | 2 |
| CT 4007.01 BG 2 | Catonsville | 3 |
| CT 4008 BG 1 | Catonsville | 1 |
| CT 4008 BG 2 | Catonsville | 2 |
| CT 4009 BG 1 | Catonsville | 3 |
| CT 4010 BG 1 | Catonsville | 2 |
| CT 4011.01 BG 1 | Woodlawn | 1 |
| CT 4011.01 BG 2 | Woodlawn | 3 |
| CT 4011.01 BG 3 | Woodlawn | 1 |
| CT 4011.01 BG 4 | Woodlawn | 1 |
| CT 4011.02 BG 1 | Woodlawn | 1 |
| CT 4012 BG 1 | Woodlawn | 3 |
| CT 4012 BG 2 | Woodlawn | 3 |
| CT 4013.01 BG 1 | Woodlawn | 1 |
| CT 4013.01 BG 2 | Woodlawn | 3 |
| CT 4013.01 BG 3 | Woodlawn | 1 |
| CT 4013.02 BG 1 | Woodlawn | 1 |
| CT 4013.02 BG 2 | Woodlawn | 3 |
| CT 4015.04 BG 1 | Woodlawn | 3 |
| CT 4015.04 BG 2 | Woodlawn | 3 |
| CT 4015.04 BG 3 | Woodlawn | 1 |
| CT 4015.05 BG 1 | Woodlawn | 1 |
| CT 4015.05 BG 2 | Woodlawn | 1 |
| CT 4015.05 BG 3 | Woodlawn | 1 |
| CT 4015.06 BG 1 | Woodlawn | 3 |
| CT 4015.06 BG 2 | Woodlawn | 3 |
| CT 4015.06 BG 3 | Woodlawn | 3 |
| CT 4015.07 BG 1 | Woodlawn | 1 |
| CT 4015.07 BG 2 | Woodlawn | 1 |
| CT 4015.07 BG 3 | Woodlawn | 1 |
| CT 4015.07 BG 4 | Woodlawn | 1 |
| CT 4022.01 BG 1 | Un-named Area | 3 |
| CT 4022.01 BG 2 | Un-named Area | 1 |
| CT 4023.02 BG 1 | Milford Mill | 3 |
| CT 4023.02 BG 2 | Milford Mill | 1 |
| CT 4023.03 BG 1 | Milford Mill | 1 |
| CT 4023.03 BG 2 | Milford Mill | 3 |
| CT 4023.03 BG 3 | Milford Mill | 3 |
| CT 4023.03 BG 4 | Milford Mill | 1 |
| CT 4023.03 BG 5 | Milford Mill | 3 |
| CT 4023.04 BG 1 | Lochearn | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4023.04 BG 2 | Lochearn | 3 |
| CT 4023.04 BG 3 | Lochearn | 1 |
| CT 4023.05 BG 1 | Lochearn | 1 |
| CT 4023.05 BG 2 | Lochearn | 1 |
| CT 4023.06 BG 1 | Milford Mill | 1 |
| CT 4023.06 BG 2 | Milford Mill | 1 |
| CT 4023.07 BG 1 | Milford Mill | 1 |
| CT 4023.07 BG 2 | Milford Mill | 3 |
| CT 4023.07 BG 3 | Milford Mill | 1 |
| CT 4024.03 BG 1 | Lochearn | 1 |
| CT 4024.03 BG 2 | Lochearn | 3 |
| CT 4024.04 BG 1 | Lochearn | 1 |
| CT 4024.04 BG 2 | Lochearn | 3 |
| CT 4024.04 BG 3 | Lochearn | 1 |
| CT 4024.05 BG 1 | Woodlawn | 3 |
| CT 4024.05 BG 2 | Lochearn | 1 |
| CT 4024.06 BG 1 | Milford Mill | 3 |
| CT 4024.06 BG 2 | Milford Mill | 1 |
| CT 4024.06 BG 3 | Milford Mill | 1 |
| CT 4024.07 BG 1 | Milford Mill | 3 |
| CT 4024.07 BG 2 | Milford Mill | 1 |
| CT 4025.03 BG 1 | Randallstown | 1 |
| CT 4025.03 BG 2 | Randallstown | 3 |
| CT 4025.03 BG 3 | Randallstown | 1 |
| CT 4025.04 BG 1 | Randallstown | 3 |
| CT 4025.04 BG 2 | Randallstown | 3 |
| CT 4025.05 BG 1 | Randallstown | 3 |
| CT 4025.05 BG 2 | Randallstown | 1 |
| CT 4025.06 BG 1 | Randallstown | 3 |
| CT 4025.06 BG 2 | Randallstown | 3 |
| CT 4025.09 BG 1 | Owings Mills | 3 |
| CT 4025.09 BG 2 | Owings Mills | 1 |
| CT 4025.09 BG 3 | Owings Mills | 3 |
| CT 4026.02 BG 1 | Randallstown | 1 |
| CT 4026.02 BG 2 | Randallstown | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4026.03 BG 1 | Randallstown | 3 |
| CT 4026.03 BG 2 | Owings Mills | 3 |
| CT 4026.03 BG 3 | Randallstown | 3 |
| CT 4026.04 BG 1 | Randallstown | 3 |
| CT 4026.04 BG 2 | Randallstown | 3 |
| CT 4026.04 BG 3 | Randallstown | 1 |
| CT 4031 BG 1 | Lochearn | 3 |
| CT 4031 BG 2 | Lochearn | 3 |
| CT 4032.01 BG 1 | Lochearn | 1 |
| CT 4032.01 BG 2 | Lochearn | 1 |
| CT 4032.02 BG 1 | Lochearn | 3 |
| CT 4033 BG 1 | Lochearn | 3 |
| CT 4033 BG 2 | Lochearn | 3 |
| CT 4034.02 BG 1 | Pikesville | 1 |
| CT 4034.02 BG 2 | Pikesville | 3 |
| CT 4034.02 BG 3 | Pikesville | 1 |
| CT 4034.02 BG 4 | Pikesville | 1 |
| CT 4036.02 BG 1 | Towson | 1 |
| CT 4037.01 BG 3 | Garrison | 1 |
| CT 4037.01 BG 5 | Garrison | 3 |
| CT 4037.02 BG 2 | Garrison | 3 |
| CT 4041.01 BG 2 | Owings Mills | 3 |
| CT 4041.02 BG 1 | Owings Mills | 3 |
| CT 4041.02 BG 2 | Owings Mills | 1 |
| CT 4042.01 BG 1 | Reisterstown | 3 |
| CT 4042.01 BG 2 | Reisterstown | 1 |
| CT 4042.01 BG 3 | Reisterstown | 3 |
| CT 4042.02 BG 1 | Owings Mills | 1 |
| CT 4042.02 BG 2 | Owings Mills | 1 |
| CT 4042.02 BG 3 | Owings Mills | 1 |
| CT 4042.02 BG 4 | Owings Mills | 1 |
| CT 4044.02 BG 2 | Un-named Area | 1 |
| CT 4044.03 BG 1 | Reisterstown | 3 |
| CT 4044.03 BG 2 | Reisterstown | 1 |
| CT 4044.04 BG 1 | Reisterstown | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4045.01 BG 1 | Reisterstown | 2 |
| CT 4045.01 BG 4 | Reisterstown | 3 |
| CT 4045.02 BG 1 | Reisterstown | 1 |
| CT 4045.02 BG 3 | Reisterstown | 1 |
| CT 4046 BG 2 | Un-named Area | 2 |
| CT 4083.04 BG 2 | Un-named Area | 1 |
| CT 4085.03 BG 2 | Cockeysville | 1 |
| CT 4085.06 BG 1 | Cockeysville | 1 |
| CT 4085.06 BG 2 | Cockeysville | 1 |
| CT 4085.07 BG 1 | Cockeysville | 3 |
| CT 4085.07 BG 2 | Cockeysville | 1 |
| CT 4085.07 BG 3 | Cockeysville | 3 |
| CT 4113.03 BG 1 | Perry Hall | 1 |
| CT 4113.06 BG 1 | Perry Hall | 1 |
| CT 4113.06 BG 3 | Perry Hall | 3 |
| CT 4113.07 BG 2 | White Marsh | 3 |
| CT 4113.09 BG 3 | Un-named Area | 3 |
| CT 4114.07 BG 4 | Carney | 1 |
| CT 4114.08 BG 1 | Carney | 1 |
| CT 4114.08 BG 2 | Perry Hall | 1 |
| CT 4114.1 BG 3 | Perry Hall | 3 |
| CT 4201 BG 1 | Dundalk | 2 |
| CT 4203.01 BG 1 | Dundalk | 2 |
| CT 4203.02 BG 1 | Dundalk | 2 |
| CT 4203.02 BG 2 | Dundalk | 2 |
| CT 4203.03 BG 1 | Dundalk | 2 |
| CT 4204.01 BG 1 | Dundalk | 2 |
| CT 4204.01 BG 2 | Dundalk | 1 |
| CT 4204.01 BG 3 | Dundalk | 2 |
| CT 4204.02 BG 1 | Dundalk | 2 |
| CT 4205 BG 1 | Dundalk | 2 |
| CT 4205 BG 2 | Dundalk | 1 |
| CT 4206 BG 1 | Dundalk | 2 |
| CT 4206 BG 2 | Dundalk | 2 |
| CT 4206 BG 3 | Dundalk | 2 |
| CT 4207.01 BG 1 | Dundalk | 2 |
| CT 4207.02 BG 1 | Dundalk | 2 |
| CT 4208 BG 1 | Dundalk | 2 |
| CT 4208 BG 3 | Dundalk | 2 |
| CT 4209 BG 1 | Dundalk | 2 |
| CT 4209 BG 2 | Dundalk | 2 |
| CT 4209 BG 3 | Dundalk | 2 |
| CT 4210 BG 1 | Dundalk | 2 |
| CT 4211.01 BG 1 | Dundalk | 2 |
| CT 4211.01 BG 2 | Dundalk | 2 |
| CT 4211.02 BG 2 | Dundalk | 2 |
| CT 4212 BG 1 | Dundalk | 2 |
| CT 4212 BG 2 | Dundalk | 2 |
| CT 4213 BG 1 | Dundalk | 1 |
| CT 4213 BG 2 | Dundalk | 1 |
| CT 4213 BG 3 | Dundalk | 1 |
| CT 4301.01 BG 1 | Baltimore Highlands | 1 |
| CT 4301.01 BG 2 | Baltimore Highlands | 1 |
| CT 4301.04 BG 2 | Baltimore Highlands | 2 |
| CT 4302 BG 1 | Lansdowne | 2 |
| CT 4302 BG 3 | Lansdowne | 2 |
| CT 4303 BG 1 | Lansdowne | 2 |
| CT 4303 BG 2 | Lansdowne | 1 |
| CT 4303 BG 3 | Lansdowne | 2 |
| CT 4303 BG 4 | Lansdowne | 1 |
| CT 4304 BG 3 | Arbutus | 2 |
| CT 4308 BG 1 | Arbutus | 2 |
| CT 4308 BG 2 | Arbutus | 2 |
| CT 4309 BG 1 | Arbutus | 1 |
| CT 4309 BG 2 | Arbutus | 1 |
| CT 4309 BG 3 | Arbutus | 1 |
| CT 4401 BG 1 | Parkville | 2 |
| CT 4402 BG 1 | Overlea | 1 |
| CT 4403 BG 1 | Overlea | 1 |
| CT 4404 BG 1 | Overlea | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4404 BG 2 | Overlea | 2 |
| CT 4404 BG 3 | Overlea | 3 |
| CT 4404 BG 4 | Overlea | 2 |
| CT 4405 BG 2 | Overlea | 2 |
| CT 4407.01 BG 1 | Rossville | 1 |
| CT 4407.01 BG 2 | Rossville | 1 |
| CT 4407.01 BG 3 | Rossville | 1 |
| CT 4407.02 BG 1 | Rossville | 1 |
| CT 4408 BG 1 | Rossville | 3 |
| CT 4409 BG 1 | Rosedale | 1 |
| CT 4409 BG 2 | Rosedale | 1 |
| CT 4410 BG 1 | Rosedale | 3 |
| CT 4410 BG 2 | Rosedale | 1 |
| CT 4411.01 BG 2 | Rosedale | 2 |
| CT 4411.02 BG 1 | Rosedale | 1 |
| CT 4411.02 BG 4 | Rosedale | 2 |
| CT 4501 BG 3 | Rosedale | 2 |
| CT 4502 BG 2 | Essex | 2 |
| CT 4503 BG 1 | Essex | 2 |
| CT 4503 BG 2 | Essex | 2 |
| CT 4504 BG 2 | Essex | 2 |
| CT 4505.01 BG 1 | Essex | 2 |
| CT 4505.01 BG 2 | Essex | 2 |
| CT 4505.01 BG 3 | Essex | 2 |
| CT 4505.03 BG 1 | Essex | 1 |
| CT 4505.03 BG 2 | Essex | 1 |
| CT 4505.03 BG 3 | Essex | 1 |
| CT 4505.04 BG 1 | Essex | 2 |
| CT 4505.04 BG 2 | Essex | 1 |
| CT 4505.04 BG 3 | Essex | 1 |
| CT 4508 BG 1 | Essex | 2 |
| CT 4508 BG 2 | Essex | 1 |
| CT 4508 BG 3 | Essex | 1 |
| CT 4509 BG 1 | Essex | 2 |
| CT 4509 BG 2 | Essex | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4511 BG 1 | Essex | 1 |
| CT 4512 BG 2 | Middle River | 2 |
| CT 4513 BG 1 | Middle River | 1 |
| CT 4513 BG 2 | Middle River | 2 |
| CT 4514.01 BG 1 | Middle River | 1 |
| CT 4514.01 BG 2 | Middle River | 1 |
| CT 4514.02 BG 2 | Middle River | 1 |
| CT 4514.02 BG 3 | Middle River | 1 |
| CT 4515 BG 1 | Middle River | 2 |
| CT 4515 BG 2 | Middle River | 1 |
| CT 4515 BG 3 | Middle River | 2 |
| CT 4516 BG 1 | Middle River | 2 |
| CT 4518.01 BG 1 | Un-named Area | 2 |
| CT 4518.01 BG 4 | Un-named Area | 1 |
| CT 4518.02 BG 3 | Middle River | 2 |
| CT 4521 BG 2 | Edgemere | 2 |
| CT 4521 BG 3 | Edgemere | 2 |
| CT 4523 BG 1 | Dundalk | 1 |
| CT 4523 BG 2 | Dundalk | 2 |
| CT 4524 BG 1 | Dundalk | 2 |
| CT 4524 BG 2 | Dundalk | 2 |
| CT 4525 BG 2 | Dundalk | 2 |
| CT 4903.01 BG 1 | Towson | 1 |
| CT 4903.01 BG 2 | Towson | 2 |
| CT 4903.02 BG 1 | Towson | 3 |
| CT 4906.05 BG 1 | Towson | 2 |
| CT 4906.05 BG 2 | Towson | 3 |
| CT 4908 BG 2 | Towson | 2 |
| CT 4909 BG 1 | Towson | 2 |
| CT 4909 BG 2 | Towson | 2 |
| CT 4909 BG 3 | Towson | 2 |
| CT 4911 BG 1 | Towson | 3 |
| CT 4911 BG 2 | Towson | 1 |
| CT 4912.02 BG 1 | Towson | 2 |
| CT 4913 BG 2 | Towson | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 4914.01 BG 1 | Parkville | 1 |
| CT 4914.01 BG 2 | Parkville | 1 |
| CT 4914.01 BG 3 | Parkville | 1 |
| CT 4914.02 BG 1 | Parkville | 3 |
| CT 4914.02 BG 2 | Parkville | 1 |
| CT 4915 BG 1 | Parkville | 2 |
| CT 4915 BG 3 | Parkville | 1 |
| CT 4916 BG 1 | Parkville | 2 |
| CT 4916 BG 2 | Parkville | 2 |
| CT 4916 BG 3 | Parkville | 3 |
| CT 4917.01 BG 2 | Carney | 1 |
| CT 4919 BG 1 | Carney | 2 |
| CT 4920.01 BG 1 | Parkville | 3 |
| CT 4920.02 BG 3 | Parkville | 1 |
| CT 4921.01 BG 1 | Parkville | 2 |
| CT 4922 BG 2 | Carney | 2 |
| CT 4923 BG 1 | Essex | 2 |
| CT 4923 BG 2 | Essex | 2 |
| CT 4924.01 BG 1 | Randallstown | 3 |
| CT 4924.01 BG 2 | Owings Mills | 3 |
| CT 4924.02 BG 1 | Owings Mills | 3 |
| CT 4924.02 BG 2 | Owings Mills | 3 |
| CT 4925 BG 2 | Catonsville | 1 |
| CT 4926 BG 1 | Carney | 3 |
| CT 4926 BG 2 | Carney | 2 |
| CT 4926 BG 3 | Carney | 1 |

## Table G-EJ23. Census Tracts (CT) and Block Groups (BG) in the City of Baltimore, Maryland (County ID 24-510) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**
**Note that Baltimore is an independent city in Maryland and is considered the equivalent of a county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1001 BG 1 | Baltimore | 1 |
| CT 1001 BG 2 | Baltimore | 1 |
| CT 1001 BG 3 | Baltimore | 3 |
| CT 1001 BG 4 | Baltimore | 1 |
| CT 1002 BG 1 | Baltimore | 1 |
| CT 1002 BG 2 | Baltimore | 1 |
| CT 1002 BG 3 | Baltimore | 1 |
| CT 1003 BG 1 | Baltimore | 3 |
| CT 1101 BG 2 | Baltimore | 3 |
| CT 1102 BG 2 | Baltimore | 2 |
| CT 1201 BG 4 | Baltimore | 1 |
| CT 1202.02 BG 2 | Baltimore | 1 |
| CT 1202.02 BG 3 | Baltimore | 1 |
| CT 1202.02 BG 4 | Baltimore | 2 |
| CT 1202.02 BG 5 | Baltimore | 3 |
| CT 1203 BG 1 | Baltimore | 3 |
| CT 1203 BG 2 | Baltimore | 3 |
| CT 1203 BG 3 | Baltimore | 1 |
| CT 1203 BG 4 | Baltimore | 1 |
| CT 1204 BG 1 | Baltimore | 1 |
| CT 1204 BG 2 | Baltimore | 1 |
| CT 1205 BG 1 | Baltimore | 3 |
| CT 1205 BG 2 | Baltimore | 1 |
| CT 1206 BG 1 | Baltimore | 3 |
| CT 1206 BG 2 | Baltimore | 1 |
| CT 1206 BG 3 | Baltimore | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1207 BG 2 | Baltimore | 2 |
| CT 1301 BG 1 | Baltimore | 3 |
| CT 1301 BG 2 | Baltimore | 1 |
| CT 1301 BG 3 | Baltimore | 3 |
| CT 1301 BG 4 | Baltimore | 1 |
| CT 1302 BG 1 | Baltimore | 3 |
| CT 1302 BG 2 | Baltimore | 3 |
| CT 1302 BG 3 | Baltimore | 1 |
| CT 1302 BG 4 | Baltimore | 1 |
| CT 1303 BG 1 | Baltimore | 3 |
| CT 1303 BG 2 | Baltimore | 1 |
| CT 1303 BG 3 | Baltimore | 1 |
| CT 1304 BG 1 | Baltimore | 1 |
| CT 1304 BG 2 | Baltimore | 1 |
| CT 1304 BG 3 | Baltimore | 1 |
| CT 1307 BG 1 | Baltimore | 2 |
| CT 1308.03 BG 1 | Baltimore | 2 |
| CT 1308.05 BG 1 | Baltimore | 3 |
| CT 1401 BG 2 | Baltimore | 3 |
| CT 1401 BG 3 | Baltimore | 1 |
| CT 1402 BG 1 | Baltimore | 1 |
| CT 1402 BG 2 | Baltimore | 3 |
| CT 1402 BG 3 | Baltimore | 1 |
| CT 1402 BG 4 | Baltimore | 1 |
| CT 1403 BG 1 | Baltimore | 1 |
| CT 1403 BG 2 | Baltimore | 1 |
| CT 1403 BG 3 | Baltimore | 3 |
| CT 1403 BG 4 | Baltimore | 3 |
| CT 1501 BG 1 | Baltimore | 1 |
| CT 1501 BG 2 | Baltimore | 1 |
| CT 1501 BG 3 | Baltimore | 1 |
| CT 1502 BG 1 | Baltimore | 3 |
| CT 1502 BG 2 | Baltimore | 1 |
| CT 1502 BG 3 | Baltimore | 1 |
| CT 1503 BG 1 | Baltimore | 1 |
| CT 1503 BG 2 | Baltimore | 3 |
| CT 1503 BG 3 | Baltimore | 1 |
| CT 1504 BG 1 | Baltimore | 1 |
| CT 1504 BG 2 | Baltimore | 1 |
| CT 1504 BG 3 | Baltimore | 1 |
| CT 1505 BG 1 | Baltimore | 1 |
| CT 1505 BG 2 | Baltimore | 1 |
| CT 1506 BG 1 | Baltimore | 1 |
| CT 1506 BG 2 | Baltimore | 1 |
| CT 1506 BG 3 | Baltimore | 1 |
| CT 1506 BG 4 | Baltimore | 1 |
| CT 1506 BG 5 | Baltimore | 1 |
| CT 1507.01 BG 1 | Baltimore | 1 |
| CT 1507.01 BG 2 | Baltimore | 3 |
| CT 1507.01 BG 3 | Baltimore | 1 |
| CT 1507.02 BG 1 | Baltimore | 3 |
| CT 1507.02 BG 2 | Baltimore | 3 |
| CT 1507.02 BG 3 | Baltimore | 1 |
| CT 1508 BG 1 | Baltimore | 1 |
| CT 1508 BG 2 | Baltimore | 1 |
| CT 1508 BG 3 | Baltimore | 1 |
| CT 1508 BG 4 | Baltimore | 3 |
| CT 1508 BG 5 | Baltimore | 1 |
| CT 1508 BG 6 | Baltimore | 3 |
| CT 1509 BG 1 | Baltimore | 1 |
| CT 1509 BG 2 | Baltimore | 3 |
| CT 1509 BG 3 | Baltimore | 3 |
| CT 1509 BG 4 | Baltimore | 3 |
| CT 1510 BG 1 | Baltimore | 1 |
| CT 1510 BG 2 | Baltimore | 1 |
| CT 1510 BG 3 | Baltimore | 1 |
| CT 1510 BG 4 | Baltimore | 3 |
| CT 1510 BG 5 | Baltimore | 3 |
| CT 1510 BG 6 | Baltimore | 1 |
| CT 1510 BG 7 | Baltimore | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1511 BG 1 | Baltimore | 3 |
| CT 1511 BG 2 | Baltimore | 1 |
| CT 1511 BG 3 | Baltimore | 3 |
| CT 1511 BG 4 | Baltimore | 3 |
| CT 1511 BG 5 | Baltimore | 1 |
| CT 1511 BG 6 | Baltimore | 3 |
| CT 1512 BG 1 | Baltimore | 1 |
| CT 1512 BG 2 | Baltimore | 1 |
| CT 1512 BG 3 | Baltimore | 1 |
| CT 1512 BG 4 | Baltimore | 1 |
| CT 1512 BG 5 | Baltimore | 1 |
| CT 1513 BG 1 | Baltimore | 1 |
| CT 1513 BG 2 | Baltimore | 1 |
| CT 1513 BG 3 | Baltimore | 1 |
| CT 1513 BG 4 | Baltimore | 1 |
| CT 1513 BG 5 | Baltimore | 1 |
| CT 1601 BG 1 | Baltimore | 1 |
| CT 1601 BG 2 | Baltimore | 1 |
| CT 1601 BG 3 | Baltimore | 1 |
| CT 1601 BG 4 | Baltimore | 1 |
| CT 1602 BG 1 | Baltimore | 3 |
| CT 1602 BG 2 | Baltimore | 1 |
| CT 1602 BG 3 | Baltimore | 1 |
| CT 1603 BG 1 | Baltimore | 1 |
| CT 1603 BG 2 | Baltimore | 1 |
| CT 1604 BG 1 | Baltimore | 1 |
| CT 1604 BG 2 | Baltimore | 1 |
| CT 1604 BG 3 | Baltimore | 1 |
| CT 1604 BG 4 | Baltimore | 1 |
| CT 1605 BG 1 | Baltimore | 1 |
| CT 1605 BG 2 | Baltimore | 1 |
| CT 1605 BG 3 | Baltimore | 1 |
| CT 1605 BG 4 | Baltimore | 1 |
| CT 1605 BG 5 | Baltimore | 3 |
| CT 1606 BG 1 | Baltimore | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1606 BG 2 | Baltimore | 1 |
| CT 1606 BG 3 | Baltimore | 1 |
| CT 1606 BG 4 | Baltimore | 1 |
| CT 1606 BG 5 | Baltimore | 3 |
| CT 1607 BG 1 | Baltimore | 1 |
| CT 1607 BG 2 | Baltimore | 1 |
| CT 1607 BG 3 | Baltimore | 1 |
| CT 1607 BG 4 | Baltimore | 1 |
| CT 1607 BG 5 | Baltimore | 3 |
| CT 1607 BG 6 | Baltimore | 1 |
| CT 1607 BG 7 | Baltimore | 1 |
| CT 1608.01 BG 1 | Baltimore | 3 |
| CT 1608.01 BG 2 | Baltimore | 1 |
| CT 1608.01 BG 3 | Baltimore | 3 |
| CT 1608.01 BG 4 | Baltimore | 3 |
| CT 1608.02 BG 1 | Baltimore | 1 |
| CT 1608.02 BG 2 | Baltimore | 1 |
| CT 1608.02 BG 3 | Baltimore | 1 |
| CT 1701 BG 1 | Baltimore | 1 |
| CT 1701 BG 2 | Baltimore | 1 |
| CT 1702 BG 1 | Baltimore | 1 |
| CT 1702 BG 2 | Baltimore | 1 |
| CT 1702 BG 3 | Baltimore | 1 |
| CT 1703 BG 1 | Baltimore | 1 |
| CT 1703 BG 2 | Baltimore | 1 |
| CT 1801 BG 1 | Baltimore | 1 |
| CT 1801 BG 2 | Baltimore | 1 |
| CT 1802 BG 1 | Baltimore | 1 |
| CT 1802 BG 2 | Baltimore | 1 |
| CT 1803 BG 1 | Baltimore | 3 |
| CT 1803 BG 2 | Baltimore | 1 |
| CT 1901 BG 1 | Baltimore | 1 |
| CT 1901 BG 2 | Baltimore | 1 |
| CT 1901 BG 3 | Baltimore | 1 |
| CT 1902 BG 1 | Baltimore | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1902 BG 2 | Baltimore | 1 |
| CT 1903 BG 1 | Baltimore | 1 |
| CT 1903 BG 2 | Baltimore | 1 |
| CT 1903 BG 3 | Baltimore | 1 |
| CT 1903 BG 4 | Baltimore | 1 |
| CT 2001 BG 1 | Baltimore | 1 |
| CT 2001 BG 2 | Baltimore | 1 |
| CT 2002 BG 1 | Baltimore | 1 |
| CT 2002 BG 2 | Baltimore | 1 |
| CT 2002 BG 3 | Baltimore | 1 |
| CT 2002 BG 4 | Baltimore | 1 |
| CT 2002 BG 5 | Baltimore | 1 |
| CT 2003 BG 1 | Baltimore | 1 |
| CT 2003 BG 2 | Baltimore | 1 |
| CT 2004 BG 1 | Baltimore | 1 |
| CT 2004 BG 2 | Baltimore | 1 |
| CT 2005 BG 1 | Baltimore | 1 |
| CT 2005 BG 2 | Baltimore | 3 |
| CT 2005 BG 3 | Baltimore | 1 |
| CT 2005 BG 4 | Baltimore | 1 |
| CT 2005 BG 5 | Baltimore | 1 |
| CT 2006 BG 1 | Baltimore | 2 |
| CT 2006 BG 2 | Baltimore | 1 |
| CT 2006 BG 3 | Baltimore | 1 |
| CT 2007.01 BG 1 | Baltimore | 1 |
| CT 2007.01 BG 2 | Baltimore | 1 |
| CT 2007.01 BG 3 | Baltimore | 1 |
| CT 2007.01 BG 4 | Baltimore | 3 |
| CT 2007.01 BG 5 | Baltimore | 1 |
| CT 2007.02 BG 1 | Baltimore | 1 |
| CT 2007.02 BG 2 | Baltimore | 1 |
| CT 2008 BG 1 | Baltimore | 1 |
| CT 2008 BG 2 | Baltimore | 1 |
| CT 2008 BG 3 | Baltimore | 1 |
| CT 2101 BG 1 | Baltimore | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 2101 BG 2 | Baltimore | 1 |
| CT 2102 BG 1 | Baltimore | 1 |
| CT 2102 BG 2 | Baltimore | 1 |
| CT 2301 BG 2 | Baltimore | 1 |
| CT 2501.01 BG 1 | Baltimore | 1 |
| CT 2501.01 BG 2 | Baltimore | 3 |
| CT 2501.02 BG 1 | Baltimore | 1 |
| CT 2501.02 BG 2 | Baltimore | 1 |
| CT 2501.03 BG 1 | Baltimore | 1 |
| CT 2501.03 BG 4 | Baltimore | 3 |
| CT 2502.03 BG 1 | Baltimore | 1 |
| CT 2502.03 BG 2 | Baltimore | 1 |
| CT 2502.04 BG 1 | Baltimore | 1 |
| CT 2502.04 BG 2 | Baltimore | 1 |
| CT 2502.05 BG 1 | Baltimore | 2 |
| CT 2502.05 BG 2 | Baltimore | 1 |
| CT 2502.05 BG 4 | Baltimore | 1 |
| CT 2502.05 BG 5 | Baltimore | 3 |
| CT 2502.06 BG 1 | Baltimore | 2 |
| CT 2502.07 BG 1 | Baltimore | 1 |
| CT 2502.07 BG 2 | Baltimore | 1 |
| CT 2503.01 BG 1 | Baltimore | 3 |
| CT 2503.01 BG 2 | Baltimore | 1 |
| CT 2503.03 BG 1 | Baltimore | 2 |
| CT 2503.03 BG 2 | Baltimore | 1 |
| CT 2503.03 BG 3 | Baltimore | 2 |
| CT 2504.01 BG 1 | Baltimore | 2 |
| CT 2504.01 BG 3 | Baltimore | 1 |
| CT 2504.02 BG 1 | Baltimore | 3 |
| CT 2504.02 BG 2 | Baltimore | 1 |
| CT 2504.02 BG 3 | Baltimore | 3 |
| CT 2504.02 BG 4 | Baltimore | 1 |
| CT 2505 BG 2 | Baltimore | 1 |
| CT 2505 BG 3 | Baltimore | 2 |
| CT 2505 BG 4 | Baltimore | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 2505 BG 5 | Baltimore | 2 |
| CT 2601.01 BG 1 | Baltimore | 3 |
| CT 2601.01 BG 2 | Baltimore | 3 |
| CT 2601.01 BG 3 | Baltimore | 3 |
| CT 2601.01 BG 4 | Baltimore | 3 |
| CT 2601.01 BG 5 | Baltimore | 3 |
| CT 2601.02 BG 1 | Baltimore | 3 |
| CT 2601.02 BG 2 | Baltimore | 1 |
| CT 2601.02 BG 3 | Baltimore | 1 |
| CT 2601.02 BG 4 | Baltimore | 3 |
| CT 2601.02 BG 5 | Baltimore | 3 |
| CT 2602.01 BG 1 | Baltimore | 1 |
| CT 2602.01 BG 2 | Baltimore | 3 |
| CT 2602.01 BG 3 | Baltimore | 1 |
| CT 2602.01 BG 4 | Baltimore | 1 |
| CT 2602.02 BG 1 | Baltimore | 2 |
| CT 2602.02 BG 2 | Baltimore | 3 |
| CT 2602.02 BG 3 | Baltimore | 1 |
| CT 2602.02 BG 4 | Baltimore | 1 |
| CT 2602.03 BG 1 | Baltimore | 1 |
| CT 2602.03 BG 2 | Baltimore | 3 |
| CT 2603.01 BG 1 | Baltimore | 1 |
| CT 2603.01 BG 2 | Baltimore | 3 |
| CT 2603.01 BG 3 | Baltimore | 1 |
| CT 2603.01 BG 4 | Baltimore | 1 |
| CT 2603.01 BG 5 | Baltimore | 1 |
| CT 2603.02 BG 1 | Baltimore | 3 |
| CT 2603.02 BG 2 | Baltimore | 1 |
| CT 2603.02 BG 3 | Baltimore | 1 |
| CT 2603.02 BG 4 | Baltimore | 1 |
| CT 2603.02 BG 5 | Baltimore | 3 |
| CT 2603.02 BG 6 | Baltimore | 1 |
| CT 2603.03 BG 1 | Baltimore | 1 |
| CT 2604.01 BG 1 | Baltimore | 1 |
| CT 2604.01 BG 2 | Baltimore | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 2604.01 BG 3 | Baltimore | 2 |
| CT 2604.02 BG 1 | Baltimore | 3 |
| CT 2604.02 BG 2 | Baltimore | 1 |
| CT 2604.03 BG 1 | Baltimore | 1 |
| CT 2604.04 BG 2 | Baltimore | 3 |
| CT 2604.04 BG 3 | Baltimore | 1 |
| CT 2605.01 BG 1 | Baltimore | 1 |
| CT 2605.01 BG 2 | Baltimore | 2 |
| CT 2606.04 BG 1 | Baltimore | 1 |
| CT 2606.04 BG 2 | Baltimore | 3 |
| CT 2606.04 BG 3 | Baltimore | 1 |
| CT 2606.05 BG 1 | Baltimore | 1 |
| CT 2606.05 BG 2 | Baltimore | 2 |
| CT 2606.05 BG 3 | Baltimore | 1 |
| CT 2606.05 BG 4 | Baltimore | 2 |
| CT 2606.05 BG 5 | Baltimore | 2 |
| CT 2607 BG 1 | Baltimore | 3 |
| CT 2607 BG 2 | Baltimore | 1 |
| CT 2608 BG 1 | Baltimore | 1 |
| CT 2608 BG 2 | Baltimore | 1 |
| CT 2610 BG 1 | Baltimore | 3 |
| CT 2610 BG 2 | Baltimore | 1 |
| CT 2610 BG 3 | Baltimore | 1 |
| CT 2701.01 BG 2 | Baltimore | 3 |
| CT 2701.02 BG 1 | Baltimore | 3 |
| CT 2701.02 BG 2 | Baltimore | 1 |
| CT 2701.02 BG 3 | Baltimore | 3 |
| CT 2701.02 BG 4 | Baltimore | 3 |
| CT 2702 BG 1 | Baltimore | 3 |
| CT 2702 BG 3 | Baltimore | 3 |
| CT 2703.01 BG 2 | Baltimore | 3 |
| CT 2703.01 BG 3 | Baltimore | 1 |
| CT 2703.01 BG 4 | Baltimore | 3 |
| CT 2703.02 BG 2 | Baltimore | 3 |
| CT 2704.01 BG 1 | Baltimore | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 2704.01 BG 3 | Baltimore | 1 |
| CT 2704.01 BG 4 | Baltimore | 3 |
| CT 2704.02 BG 1 | Baltimore | 3 |
| CT 2704.02 BG 3 | Baltimore | 3 |
| CT 2704.02 BG 4 | Baltimore | 3 |
| CT 2705.01 BG 1 | Baltimore | 3 |
| CT 2705.01 BG 4 | Baltimore | 3 |
| CT 2705.02 BG 1 | Baltimore | 3 |
| CT 2705.02 BG 2 | Baltimore | 3 |
| CT 2705.02 BG 3 | Baltimore | 3 |
| CT 2706 BG 2 | Baltimore | 3 |
| CT 2706 BG 3 | Baltimore | 1 |
| CT 2706 BG 4 | Baltimore | 3 |
| CT 2706 BG 5 | Baltimore | 1 |
| CT 2706 BG 6 | Baltimore | 3 |
| CT 2707.01 BG 1 | Baltimore | 3 |
| CT 2707.02 BG 1 | Baltimore | 1 |
| CT 2707.02 BG 2 | Baltimore | 3 |
| CT 2707.03 BG 3 | Baltimore | 3 |
| CT 2708.01 BG 1 | Baltimore | 1 |
| CT 2708.01 BG 2 | Baltimore | 3 |
| CT 2708.01 BG 3 | Baltimore | 3 |
| CT 2708.01 BG 4 | Baltimore | 3 |
| CT 2708.02 BG 1 | Baltimore | 3 |
| CT 2708.02 BG 2 | Baltimore | 3 |
| CT 2708.02 BG 3 | Baltimore | 3 |
| CT 2708.02 BG 4 | Baltimore | 1 |
| CT 2708.02 BG 5 | Baltimore | 3 |
| CT 2708.03 BG 1 | Baltimore | 3 |
| CT 2708.03 BG 2 | Baltimore | 3 |
| CT 2708.03 BG 3 | Baltimore | 3 |
| CT 2708.04 BG 1 | Baltimore | 3 |
| CT 2708.04 BG 2 | Baltimore | 1 |
| CT 2708.04 BG 4 | Baltimore | 3 |
| CT 2708.05 BG 1 | Baltimore | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 2708.05 BG 2 | Baltimore | 1 |
| CT 2708.05 BG 3 | Baltimore | 1 |
| CT 2708.05 BG 4 | Baltimore | 3 |
| CT 2708.05 BG 5 | Baltimore | 3 |
| CT 2709.01 BG 1 | Baltimore | 3 |
| CT 2709.01 BG 2 | Baltimore | 3 |
| CT 2709.01 BG 3 | Baltimore | 3 |
| CT 2709.02 BG 1 | Baltimore | 1 |
| CT 2709.02 BG 2 | Baltimore | 3 |
| CT 2709.02 BG 3 | Baltimore | 3 |
| CT 2709.03 BG 1 | Baltimore | 3 |
| CT 2709.03 BG 2 | Baltimore | 3 |
| CT 2709.03 BG 3 | Baltimore | 3 |
| CT 2710.01 BG 1 | Baltimore | 1 |
| CT 2710.01 BG 2 | Baltimore | 1 |
| CT 2710.01 BG 3 | Baltimore | 1 |
| CT 2710.02 BG 1 | Baltimore | 1 |
| CT 2710.02 BG 2 | Baltimore | 3 |
| CT 2710.02 BG 3 | Baltimore | 1 |
| CT 2710.02 BG 4 | Baltimore | 1 |
| CT 2710.02 BG 5 | Baltimore | 1 |
| CT 2711.01 BG 1 | Baltimore | 1 |
| CT 2716 BG 1 | Baltimore | 1 |
| CT 2716 BG 2 | Baltimore | 1 |
| CT 2716 BG 3 | Baltimore | 1 |
| CT 2716 BG 4 | Baltimore | 3 |
| CT 2716 BG 5 | Baltimore | 1 |
| CT 2716 BG 6 | Baltimore | 1 |
| CT 2717 BG 1 | Baltimore | 1 |
| CT 2717 BG 2 | Baltimore | 1 |
| CT 2717 BG 3 | Baltimore | 3 |
| CT 2717 BG 4 | Baltimore | 3 |
| CT 2717 BG 5 | Baltimore | 3 |
| CT 2717 BG 6 | Baltimore | 3 |
| CT 2718.01 BG 1 | Baltimore | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 2718.01 BG 2 | Baltimore | 1 |
| CT 2718.01 BG 3 | Baltimore | 1 |
| CT 2718.02 BG 1 | Baltimore | 1 |
| CT 2718.02 BG 2 | Baltimore | 1 |
| CT 2718.02 BG 3 | Baltimore | 1 |
| CT 2718.02 BG 4 | Baltimore | 1 |
| CT 2719 BG 2 | Baltimore | 3 |
| CT 2719 BG 3 | Baltimore | 3 |
| CT 2719 BG 4 | Baltimore | 1 |
| CT 2719 BG 5 | Baltimore | 3 |
| CT 2720.03 BG 2 | Baltimore | 3 |
| CT 2720.03 BG 5 | Baltimore | 3 |
| CT 2720.04 BG 2 | Baltimore | 2 |
| CT 2720.05 BG 2 | Baltimore | 2 |
| CT 2720.06 BG 1 | Baltimore | 1 |
| CT 2720.07 BG 1 | Baltimore | 1 |
| CT 2720.07 BG 2 | Baltimore | 2 |
| CT 2720.07 BG 3 | Baltimore | 1 |
| CT 2801.01 BG 1 | Baltimore | 3 |
| CT 2801.01 BG 2 | Baltimore | 1 |
| CT 2801.01 BG 3 | Baltimore | 1 |
| CT 2801.02 BG 1 | Baltimore | 1 |
| CT 2801.02 BG 2 | Baltimore | 1 |
| CT 2801.02 BG 3 | Baltimore | 3 |
| CT 2801.02 BG 4 | Baltimore | 3 |
| CT 2801.02 BG 5 | Baltimore | 3 |
| CT 2801.02 BG 6 | Baltimore | 3 |
| CT 2802 BG 1 | Baltimore | 1 |
| CT 2802 BG 2 | Baltimore | 1 |
| CT 2802 BG 3 | Baltimore | 3 |
| CT 2802 BG 4 | Baltimore | 3 |
| CT 2802 BG 5 | Baltimore | 3 |
| CT 2802 BG 6 | Baltimore | 3 |
| CT 2803.01 BG 1 | Baltimore | 3 |
| CT 2803.01 BG 2 | Baltimore | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 2803.01 BG 3 | Baltimore | 1 |
| CT 2803.02 BG 1 | Baltimore | 3 |
| CT 2803.02 BG 2 | Baltimore | 3 |
| CT 2804.01 BG 1 | Baltimore | 1 |
| CT 2804.01 BG 2 | Baltimore | 3 |
| CT 2804.01 BG 3 | Baltimore | 1 |
| CT 2804.01 BG 4 | Baltimore | 3 |
| CT 2804.01 BG 5 | Baltimore | 3 |
| CT 2804.02 BG 1 | Baltimore | 3 |
| CT 2804.02 BG 2 | Baltimore | 1 |
| CT 2804.03 BG 1 | Baltimore | 1 |
| CT 2804.03 BG 2 | Baltimore | 1 |
| CT 2804.03 BG 3 | Baltimore | 1 |
| CT 2804.03 BG 4 | Baltimore | 3 |
| CT 2804.03 BG 5 | Baltimore | 3 |
| CT 2804.04 BG 1 | Baltimore | 1 |
| CT 2804.04 BG 2 | Baltimore | 3 |
| CT 2805 BG 1 | Baltimore | 1 |
| CT 2805 BG 2 | Baltimore | 1 |
| CT 2805 BG 3 | Baltimore | 1 |
| CT 2805 BG 4 | Baltimore | 1 |
| CT 301 BG 1 | Baltimore | 1 |
| CT 301 BG 2 | Baltimore | 1 |
| CT 302 BG 1 | Baltimore | 1 |
| CT 401 BG 2 | Baltimore | 3 |
| CT 402 BG 1 | Baltimore | 1 |
| CT 601 BG 1 | Baltimore | 1 |
| CT 601 BG 2 | Baltimore | 1 |
| CT 601 BG 4 | Baltimore | 3 |
| CT 602 BG 1 | Baltimore | 1 |
| CT 602 BG 3 | Baltimore | 1 |
| CT 602 BG 4 | Baltimore | 3 |
| CT 602 BG 5 | Baltimore | 1 |
| CT 603 BG 1 | Baltimore | 3 |
| CT 604 BG 1 | Baltimore | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 604 BG 2 | Baltimore | 3 |
| CT 701 BG 1 | Baltimore | 1 |
| CT 701 BG 2 | Baltimore | 1 |
| CT 702 BG 1 | Baltimore | 1 |
| CT 702 BG 2 | Baltimore | 1 |
| CT 702 BG 3 | Baltimore | 1 |
| CT 702 BG 4 | Baltimore | 1 |
| CT 702 BG 5 | Baltimore | 3 |
| CT 703 BG 1 | Baltimore | 1 |
| CT 703 BG 2 | Baltimore | 1 |
| CT 704 BG 1 | Baltimore | 1 |
| CT 704 BG 2 | Baltimore | 1 |
| CT 704 BG 3 | Baltimore | 1 |
| CT 801.01 BG 2 | Baltimore | 3 |
| CT 801.01 BG 3 | Baltimore | 1 |
| CT 801.01 BG 4 | Baltimore | 3 |
| CT 801.02 BG 1 | Baltimore | 1 |
| CT 801.02 BG 2 | Baltimore | 1 |
| CT 802 BG 1 | Baltimore | 3 |
| CT 802 BG 2 | Baltimore | 1 |
| CT 802 BG 3 | Baltimore | 1 |
| CT 803.01 BG 1 | Baltimore | 1 |
| CT 803.01 BG 2 | Baltimore | 1 |
| CT 803.01 BG 3 | Baltimore | 1 |
| CT 803.02 BG 1 | Baltimore | 1 |
| CT 803.02 BG 2 | Baltimore | 1 |
| CT 803.02 BG 3 | Baltimore | 1 |
| CT 803.02 BG 4 | Baltimore | 1 |
| CT 804 BG 1 | Baltimore | 1 |
| CT 804 BG 2 | Baltimore | 1 |
| CT 805 BG 1 | Baltimore | 1 |
| CT 805 BG 2 | Baltimore | 3 |
| CT 805 BG 3 | Baltimore | 1 |
| CT 806 BG 1 | Baltimore | 1 |
| CT 806 BG 2 | Baltimore | 1 |
| CT 806 BG 3 | Baltimore | 3 |
| CT 806 BG 4 | Baltimore | 3 |
| CT 807 BG 1 | Baltimore | 1 |
| CT 807 BG 2 | Baltimore | 1 |
| CT 808 BG 1 | Baltimore | 1 |
| CT 808 BG 2 | Baltimore | 1 |
| CT 901 BG 1 | Baltimore | 1 |
| CT 901 BG 2 | Baltimore | 3 |
| CT 901 BG 4 | Baltimore | 1 |
| CT 901 BG 5 | Baltimore | 1 |
| CT 902 BG 1 | Baltimore | 3 |
| CT 902 BG 2 | Baltimore | 3 |
| CT 903 BG 1 | Baltimore | 3 |
| CT 903 BG 2 | Baltimore | 1 |
| CT 903 BG 3 | Baltimore | 3 |
| CT 903 BG 4 | Baltimore | 1 |
| CT 904 BG 1 | Baltimore | 1 |
| CT 904 BG 2 | Baltimore | 1 |
| CT 905 BG 1 | Baltimore | 3 |
| CT 905 BG 2 | Baltimore | 1 |
| CT 906 BG 1 | Baltimore | 1 |
| CT 906 BG 2 | Baltimore | 1 |
| CT 906 BG 3 | Baltimore | 1 |
| CT 906 BG 4 | Baltimore | 3 |
| CT 907 BG 1 | Baltimore | 1 |
| CT 907 BG 2 | Baltimore | 1 |
| CT 907 BG 3 | Baltimore | 1 |
| CT 907 BG 4 | Baltimore | 1 |
| CT 908 BG 1 | Baltimore | 1 |
| CT 908 BG 2 | Baltimore | 1 |
| CT 908 BG 3 | Baltimore | 1 |
| CT 908 BG 4 | Baltimore | 1 |
| CT 908 BG 5 | Baltimore | 1 |
| CT 909 BG 1 | Baltimore | 1 |
| CT 909 BG 2 | Baltimore | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 909 BG 3 | Baltimore | 1 |
| CT 909 BG 4 | Baltimore | 1 |

**Table G-EJ24. Census Tracts (CT) and Block Groups (BG) in Anne Arundel County, Maryland (County ID 24-003) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 7011.01 BG 1 | Riva | 2 |
| CT 7011.01 BG 3 | Edgewater | 2 |
| CT 7011.02 BG 2 | Edgewater | 2 |
| CT 7011.02 BG 3 | Edgewater | 1 |
| CT 7011.02 BG 4 | Edgewater | 2 |
| CT 7013 BG 3 | Un-named Area | 1 |
| CT 7014 BG 1 | Un-named Area | 2 |
| CT 7021 BG 2 | Herald Harbor | 2 |
| CT 7021 BG 3 | Crownsville | 2 |
| CT 7022.05 BG 2 | Crofton | 3 |
| CT 7022.06 BG 1 | Crofton | 3 |
| CT 7022.06 BG 2 | Crofton | 3 |
| CT 7022.08 BG 1 | Crofton | 3 |
| CT 7024.02 BG 1 | Parole | 2 |
| CT 7025 BG 1 | Annapolis Neck | 2 |
| CT 7025 BG 2 | Annapolis | 1 |
| CT 7025 BG 3 | Annapolis | 1 |
| CT 7025 BG 4 | Annapolis Neck | 2 |
| CT 7026.01 BG 1 | Annapolis Neck | 2 |
| CT 7026.01 BG 5 | Annapolis | 1 |
| CT 7026.02 BG 3 | Annapolis Neck | 3 |
| CT 7027.01 BG 1 | Parole | 1 |
| CT 7061.01 BG 2 | Annapolis | 2 |
| CT 7061.01 BG 3 | Annapolis | 1 |
| CT 7063.01 BG 1 | Annapolis Neck | 3 |
| CT 7063.01 BG 2 | Annapolis | 1 |
| CT 7063.02 BG 1 | Annapolis | 2 |
| CT 7063.02 BG 2 | Annapolis | 2 |
| CT 7064.01 BG 1 | Annapolis | 1 |
| CT 7064.01 BG 2 | Annapolis | 1 |
| CT 7064.01 BG 3 | Annapolis | 1 |
| CT 7064.02 BG 1 | Annapolis | 1 |
| CT 7064.02 BG 2 | Annapolis | 1 |
| CT 7065 BG 1 | Annapolis | 1 |
| CT 7065 BG 2 | Annapolis | 1 |
| CT 7065 BG 3 | Annapolis | 1 |
| CT 7066 BG 5 | Annapolis | 1 |
| CT 7067 BG 1 | Naval Academy | 1 |
| CT 7070.01 BG 1 | Shady Side | 2 |
| CT 7070.01 BG 3 | Shady Side | 3 |
| CT 7080.04 BG 1 | Un-named Area | 2 |
| CT 7080.04 BG 3 | Un-named Area | 1 |
| CT 7302.03 BG 1 | Glen Burnie | 2 |
| CT 7302.03 BG 2 | Glen Burnie | 1 |
| CT 7302.03 BG 3 | Glen Burnie | 1 |
| CT 7302.03 BG 4 | Glen Burnie | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 7302.04 BG 1 | Glen Burnie | 3 |
| CT 7302.04 BG 2 | Glen Burnie | 1 |
| CT 7302.04 BG 3 | Glen Burnie | 1 |
| CT 7304.01 BG 1 | Glen Burnie | 3 |
| CT 7304.01 BG 2 | Glen Burnie | 2 |
| CT 7304.02 BG 1 | Glen Burnie | 1 |
| CT 7304.02 BG 2 | Glen Burnie | 2 |
| CT 7304.02 BG 3 | Glen Burnie | 2 |
| CT 7305.02 BG 1 | Glen Burnie | 2 |
| CT 7305.02 BG 2 | Glen Burnie | 1 |
| CT 7305.02 BG 3 | Glen Burnie | 3 |
| CT 7305.04 BG 1 | Glen Burnie | 3 |
| CT 7305.04 BG 2 | Glen Burnie | 1 |
| CT 7305.04 BG 3 | Glen Burnie | 3 |
| CT 7305.05 BG 1 | Glen Burnie | 1 |
| CT 7305.05 BG 2 | Glen Burnie | 1 |
| CT 7305.06 BG 1 | Glen Burnie | 1 |
| CT 7305.06 BG 2 | Glen Burnie | 1 |
| CT 7305.06 BG 3 | Glen Burnie | 1 |
| CT 7307 BG 3 | Severna Park | 2 |
| CT 7307 BG 5 | Severna Park | 2 |
| CT 7309.01 BG 3 | Un-named Area | 2 |
| CT 7310.03 BG 1 | Cape St. Claire | 2 |
| CT 7310.04 BG 1 | Cape St. Claire | 2 |
| CT 7311.02 BG 1 | Arnold | 2 |
| CT 7311.04 BG 2 | Arnold | 2 |
| CT 7312.02 BG 2 | Lake Shore | 2 |
| CT 7312.03 BG 4 | Severna Park | 3 |
| CT 7312.03 BG 5 | Severna Park | 3 |
| CT 7312.04 BG 1 | Pasadena | 2 |
| CT 7313.03 BG 1 | Lake Shore | 2 |
| CT 7313.03 BG 4 | Un-named Area | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 7313.06 BG 1 | Un-named Area | 2 |
| CT 7313.07 BG 1 | Lake Shore | 2 |
| CT 7313.07 BG 2 | Lake Shore | 2 |
| CT 7313.08 BG 2 | Riviera Beach | 2 |
| CT 7313.09 BG 1 | Riviera Beach | 2 |
| CT 7313.09 BG 3 | Riviera Beach | 2 |
| CT 7313.1 BG 1 | Pasadena | 2 |
| CT 7313.1 BG 3 | Pasadena | 2 |
| CT 7313.11 BG 3 | Pasadena | 2 |
| CT 7401.02 BG 1 | Un-named Area | 3 |
| CT 7401.02 BG 2 | Severn | 3 |
| CT 7401.03 BG 1 | Severn | 3 |
| CT 7401.03 BG 2 | Severn | 3 |
| CT 7401.03 BG 3 | Severn | 3 |
| CT 7401.03 BG 4 | Severn | 3 |
| CT 7401.04 BG 1 | Severn | 3 |
| CT 7401.04 BG 2 | Severn | 1 |
| CT 7401.04 BG 3 | Severn | 1 |
| CT 7401.05 BG 1 | Severn | 1 |
| CT 7401.05 BG 2 | Severn | 1 |
| CT 7402.01 BG 2 | Severn | 1 |
| CT 7402.01 BG 3 | Severn | 3 |
| CT 7402.01 BG 4 | Glen Burnie | 1 |
| CT 7402.03 BG 2 | Severn | 3 |
| CT 7403.03 BG 1 | Severn | 2 |
| CT 7403.03 BG 2 | Severn | 3 |
| CT 7403.04 BG 1 | Odenton | 3 |
| CT 7403.05 BG 1 | Odenton | 1 |
| CT 7403.05 BG 2 | Odenton | 1 |
| CT 7403.05 BG 3 | Severn | 1 |
| CT 7403.05 BG 4 | Odenton | 3 |
| CT 7404 BG 1 | Jessup | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 7405 BG 1 | Maryland City | 3 |
| CT 7405 BG 2 | Maryland City | 3 |
| CT 7405 BG 3 | Maryland City | 1 |
| CT 7406.01 BG 1 | Fort Meade | 3 |
| CT 7406.01 BG 2 | Fort Meade | 3 |
| CT 7406.01 BG 3 | Fort Meade | 1 |
| CT 7406.01 BG 4 | Fort Meade | 1 |
| CT 7406.02 BG 1 | Fort Meade | 1 |
| CT 7406.02 BG 2 | Fort Meade | 1 |
| CT 7406.03 BG 2 | Fort Meade | 1 |
| CT 7407.01 BG 1 | Odenton | 1 |
| CT 7407.01 BG 2 | Odenton | 3 |
| CT 7407.02 BG 1 | Odenton | 3 |
| CT 7407.02 BG 2 | Un-named Area | 3 |
| CT 7409 BG 1 | Odenton | 1 |
| CT 7409 BG 2 | Odenton | 2 |
| CT 7409 BG 3 | Odenton | 3 |
| CT 7501.01 BG 1 | Brooklyn Park | 1 |
| CT 7501.01 BG 2 | Brooklyn Park | 2 |
| CT 7501.01 BG 3 | Brooklyn Park | 1 |
| CT 7501.01 BG 4 | Brooklyn Park | 1 |
| CT 7501.02 BG 1 | Brooklyn Park | 1 |
| CT 7501.02 BG 2 | Brooklyn Park | 2 |
| CT 7502.01 BG 1 | Brooklyn Park | 3 |
| CT 7502.01 BG 2 | Brooklyn Park | 1 |
| CT 7502.02 BG 1 | Brooklyn Park | 2 |
| CT 7502.02 BG 2 | Brooklyn Park | 1 |
| CT 7502.03 BG 1 | Brooklyn Park | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 7503 BG 2 | Linthicum | 2 |
| CT 7508.01 BG 3 | Ferndale | 2 |
| CT 7508.03 BG 1 | Ferndale | 1 |
| CT 7508.03 BG 2 | Ferndale | 2 |
| CT 7508.03 BG 3 | Ferndale | 1 |
| CT 7508.03 BG 4 | Ferndale | 1 |
| CT 7508.03 BG 5 | Ferndale | 1 |
| CT 7508.04 BG 1 | Ferndale | 1 |
| CT 7508.04 BG 2 | Ferndale | 2 |
| CT 7509 BG 1 | Glen Burnie | 2 |
| CT 7509 BG 2 | Glen Burnie | 1 |
| CT 7510 BG 1 | Glen Burnie | 2 |
| CT 7510 BG 2 | Glen Burnie | 1 |
| CT 7510 BG 3 | Glen Burnie | 2 |
| CT 7511.02 BG 1 | Glen Burnie | 1 |
| CT 7511.02 BG 2 | Glen Burnie | 2 |
| CT 7511.03 BG 1 | Glen Burnie | 2 |
| CT 7511.03 BG 3 | Glen Burnie | 2 |
| CT 7511.03 BG 4 | Glen Burnie | 2 |
| CT 7512 BG 3 | Un-named Area | 3 |
| CT 7514 BG 1 | Severn | 3 |
| CT 7514 BG 2 | Un-named Area | 3 |
| CT 7515 BG 1 | Maryland City | 3 |
| CT 7515 BG 2 | Maryland City | 1 |
| CT 7515 BG 3 | Maryland City | 1 |
| CT 7515 BG 4 | Maryland City | 1 |
| CT 7516 BG 2 | Crownsville | 2 |
| CT 9800 BG 1 | Un-named Area | 3 |

## Table G-EJ25. Census Tracts (CT) and Block Groups (BG) in Norfolk, Virginia (County ID 51-710) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**
**Note that Norfolk is an independent city in Virginia and is considered the equivalent of a county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 1 BG 1 | Norfolk | 2 |
| CT 1 BG 2 | Norfolk | 2 |
| CT 11 BG 1 | Norfolk | 1 |
| CT 11 BG 2 | Norfolk | 1 |
| CT 12 BG 2 | Norfolk | 1 |
| CT 13 BG 1 | Norfolk | 3 |
| CT 13 BG 2 | Norfolk | 1 |
| CT 14 BG 1 | Norfolk | 1 |
| CT 14 BG 2 | Norfolk | 2 |
| CT 15 BG 2 | Norfolk | 3 |
| CT 16 BG 1 | Norfolk | 1 |
| CT 16 BG 2 | Norfolk | 1 |
| CT 17 BG 2 | Norfolk | 3 |
| CT 2.01 BG 1 | Norfolk | 2 |
| CT 2.01 BG 2 | Norfolk | 2 |
| CT 2.02 BG 2 | Norfolk | 2 |
| CT 2.02 BG 3 | Norfolk | 2 |
| CT 24 BG 3 | Norfolk | 2 |
| CT 25 BG 1 | Norfolk | 1 |
| CT 25 BG 2 | Norfolk | 1 |
| CT 26 BG 1 | Norfolk | 1 |
| CT 26 BG 2 | Norfolk | 1 |
| CT 27 BG 1 | Norfolk | 1 |
| CT 27 BG 2 | Norfolk | 1 |
| CT 27 BG 3 | Norfolk | 1 |
| CT 28 BG 2 | Norfolk | 2 |
| CT 29 BG 1 | Norfolk | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 29 BG 2 | Norfolk | 1 |
| CT 29 BG 3 | Norfolk | 1 |
| CT 29 BG 4 | Norfolk | 1 |
| CT 3 BG 2 | Norfolk | 3 |
| CT 3 BG 3 | Norfolk | 3 |
| CT 30 BG 1 | Norfolk | 2 |
| CT 31 BG 1 | Norfolk | 3 |
| CT 31 BG 2 | Norfolk | 1 |
| CT 31 BG 3 | Norfolk | 1 |
| CT 32 BG 1 | Norfolk | 1 |
| CT 32 BG 2 | Norfolk | 1 |
| CT 32 BG 3 | Norfolk | 1 |
| CT 33 BG 1 | Norfolk | 1 |
| CT 33 BG 2 | Norfolk | 1 |
| CT 34 BG 1 | Norfolk | 1 |
| CT 34 BG 2 | Norfolk | 1 |
| CT 35.01 BG 1 | Norfolk | 1 |
| CT 35.01 BG 2 | Norfolk | 1 |
| CT 35.01 BG 3 | Norfolk | 1 |
| CT 35.01 BG 4 | Norfolk | 1 |
| CT 37 BG 1 | Norfolk | 2 |
| CT 38 BG 1 | Norfolk | 2 |
| CT 4 BG 3 | Norfolk | 2 |
| CT 40.02 BG 4 | Norfolk | 2 |
| CT 41 BG 1 | Norfolk | 1 |
| CT 42 BG 1 | Norfolk | 1 |
| CT 42 BG 2 | Norfolk | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 43 BG 1 | Norfolk | 1 |
| CT 43 BG 2 | Norfolk | 1 |
| CT 43 BG 3 | Norfolk | 1 |
| CT 43 BG 4 | Norfolk | 1 |
| CT 44 BG 1 | Norfolk | 1 |
| CT 44 BG 2 | Norfolk | 3 |
| CT 44 BG 3 | Norfolk | 1 |
| CT 45 BG 1 | Norfolk | 3 |
| CT 46 BG 1 | Norfolk | 1 |
| CT 46 BG 2 | Norfolk | 1 |
| CT 47 BG 1 | Norfolk | 3 |
| CT 47 BG 2 | Norfolk | 1 |
| CT 48 BG 1 | Norfolk | 1 |
| CT 49 BG 2 | Norfolk | 3 |
| CT 5 BG 1 | Norfolk | 1 |
| CT 5 BG 4 | Norfolk | 2 |
| CT 50 BG 1 | Norfolk | 1 |
| CT 50 BG 2 | Norfolk | 1 |
| CT 50 BG 3 | Norfolk | 1 |
| CT 51 BG 1 | Norfolk | 3 |
| CT 51 BG 2 | Norfolk | 1 |
| CT 51 BG 3 | Norfolk | 1 |
| CT 55 BG 1 | Norfolk | 1 |
| CT 55 BG 2 | Norfolk | 1 |
| CT 55 BG 3 | Norfolk | 1 |
| CT 56.02 BG 2 | Norfolk | 1 |
| CT 57.01 BG 1 | Norfolk | 1 |
| CT 57.01 BG 2 | Norfolk | 1 |
| CT 57.01 BG 3 | Norfolk | 1 |
| CT 57.02 BG 1 | Norfolk | 1 |
| CT 57.02 BG 2 | Norfolk | 3 |
| CT 58 BG 1 | Norfolk | 1 |
| CT 58 BG 2 | Norfolk | 1 |
| CT 58 BG 3 | Norfolk | 3 |
| CT 59.01 BG 1 | Norfolk | 3 |
| CT 59.01 BG 2 | Norfolk | 1 |
| CT 59.01 BG 3 | Norfolk | 1 |
| CT 59.02 BG 1 | Norfolk | 3 |
| CT 59.02 BG 2 | Norfolk | 3 |
| CT 59.02 BG 4 | Norfolk | 1 |
| CT 59.03 BG 1 | Norfolk | 1 |
| CT 6 BG 1 | Norfolk | 3 |
| CT 6 BG 3 | Norfolk | 1 |
| CT 60 BG 1 | Norfolk | 1 |
| CT 60 BG 2 | Norfolk | 1 |
| CT 61 BG 1 | Norfolk | 1 |
| CT 61 BG 2 | Norfolk | 3 |
| CT 61 BG 3 | Norfolk | 1 |
| CT 61 BG 4 | Norfolk | 3 |
| CT 61 BG 5 | Norfolk | 2 |
| CT 62 BG 1 | Norfolk | 3 |
| CT 62 BG 2 | Norfolk | 2 |
| CT 64 BG 1 | Norfolk | 3 |
| CT 64 BG 2 | Norfolk | 1 |
| CT 65.01 BG 1 | Norfolk | 2 |
| CT 65.01 BG 2 | Norfolk | 2 |
| CT 65.02 BG 2 | Norfolk | 1 |
| CT 66.05 BG 2 | Norfolk | 1 |
| CT 66.06 BG 1 | Norfolk | 1 |
| CT 66.06 BG 3 | Norfolk | 1 |
| CT 66.07 BG 1 | Norfolk | 3 |
| CT 66.07 BG 2 | Norfolk | 2 |
| CT 69.01 BG 1 | Norfolk | 3 |
| CT 69.01 BG 2 | Norfolk | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 69.01 BG 3 | Norfolk | 3 |
| CT 69.02 BG 1 | Norfolk | 1 |
| CT 70.01 BG 1 | Norfolk | 1 |
| CT 70.02 BG 1 | Norfolk | 1 |
| CT 70.02 BG 2 | Norfolk | 3 |
| CT 8 BG 2 | Norfolk | 1 |
| CT 9.01 BG 1 | Norfolk | 2 |
| CT 9.02 BG 1 | Norfolk | 2 |

**Table G-EJ26. Census Tracts (CT) and Block Groups (BG) in Newport News, Virginia (County ID 51-700) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**
**Note that Newport News is an independent city in Virginia and is considered the equivalent of a county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 301 BG 1 | Newport News | 1 |
| CT 301 BG 2 | Newport News | 1 |
| CT 301 BG 3 | Newport News | 1 |
| CT 303 BG 1 | Newport News | 1 |
| CT 303 BG 2 | Newport News | 3 |
| CT 303 BG 3 | Newport News | 1 |
| CT 303 BG 4 | Newport News | 1 |
| CT 303 BG 5 | Newport News | 1 |
| CT 303 BG 6 | Newport News | 1 |
| CT 303 BG 7 | Newport News | 3 |
| CT 304 BG 1 | Newport News | 1 |
| CT 304 BG 2 | Newport News | 1 |
| CT 304 BG 3 | Newport News | 1 |
| CT 304 BG 4 | Newport News | 1 |
| CT 305 BG 1 | Newport News | 1 |
| CT 305 BG 2 | Newport News | 1 |
| CT 306 BG 1 | Newport News | 1 |
| CT 306 BG 2 | Newport News | 1 |
| CT 306 BG 3 | Newport News | 1 |
| CT 308 BG 1 | Newport News | 1 |
| CT 308 BG 2 | Newport News | 1 |
| CT 308 BG 3 | Newport News | 1 |
| CT 309 BG 1 | Newport News | 1 |
| CT 309 BG 2 | Newport News | 1 |
| CT 311 BG 1 | Newport News | 1 |
| CT 311 BG 2 | Newport News | 1 |
| CT 312 BG 1 | Newport News | 2 |
| CT 312 BG 2 | Newport News | 1 |
| CT 313 BG 1 | Newport News | 1 |
| CT 313 BG 2 | Newport News | 1 |
| CT 313 BG 3 | Newport News | 1 |
| CT 313 BG 4 | Newport News | 1 |
| CT 314 BG 3 | Newport News | 3 |
| CT 314 BG 4 | Newport News | 1 |
| CT 315 BG 1 | Newport News | 2 |
| CT 316.01 BG 2 | Newport News | 1 |
| CT 316.01 BG 3 | Newport News | 1 |
| CT 316.02 BG 1 | Newport News | 1 |
| CT 317.01 BG 1 | Newport News | 1 |
| CT 317.01 BG 2 | Newport News | 2 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 319.02 BG 1 | Newport News | 3 |
| CT 319.02 BG 3 | Newport News | 1 |
| CT 320.06 BG 1 | Newport News | 1 |
| CT 320.06 BG 2 | Newport News | 1 |
| CT 320.06 BG 3 | Newport News | 1 |
| CT 320.07 BG 1 | Newport News | 3 |
| CT 320.07 BG 2 | Newport News | 3 |
| CT 321.13 BG 1 | Newport News | 1 |
| CT 321.17 BG 2 | Newport News | 2 |
| CT 321.23 BG 1 | Newport News | 1 |
| CT 321.23 BG 2 | Newport News | 3 |
| CT 321.23 BG 3 | Newport News | 2 |
| CT 321.24 BG 1 | Newport News | 1 |
| CT 321.24 BG 2 | Newport News | 3 |
| CT 321.26 BG 1 | Newport News | 1 |
| CT 321.26 BG 2 | Newport News | 1 |
| CT 321.27 BG 1 | Newport News | 2 |
| CT 321.27 BG 2 | Newport News | 3 |
| CT 321.27 BG 3 | Newport News | 1 |
| CT 321.28 BG 1 | Newport News | 3 |
| CT 321.28 BG 2 | Newport News | 1 |
| CT 321.29 BG 1 | Newport News | 3 |
| CT 321.29 BG 2 | Newport News | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 321.31 BG 1 | Newport News | 3 |
| CT 321.31 BG 3 | Newport News | 1 |
| CT 321.32 BG 4 | Newport News | 3 |
| CT 322.11 BG 3 | Newport News | 3 |
| CT 322.12 BG 1 | Newport News | 1 |
| CT 322.12 BG 2 | Newport News | 3 |
| CT 322.12 BG 3 | Newport News | 1 |
| CT 322.23 BG 1 | Newport News | 3 |
| CT 322.23 BG 2 | Newport News | 3 |
| CT 322.23 BG 3 | Newport News | 3 |
| CT 322.24 BG 1 | Newport News | 1 |
| CT 322.24 BG 2 | Newport News | 1 |
| CT 322.24 BG 3 | Newport News | 3 |
| CT 322.24 BG 4 | Newport News | 3 |
| CT 322.25 BG 1 | Newport News | 1 |
| CT 322.25 BG 2 | Newport News | 1 |
| CT 322.26 BG 1 | Newport News | 1 |
| CT 322.26 BG 2 | Newport News | 1 |
| CT 323 BG 2 | Newport News | 1 |
| CT 323 BG 3 | Newport News | 1 |
| CT 324 BG 1 | Newport News | 1 |
| CT 324 BG 2 | Newport News | 1 |

**Table G-EJ27. Census Tracts (CT) and Block Groups (BG) in Hampton, Virginia (County ID 51-650) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**
**Note that Hampton is an independent city in Virginia and is considered the equivalent of a county.**

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 101.03 BG 1 | Hampton | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 101.03 BG 3 | Hampton | 3 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 101.04 BG 2 | Hampton | 2 |
| CT 101.04 BG 4 | Hampton | 1 |
| CT 101.04 BG 5 | Hampton | 1 |
| CT 103.04 BG 1 | Hampton | 3 |
| CT 103.04 BG 2 | Hampton | 3 |
| CT 103.04 BG 3 | Hampton | 3 |
| CT 103.06 BG 2 | Hampton | 1 |
| CT 103.06 BG 3 | Hampton | 1 |
| CT 103.07 BG 1 | Hampton | 3 |
| CT 103.07 BG 2 | Hampton | 3 |
| CT 103.09 BG 2 | Hampton | 3 |
| CT 103.09 BG 3 | Hampton | 1 |
| CT 103.1 BG 1 | Hampton | 3 |
| CT 103.11 BG 1 | Hampton | 1 |
| CT 103.11 BG 2 | Hampton | 3 |
| CT 103.13 BG 1 | Hampton | 3 |
| CT 103.13 BG 2 | Hampton | 1 |
| CT 103.13 BG 3 | Hampton | 3 |
| CT 103.13 BG 4 | Hampton | 1 |
| CT 103.14 BG 1 | Hampton | 3 |
| CT 103.14 BG 2 | Hampton | 1 |
| CT 104 BG 1 | Hampton | 1 |
| CT 104 BG 2 | Hampton | 1 |
| CT 104 BG 3 | Hampton | 1 |
| CT 104 BG 4 | Hampton | 1 |
| CT 104 BG 5 | Hampton | 2 |
| CT 105.01 BG 1 | Hampton | 1 |
| CT 105.01 BG 2 | Hampton | 1 |
| CT 105.01 BG 3 | Hampton | 1 |
| CT 105.02 BG 1 | Hampton | 1 |
| CT 105.02 BG 2 | Hampton | 1 |
| CT 106.01 BG 1 | Hampton | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 106.01 BG 2 | Hampton | 1 |
| CT 106.02 BG 1 | Hampton | 1 |
| CT 106.02 BG 2 | Hampton | 1 |
| CT 107.01 BG 1 | Hampton | 2 |
| CT 107.01 BG 2 | Hampton | 1 |
| CT 107.02 BG 1 | Hampton | 2 |
| CT 107.02 BG 2 | Hampton | 1 |
| CT 107.03 BG 2 | Hampton | 2 |
| CT 108 BG 1 | Hampton | 1 |
| CT 108 BG 2 | Hampton | 1 |
| CT 109 BG 1 | Hampton | 1 |
| CT 110 BG 1 | Hampton | 2 |
| CT 110 BG 2 | Hampton | 1 |
| CT 110 BG 3 | Hampton | 1 |
| CT 112 BG 1 | Hampton | 1 |
| CT 112 BG 2 | Hampton | 2 |
| CT 112 BG 3 | Hampton | 2 |
| CT 113 BG 1 | Hampton | 1 |
| CT 113 BG 2 | Hampton | 1 |
| CT 114 BG 1 | Hampton | 1 |
| CT 114 BG 2 | Hampton | 3 |
| CT 116 BG 1 | Hampton | 1 |
| CT 116 BG 2 | Hampton | 1 |
| CT 116 BG 3 | Hampton | 1 |
| CT 118 BG 1 | Hampton | 1 |
| CT 118 BG 2 | Hampton | 1 |
| CT 118 BG 3 | Hampton | 1 |
| CT 118 BG 5 | Hampton | 1 |
| CT 118 BG 6 | Hampton | 3 |
| CT 119 BG 1 | Hampton | 1 |
| CT 119 BG 2 | Hampton | 3 |
| CT 119 BG 3 | Hampton | 1 |

| Census Tract & Block Group ID | Place Name | Category | Census Tract & Block Group ID | Place Name | Category |
|---|---|---|---|---|---|
| CT 120 BG 1 | Hampton | 1 | CT 120 BG 2 | Hampton | 1 |

**Table G-EJ28. Census Tracts (CT) and Block Groups (BG) in Portsmouth, Virginia (County ID 51-740) that are Potential Environmental Justice Areas of Concern due to Concentrations of Minority and/or Low-Income Populations**

**Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.**
**Note that Portsmouth is an independent city in Virginia and is considered the equivalent of a county.**

| Census Tract & Block Group ID | Place Name | Category | Census Tract & Block Group ID | Place Name | Category |
|---|---|---|---|---|---|
| CT 2103 BG 1 | Portsmouth | 3 | CT 2121 BG 1 | Portsmouth | 1 |
| CT 2103 BG 2 | Portsmouth | 2 | CT 2121 BG 2 | Portsmouth | 1 |
| CT 2105 BG 1 | Portsmouth | 1 | CT 2123 BG 1 | Portsmouth | 1 |
| CT 2106 BG 2 | Portsmouth | 2 | CT 2123 BG 2 | Portsmouth | 3 |
| CT 2109 BG 1 | Portsmouth | 3 | CT 2123 BG 3 | Portsmouth | 3 |
| CT 2111 BG 1 | Portsmouth | 1 | CT 2123 BG 4 | Portsmouth | 1 |
| CT 2111 BG 2 | Portsmouth | 1 | CT 2124 BG 1 | Portsmouth | 1 |
| CT 2114 BG 1 | Portsmouth | 1 | CT 2124 BG 2 | Portsmouth | 3 |
| CT 2114 BG 2 | Portsmouth | 1 | CT 2124 BG 3 | Portsmouth | 1 |
| CT 2115 BG 1 | Portsmouth | 1 | CT 2125 BG 1 | Portsmouth | 1 |
| CT 2115 BG 2 | Portsmouth | 1 | CT 2126 BG 1 | Portsmouth | 1 |
| CT 2116 BG 3 | Portsmouth | 2 | CT 2126 BG 2 | Portsmouth | 2 |
| CT 2117 BG 1 | Portsmouth | 3 | CT 2127.01 BG 1 | Portsmouth | 1 |
| CT 2117 BG 2 | Portsmouth | 1 | CT 2127.01 BG 2 | Portsmouth | 3 |
| CT 2117 BG 3 | Portsmouth | 1 | CT 2127.01 BG 3 | Portsmouth | 3 |
| CT 2118 BG 1 | Portsmouth | 1 | CT 2127.01 BG 4 | Portsmouth | 3 |
| CT 2118 BG 2 | Portsmouth | 1 | CT 2127.02 BG 1 | Portsmouth | 3 |
| CT 2118 BG 3 | Portsmouth | 1 | CT 2127.02 BG 2 | Portsmouth | 1 |
| CT 2118 BG 4 | Portsmouth | 1 | CT 2128.01 BG 2 | Portsmouth | 1 |
| CT 2119 BG 1 | Portsmouth | 1 | CT 2128.01 BG 3 | Portsmouth | 3 |
| CT 2119 BG 2 | Portsmouth | 3 | CT 2129 BG 2 | Portsmouth | 2 |
| CT 2120 BG 1 | Portsmouth | 1 | CT 2129 BG 3 | Portsmouth | 2 |
| CT 2120 BG 2 | Portsmouth | 1 | CT 2131.01 BG 1 | Portsmouth | 1 |

| Census Tract & Block Group ID | Place Name | Category |
|---|---|---|
| CT 2131.01 BG 2 | Portsmouth | 1 |
| CT 2131.01 BG 3 | Portsmouth | 3 |
| CT 2131.03 BG 3 | Portsmouth | 3 |
| CT 2131.03 BG 4 | Portsmouth | 3 |
| CT 2131.03 BG 5 | Portsmouth | 3 |
| CT 2131.04 BG 1 | Portsmouth | 3 |
| CT 2131.04 BG 2 | Portsmouth | 3 |
| CT 2132 BG 1 | Portsmouth | 3 |
| CT 2132 BG 2 | Portsmouth | 1 |
| CT 9801 BG 1 | Portsmouth | 3 |

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# Electromagnetic Fields

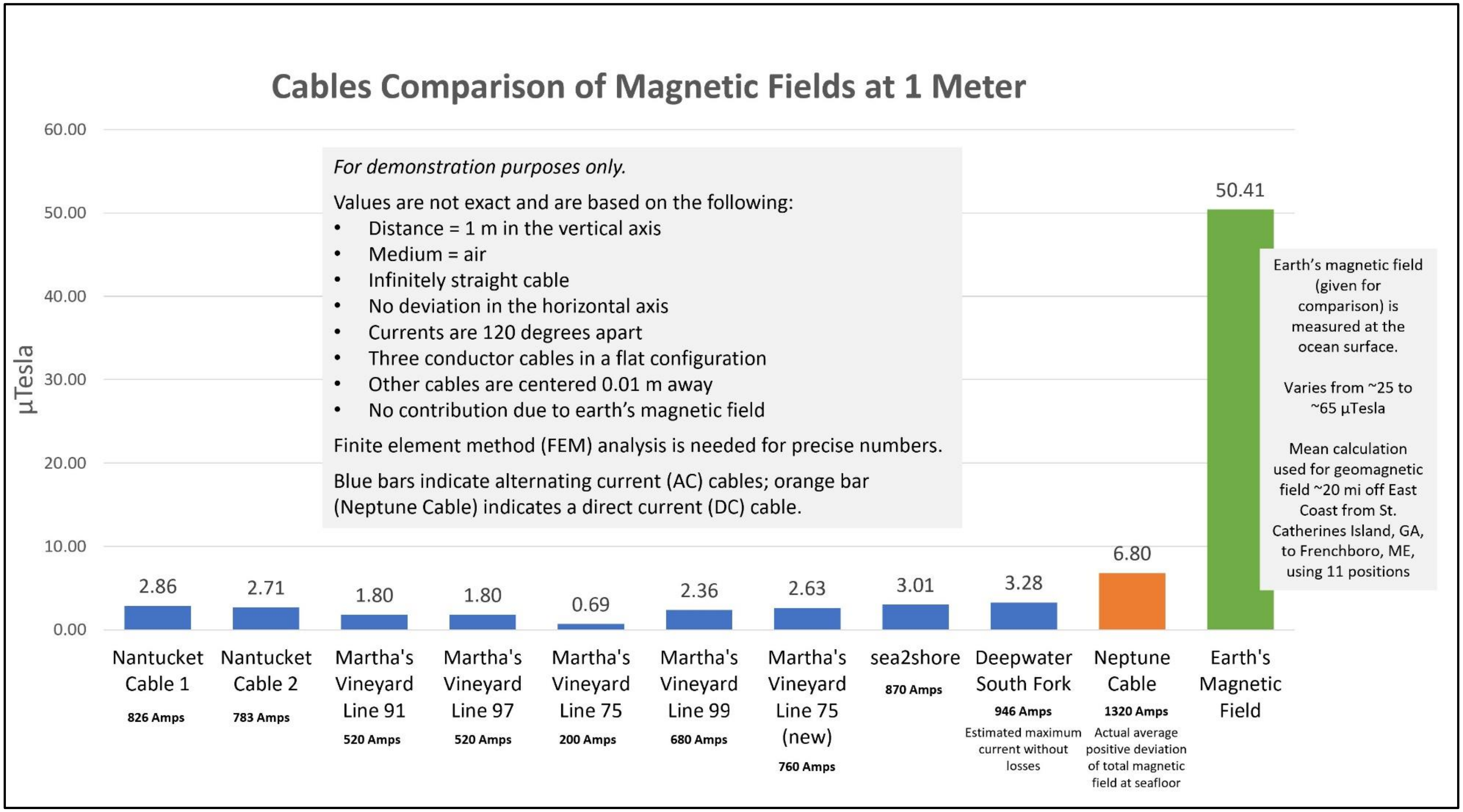


**Figure G-EMF1. Comparison of electromagnetic fields produced by offshore wind farm transmission cables to the Earth's background magnetic field.**

# Overview of Sound and Marine Mammal Hearing

Underwater noise can be described through a source-path-receiver model. An acoustic source emits sound energy that radiates outward and travels through the water and the seafloor as pressure waves, which is the most relevant component of sound to marine mammals. The sound level decreases with increasing distance from the acoustic source as the sound pressure waves spread out under the influence of the surrounding environment. The amount by which the sound levels decrease between a source and receiver is called transmission loss (Richardson et al. 1995). The amount of transmission loss that occurs depends on the source-receiver separation, frequency of the sound, properties of the water column, and properties of the seafloor layers. Underwater sound levels are expressed in decibels, which is a logarithmic ratio relative to a fixed reference pressure of 1 micropascal (equal to 10-6 pascals or 10-11 bar).

Underwater sound can be produced by biological and physical oceanographic sources, as well as anthropogenic sources. A brief overview of acoustic units and the propagation of underwater sound can be found in Appendix J (Underwater Sound and Acoustic Modeling Results) of the *Ocean Wind 1 Offshore Wind Farm Final Environmental Impact Statement* (BOEM 2023). Biological sounds include vocalizations made by marine mammals and physical oceanographic sounds, including wind and wave activity, rain, sea ice, and undersea earthquakes. Anthropogenic (human-introduced) sounds include shipping and other vessel traffic, military activities, marine construction, oil and gas exploration, and more. Some of these natural and anthropogenic sounds are present everywhere in the ocean all of the time; therefore, background sound in the ocean is commonly referred to as “ambient noise” (DOSITS 2019). The efficiency of underwater sound propagation allows marine mammals to use underwater sound as a primary method of communication, navigation, prey detection (i.e., foraging), and predator avoidance (Richardson et al. 1995; Southall et al. 2007; OSPAR Commission 2009). Anthropogenic noise has gained recognition as an important stressor for marine mammals because of their reliance on underwater hearing for maintenance of these critical biological functions (Richardson et al. 1995; Ketten 1998). Underwater noise generated by human activities can often be detected by marine mammals many kilometers from the source. With decreasing distance from a noise source, potential acoustic impacts can result in mortality, non-auditory injury, permanent or temporary hearing loss, behavioral changes, and acoustic masking. All of these effects have the potential to induce impacts on marine mammals (OSPAR Commission 2009; Erbe 2013).

Auditory masking occurs when sound signals used or produced by marine mammals overlap in time, space, and frequency with another sound source (Richardson et al. 1995). Masking can reduce communication space, limit the detection of relevant biological cues, and reduce echolocation effectiveness. A growing body of literature is focused on improving the framework for assessing the potential for masking of animal communication by anthropogenic noise and understanding the resulting effects. More research is needed to understand the process of masking, the risk of masking by anthropogenic activities, the ecological significance of masking, and what anti-masking strategies are used by marine animals and their degree of effectiveness before masking can be incorporated into regulation strategies or mitigation approaches (Erbe et al. 2016). The potential for masking can be assessed qualitatively by comparing the frequencies of anthropogenic sources with the frequencies at which marine mammal vocalizations are made and the hearing ranges of marine mammal species.

Marine mammals are acoustically diverse, with wide variations in ear anatomy, hearing frequency range, and amplitude sensitivity (Ketten 1991). An animal's sensitivity to sound likely depends on the presence and level of sound in certain frequency bands and the range of frequencies to which the animal is most sensitive (Richardson et al. 1995). In general, larger species, such as baleen whales, are believed to hear better at lower frequency ranges than smaller species, such as porpoises and dolphins. Hearing abilities are generally only well understood for smaller species for which audiograms (plots of hearing threshold at different sound frequencies) have been developed based on captive behavioral studies (reactions to sound or behavioral audiograms), and electrophysiological experiments (measuring auditory evoked potentials) on captive or stranded animals (Erbe et al. 2012). Audiograms have been obtained in some toothed whale (odontocetes) and pinniped species (Southall et al. 2007; Finneran 2015), while direct measurements of baleen whale (mysticetes) hearing are lacking (Ridgway and Carder 2001). Baleen whale hearing sensitivities have therefore been estimated based on anatomy, modeling, vocalizations, taxonomy, and behavioral response studies (Houser et al. 2001; Ketten and Mountain 2011, 2014 in Southall et al. 2019; Cranford and Krysl 2015; Richardson et al. 1995; Wartzok and Ketten 1999; Au and Hastings 2008; Dahlheim and Ljungblad 1990; Reichmuth 2007).

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## Visual Resources

Visual resources impacts associated with the RWF were evaluated and determined based on information and findings associated with the RWF visual impact assessment (VIA) (EDR 2023) and the application of BOEM’s Assessment of *Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States* methodology (Sullivan 2021), also known as seascape, landscape, and visual impacts assessment (SLVIA). At the request of BOEM, the SLVIA methodology for determination of impacts to key observation points (KOPs) (comprising the VIA component of the SLVIA) and impacts to character areas (ocean [OCA], seascapes [SCA] and landscapes [LCA]) (comprising the seascape and landscape impacts assessment [SLIA] component of the SLVIA) was applied (Sullivan 2021:29–33) to previously documented evaluation and impact methodologies associated with the RWF VIA.

The SLVIA impact methodology was cross walked with the RWF VIA to extract previously documented existing views and proposed Project visual conditions and information associated with the Proposed Action (Tables G-VIS1a through G-VIS2e). KOP information and character area information associated with the 2021 VIA was also extracted and applied to Alternatives B, C, D, E, and G (Alternative F has not been evaluated) and compiled in Tables G-VIS1a through G-VIS10c to provide a consistent baseline of information related to determination of impacts associated with KOPs and character areas in relation to the Proposed Action for comparison purposes. EIS Tables 3.20-2 through 3.20-4 provide summaries of overall impact determination by action alternative per KOP, specially designated areas (SDAs), and character area for ease in comparison between the various action alternatives.

Up to 37 viewing condition scenarios (e.g., daytime, sunset and nighttime) associated with 28 individual KOPs were evaluated for each action alternative associated with the VIA component of the SLVIA (Tables G-VIS1a through G-VIS1b, G-VIS3, G-VIS5a through G-VIS5b, and G-VIS7 and G-VIS9). Not all KOPs were evaluated for all action alternatives. The orientation of specific KOPs in relation to action alternatives were reviewed and selected for further analysis based on geographic proximity of each action alternative. Each table combines the sensitivity rating based on a location's susceptibility to change and its perceived value to society based on information from the RWF VIA as well as the magnitude rating consisting of size or scale of the change associated with the Project, the geographic extent of the change, and the duration and reversibility of the change for each KOP, for an overall impact determination finding of major, moderate, minor, or negligible (Sullivan 2021), which correspond to impacts described in the EIS. It is assumed that nighttime impacts would be reduced to Negligible as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels) when Federal Aviation Administration (FAA) warning lights are not activated though the use of aircraft detection lighting system (ADLS). Cumulative impacts associated with KOPs (VIA Table G-VIS11) have been evaluated and identify the level of impact associated with the contribution of the Proposed Action to the No Action Alternative.

Impacts associated with the SLIA component of the analysis (see Tables G-VIS2a through G-VIS2e, G-VIS4a through G-VIS4c, G-VIS6a through G-VIS6c, G-VIS8a through G-VIS8c, and G-VIS10a through G-VIS10c) crosswalk and categorize landscape similarity zones as described in the RWF VIA with SLVIA character area descriptions to provide a general understating of OCA, SCA, and LCA relationships. Visibility analyses to determine the overall character area visibility associated with each alternative in comparison to the Proposed Action to provide a basis for impact determination is included in each table. Impacts to SDAs have also been included in each SLIA table and categorized based on SDA type.

Impact findings are based on the best available information associated with the RWF VIA for the action alternatives, and some deviation between the RWF VIA impact findings and the SLVIA impacts findings as applied in the following tables may occur due to differences in methodological approaches.

**Table G-VIS1a. Visual Impact Assessment Impact Matrix for Alternative B (Proposed Action) (see Table G-VIS1b for continuation table)**

| KOP Number | KOP Name | Representative Character Area (SCA, LCA, OCA) | Viewing Direction | Elevation (feet) | Lighting Angle of Proposed Action Simulation | Visibility Threshold | Distance to Nearest Turbine (miles/nautical miles) | Horizontal Field of View Occupied (degrees) | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLVIA Sensitivity Rating Rationale | SLVIA Sensitivity Rating (high, medium, low) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AI01** | Brenton Point State Park | SCA/LCA | South-Southeast | 34.9 | Sidelit | VTL2 | 16.7/14.5 | 40 | Landscape is characteristic of recreational development; seascape appears intact. | Low | Local Residents, Tourists/Vacationers, Fishing Community<br><br>Newport/Ocean Drive State Scenic Area, Brenton Point State Park, Rhode Island Historic District, Ocean Drive National Historic Landmark | High | Popular destination for residents and tourists who enjoy sightseeing, recreating, and sunbathing. | Medium |
| **AI01** | Brenton Point State Park – Night | SCA/LCA | South-Southeast | 34.9 | N/A | VTL5 | 16.7/14.5 | 40 | Night seascape appears intact. | Medium | Local Residents, Tourists/Vacationers, Fishing Community<br><br>Newport/Ocean Drive State Scenic Area, Brenton Point State Park, Rhode Island Historic District, Ocean Drive National Historic Landmark | High | Popular destination for residents and tourists who enjoy sightseeing. | High |
| **AI03** | Newport Cliff Walk | SCA/LCA | Southeast to South-Southeast | 22.8 | Sidelit | VTL3 | 15.3/13.3 | 42 | Landscape is characteristic of natural areas and minimal recreational development; seascape appears intact. | Medium | Local Residents, Tourists/Vacationers<br><br>Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark | High | Popular among residents and tourists, particularly during the summer season. No other human-made features are visible. | High |
| **AI05** | Sachuest Point National Wildlife Refuge | LCA | South-Southeast | 21.7 | Variable | VTL4 | 14.8/12.9 | 46 | Landscape is characteristic of natural areas and minimal recreational development; seascape appears intact. | Medium | Local Residents, Tourists/Vacationers; Educational, Birders<br><br>Sachuest Point National Wildlife Refuge, Sachuest Point State Scenic Area | High | Popular destination for hikers, fishermen, and nature enthusiasts, particularly birders | High |
| **AI06** | Sachuest Beach (Second Beach) | SCA | South-Southeast to South | 10.2 | Sidelit | VTL3 | 16.0/13.9 | 43 | Landscape is characteristic of minimal shoreline recreational development; seascape appears intact. | Medium | Local Residents, Tourists/Vacationers<br><br>Sachuest Beach (Second Beach), Narragansett Bay | Medium | Residents and vacationers regularly use Second Beach, particularly during the summer. | Medium |
| **AI07** | Hanging Rock (Norman Bird Sanctuary) | LCA | Southeast to South-Southeast | 67.3 | Backlit | VTL5 | 16.2/14.1 | 43 | Landscape has infrastructure development and recreational development; seascape appears intact. | Medium | Local Residents, Tourists/Vacationers<br><br>Norman Bird Sanctuary, Paradise Avenue and Associated Roads, State Scenic Byway, Second Beach, Paradise Rocks Rhode Island Historic District | High | Popular destination for residents and tourists who enjoy birdwatching, sightseeing, recreating, and sunbathing. | High |
| **BI04** | Southeast Lighthouse | SCA | East | 161.1 | Sidelit | VTL2 | 15.3/13.3 | 40 | Landscape has characteristic historic lighthouse setting with supporting development; BIWF is visible (3 miles). | High | Local Residents, Tourists/Vacationers<br><br>Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area | High | Maintenance of views from historic landmark and scenic area; user groups. | High |

| KOP Number | KOP Name | Representative Character Area (SCA, LCA, OCA) | Viewing Direction | Elevation (feet) | Lighting Angle of Proposed Action Simulation | Visibility Threshold | Distance to Nearest Turbine (miles/nautical miles) | Horizontal Field of View Occupied (degrees) | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLVIA Sensitivity Rating Rationale | SLVIA Sensitivity Rating (high, medium, low) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BI04** | Southeast Lighthouse – Night | SCA | East | 161.1 | N/A | VTL 5 | 15.3/13.4 | 40 | Night seascape appears intact. | High | Local Residents, Tourists/Vacationers<br><br>Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area | High | Maintenance of views from historic landmark and scenic area; user groups | High |
| **BI12** | Clayhead Trail | SCA | East | 78.8 | Sidelit | VTL1 | 15.9/13.8 | 42 | Landscape is characteristic of intact natural shoreline; seascape appears intact. | Medium | Tourists/Vacationers, Local Residents<br><br>Clayhead Trail State Scenic District; Clay Head Preserve | High | Clayhead Trail State Scenic District; popular destination for residents and tourists who enjoy sightseeing and recreating. | High |
| **BI13** | North Light | SCA | East | 27.5 | Backlit | VTL4 | 17.2/15.0 | 40 | Landscape has compatible residential and recreational development; seascape appears intact. | Moderate | Tourists/Vacationers, Local Residents<br><br>North Light National Register Historic Property, Beach Plum Neck/North Light State Scenic Area, Corn Neck Road Historic District (NRE) | High | Remote and private scenic/historic experience set among dune landforms and dense dune vegetation. | High |
| **CI01** | Cuttyhunk Island | SCA | South to Southwest | 151.3 | Backlit | VTL5 | 13.9/12.1 | 78 | Landscape has compatible residential and recreational development; seascape appears intact. | High | Local Residents, Tourists/Vacationers<br><br>Elizabeth Islands State Scenic Area, Buzzards Bay | High | Cuttyhunk is a remote island, which hosts a small number of year-round residents and a large influx of tourists during the summer months. | High |
| **C01** | Beavertail Lighthouse | SCA | Southeast to South-Southeast | 27.5 | Sidelit | VTL1 | 18.4/15.9 | 37 | Landscape is characteristic of intact natural shoreline; seascape appears intact. | Low | Local Residents, Tourists/Vacationers<br><br>National Register Historic Site, Beavertail Point Scenic Area, Rhode Island Historic District, Beavertail State Park | High | Popular destination for residents and tourists who enjoy sightseeing, recreating, fishing, and sunbathing. | Medium |
| **LI04** | Montauk Point State Park | SCA/LCA | East | 48.0 | Sidelit | VTL1 | 31.5/27.4 | 21 | Landscape has characteristic historic lighthouse setting with supporting compatible development; BIWF is visible (approximately 17 miles). | Low | Local Residents, Tourists/Vacationers, Fishing Community<br><br>Montauk Point State Park, National Register Historic Site, Scenic Area of Statewide Significance | High | Montauk Point Scenic Area of Statewide Significance; Montauk State Park is a popular destination for local residents and tourists/vacationers. Year-round outdoor recreational opportunities include wildlife viewing and photography. | Medium |
| **LI04** | Montauk Point State Park – Night | SCA/LCA | East | 48.0 | N/A | VTL2 | 31.5/27.4 | 21 | Night seascape influenced by existing BIWF lighting. | Medium | Local Residents, Tourists/Vacationers, Fishing Community<br><br>Montauk Point State Park, National Register Historic Site, Scenic Area of Statewide Significance | High | Montauk Point Scenic Area of Statewide Significance; Montauk State Park is a popular destination for local residents and tourists/vacationers. Year-round outdoor recreational opportunities include wildlife viewing and photography. | High |

| KOP Number | KOP Name | Representative Character Area (SCA, LCA, OCA) | Viewing Direction | Elevation (feet) | Lighting Angle of Proposed Action Simulation | Visibility Threshold | Distance to Nearest Turbine (miles/nautical miles) | Horizontal Field of View Occupied (degrees) | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLVIA Sensitivity Rating Rationale | SLVIA Sensitivity Rating (high, medium, low) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MM01** | Gooseberry Island | LCA | South to South-Southwest | 16.0 | Backlit | VTL4 | 15.1/13.2 | 51 | Landscape is characteristic of intact natural shoreline; seascape appears intact. | Medium | Local Residents, Tourists/Vacationers<br><br>Horseneck Beach State Reservation, Westport South Dartmouth Unit State Scenic Area, Buzzards Bay | Medium | Buzzards Bay is near Gooseberry Public Beach, south of Horseneck Beach State Reservation on the mainland, and within the Westport South Dartmouth State Scenic Area. | Medium |
| **MM04** | Nobska Lighthouse | SCA/LCA | South-Southwest to Southwest | 53.7 | Sidelit | VTL1 | 28.2/24.5 | 39 | Landscape has characteristic historic lighthouse setting with supporting compatible development; seascape appears intact. | Low | Local Residents, Tourists/Vacationers<br><br>Nobska Lighthouse National Register Historic Site, Church Street/Nobska Point State Historic District, Nobska Beach Association Beach | High | Maintenance of views from historic landmark and scenic area; user groups. | Medium |
| **MV02** | Philbin Beach | SCA | South-Southwest to West-Southwest | 10.5 | Variable | VTL5 | 13.6/11.8 | 78 | Landscape is characteristic of intact natural shoreline; seascape appears intact. | High | Local Residents, Tourists/Vacationers<br><br>Gay Head West Tisbury Unit State Scenic Area, Philbin Beach | High | A popular destination for residents and tourists who enjoy sightseeing, surfing, swimming, recreating, and sunbathing. | High |
| **MV03** | Lucy Vincent Beach | SCA | South-Southwest to Southwest | 27.7 | Backlit | VTL 3 | 15.5/13.5 | 59 | Landscape has compatible residential and recreational development; seascape appears intact though occupied by beach users. | Medium | Local Residents, Tourists/Vacationers<br><br>Gay Head West Tisbury Unit State Scenic Area, Lucy Vincent Beach | High | Provides recreational opportunities for town residents including swimming, sunbathing, walking, nature viewing, fishing, and photography. | High |
| **MV03** | Lucy Vincent Beach – Sunset | SCA | South-Southwest to Southwest | 27.7 | Backlit | VTL 4 | 15.5/13.6 | 59 | Landscape has compatible residential and recreational development; seascape appears intact with minimal influence of beach users. | High | Local Residents, Tourists/Vacationers<br><br>Gay Head West Tisbury Unit State Scenic Area, Lucy Vincent Beach | Medium | Provides recreational opportunities for town residents including walking, nature viewing, and photography.<br><br>Evening/night less occupied. | Medium |
| **MV05** | Moshup Beach | SCA | South-Southwest to West-Southwest | 23.1 | Variable | VTL 5 | 13.7/11.9 | 74 | Landscape is characteristic of intact natural shoreline; seascape appears intact. | High | Local Residents, Tourists/Vacationers<br><br>Gay Head West Tisbury State Scenic Area, Moshup Beach | High | Popular public beach; open to residents and tourists and is a popular destination in the summertime. | High |
| **MV05** | Moshup Beach – Sunset | SCA | South-Southwest to West-Southwest | 23.1 | Backlit | VTL 5 | 13.7/11.10 | 74 | Landscape is characteristic of intact natural shoreline; seascape appears intact. | High | Local Residents, Tourists/Vacationers<br><br>Gay Head West Tisbury State Scenic Area, Moshup Beach | High | Popular public beach; open to residents and tourists and is a popular destination in the summertime. | High |
| **MV07** | Aquinnah Overlook | SCA | South to Southwest | 145.5 | Sidelit | VTL 3 | 13.7/11.9 | 74 | Landscape has compatible recreational development; seascape appears intact. | High | Local Residents, Tourists/Vacationers<br><br>Gay Head Aquinnah Shops Area State Historic Area, Gay Head West Tisbury Unit State Scenic Area, Gay Head Cliffs National Natural Landmark | High | The Aquinnah Overlook is a dedicated viewing platform, providing opportunities for sweeping views of the ocean, beach, shoreline bluffs, and natural vegetation. | High |

| KOP Number | KOP Name | Representative Character Area (SCA, LCA, OCA) | Viewing Direction | Elevation (feet) | Lighting Angle of Proposed Action Simulation | Visibility Threshold | Distance to Nearest Turbine (miles/nautical miles) | Horizontal Field of View Occupied (degrees) | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLVIA Sensitivity Rating Rationale | SLVIA Sensitivity Rating (high, medium, low) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MV07** | Aquinnah Overlook – Sunset | SCA | South to Southwest | 145.5 | Backlit | VTL 5 | 13.7/11.10 | 74 | Landscape has compatible recreational development; seascape appears intact. | High | Local Residents, Tourists/Vacationers<br><br>Gay Head Aquinnah Shops Area State Historic Area, Gay Head West Tisbury Unit State Scenic Area, Gay Head Cliffs National Natural Landmark | High | The Aquinnah Overlook is a dedicated viewing platform, providing opportunities for sweeping views of the ocean, beach, and shoreline bluffs. | High |
| **MV07** | Aquinnah Overlook – Night | SCA | South to Southwest | 145.5 | N/A | VTL 3 | 13.7/11.11 | 74 | Night seascape appears intact. | High | Local Residents, Tourists/Vacationers<br><br>Gay Head Aquinnah Shops Area State Historic Area, Gay Head West Tisbury Unit State Scenic Area, Gay Head Cliffs National Natural Landmark | High | The Aquinnah Overlook is a dedicated viewing platform, providing opportunities for sweeping views of the ocean. | High |
| **MV09** | Gay Head Lighthouse | SCA | South to West-Southwest | 162.1 | Sidelit | VTL 4 | 13.9/12.1 | 73 | Landscape has characteristic historic lighthouse setting with supporting compatible development; seascape appears intact. | High | Local Residents, Tourists/Vacationers<br><br>Gay Head Lighthouse National Historic Landmark, Gay Head West Tisbury Unit State Scenic Area | High | Gay Head Lighthouse is a popular destination for residents and tourists interested in historic lighthouses and picturesque ocean views. | High |
| **MV10** | South Beach State Park | SCA | Southwest to West-Southwest | 17.0 | Sidelit | VTL3 | 22.0/19.1 | 37 | Landscape is characteristic of intact natural shoreline; seascape appears intact other than single buoy on horizon. | Moderate | Local Residents, Tourists/Vacationers<br><br>South Beach State Park | High | The beach is a popular destination for local residents as well as tourists/vacationers, and is heavily utilized during the summer months for recreating, sunbathing, and surfing. | High |
| **MV11** | Wasque Point | SCA | West-Southwest | 13.6 | Backlit | VTL 2 | 24.8/21.5 | 32 | Landscape is characteristic of intact natural shoreline; seascape appears intact. | Low | Local Residents, Tourists/Vacationers<br><br>Wasque Point | Medium | A variety of public lands used by residents and tourists/vacationers for hiking, sunbathing, beachcombing, and wildlife viewing. | Low |
| **MV12** | Peaked Hill Reservation | LCA | South-Southwest to Southwest | 305.1 | Backlit | VTL 1 | 16.3/14.2 | 59 | Landscape is characteristic of intact, natural forested shoreline; seascape appears intact. | Low | Local Residents, Tourists/Vacationers<br><br>Identified by the Wampanoag Tribe of Gay Head (Aquinnah) | High | Location has particular cultural importance and is a popular destination for members of the Wampanoag Tribe of Gay Head (Aquinnah). | High |
| **MV12** | Peaked Hill Reservation – Sunset | LCA | South-Southwest to Southwest | 305.1 | Backlit | VTL4 | 16.3/14.2 | 59 | Landscape is characteristic of intact, natural densely forested shoreline; seascape appears intact. | Medium | Local Residents, Tourists/Vacationers<br><br>Identified by the Wampanoag Tribe of Gay Head (Aquinnah) | High | Location has particular cultural importance and is a popular destination for members of the Wampanoag Tribe of Gay Head (Aquinnah). | High |
| **MV13** | Edwin DeVries Vanderhoop Homestead | SCA | South to Southwest | 17.0 | Backlit | VTL5 | 13.8/12.0 | 74 | Landscape is characteristic of intact natural shoreline; seascape appears intact. | High | Local Residents, Tourists/Vacationers<br><br>Edwin D. Vanderhoop Homestead National Register Historic Site, Head West Tisbury Unit State Scenic Resource | High | Large numbers of residents and tourists during the summer months while visiting the Aquinnah Cultural Center. | Medium |
| **NI10** | Madaket Beach | SCA | West | 20.6 | Backlit | VTL1 | 34.6/30.0 | 20 | Landscape has compatible recreational development; seascape appears intact. | Low | Local Residents, Tourists/Vacationers<br><br>Madaket Beach, Nantucket National Historic Landmark | High | Beach is a popular destination for residents and tourists who enjoy sightseeing, recreating, and sunbathing. | Medium |

| KOP Number | KOP Name | Representative Character Area (SCA, LCA, OCA) | Viewing Direction | Elevation (feet) | Lighting Angle of Proposed Action Simulation | Visibility Threshold | Distance to Nearest Turbine (miles/nautical miles) | Horizontal Field of View Occupied (degrees) | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLVIA Sensitivity Rating Rationale | SLVIA Sensitivity Rating (high, medium, low) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NL01** | Nomans Land Island NWR *(not occupied)* | SCA | West-Southwest | 42.1 | Sidelit | VTL5 | 8.7/7.5 | 95 | Landscape is characteristic of intact natural shoreline/ bluffs; seascape appears intact; minimal human influence. | Medium | No Access<br><br>Nomans Land Island National Wildlife Refuge/ natural and intact | Low | Uninhabited island with intact seascape. | Low |
| **NL01** | Nomans Land Island NWR – Sunset *(not occupied)* | SCA | West-Southwest | 42.1 | Backlit | VTL6 | 8.7/7.6 | 95 | Landscape is characteristic of intact natural shoreline/ bluffs; seascape appears intact. | High | No Access<br><br>Nomans Land Island National Wildlife Refuge | Medium | Uninhabited island with intact seascape. | Medium |
| **RI01** | Watch Hill Lighthouse | SCA/LCA | East-Southeast | 24.1 | Sidelit | VTL1 | 32.8/28.5 | 24 | Landscape has compatible residential and recreational development; seascape appears intact. | Low | Local Residents, Tourists/Vacationers<br><br>Watch Hill National Register Historic District, Watch Hill State Scenic Area | High | Popular destination for residents and tourists who enjoy sightseeing, history, and recreating. | Medium |
| **RI06** | Trustom Pond NWR | SCA/LCA | Southeast | 13.8 | Backlit | VTL3 | 22.6/19.6 | 33 | Landscape is characteristic of intact natural shoreline; seascape appears intact. | Medium | Local Residents, Tourists/Vacationers<br><br>Trustom Pond/Matunuck State Scenic Area, Trustom Pond National Wildlife Refuge | Medium | Near the Trustom Pond/Matunuck State Scenic Area, and the Trustom Pond National Wildlife Refuge Public Beach. | Medium |
| **RI08** | Scarborough Beach State Park | SCA | Southeast | 14.8 | Backlit | VTL4 | 19.1/16.6 | 38 | Landscape is characteristic of recreational shoreline development; seascape appears intact. | Medium | Local Residents, Tourists/Vacationers<br><br>Scarborough State Beach | Medium | Popular destination for residents and tourists who enjoy sightseeing, recreating, and sunbathing. | Medium |
| **RI09** | Narragansett Beach | SCA | Southeast | 10.5 | Backlit | VTL1 | 20.0/17.4 | 34 | Landscape has compatible residential and recreational development; seascape appears intact. | Low | Local Residents, Tourists/Vacationers<br><br>Narragansett Town Beach | High | Very popular vacation destination and hosts large tourist crowds in the summer with up to 10,000 guests per day. | Medium |

## Table G-VIS1b. Visual Impact Assessment Impact Matrix for Alternative B (Proposed Action)

| KOP Number | Size or Scale Rationale | Size and Scale Rating (large, medium, small) | Geographic Extent Rationale* | Geographic Extent Rating (large, medium, small) | Duration/Reversibility Rationale | Duration/Reversibility Rating (good, fair, poor) | SLVIA Magnitude Rating Rationale | SLVIA Magnitude Rating (large, medium, small) | SLVIA Overall Impact Level Rationale | SLVIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| **AI01** | Visibility of the entire RWF extends inland across public open space and into the adjacent Newport Country Club before breaking up into discrete areas of visibility of less than half of the WTGs due to screening provided by vegetation, structures, and topography. | Small | Number of turbines visible: 100<br>Percent visibility: 26%–50% | Medium | Long term (30 years)/reversible | Fair | Overall size and scale along with visibility reduce contrast and perceivability. | Medium | Importance of recreation and historic resources, duration and visibility from KOP. | Moderate |

| KOP Number | Size or Scale Rationale | Size and Scale Rating (large, medium, small) | Geographic Extent Rationale* | Geographic Extent Rating (large, medium, small) | Duration/Reversibility Rationale | Duration/Reversibility Rating (good, fair, poor) | SLVIA Magnitude Rating Rationale | SLVIA Magnitude Rating (large, medium, small) | SLVIA Overall Impact Level Rationale | SLVIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| AI01 | The addition of the flashing warning lights on the WTGs and decks will add evidence of human development and increase visual clutter at the horizon. | Medium | Number of turbines visible:<br>Percent visibility: %<br>Information not available in RWF VIA | Large | Long term (30 years)/reversible | Fair | Prominence and dominance of warning lights in non-developed setting. | Large | The addition of aviation warning lights along the horizon within the viewshed would detract from the overall nighttime environment. | Major |
| AI03 | Project will not be conspicuous to casual observers from this KOP, and the unique rock features in the foreground will remain the focal point in this view. | Medium | Majority of turbines visible: 100<br>Percent visibility: 51%–75% | Medium | Long term (30 years)/reversible | Fair | Overall size and scale along with visibility reduce contrast and perceivability. | Medium | Importance of recreation and historic resources; proximity of residential viewers, duration, and visibility from KOP. | Moderate |
| AI05 | Project will be prominent in dramatic 180-degree open views and appears wild and undisturbed with open view of the ocean framed by boulders in the foreground. | Large | Number of turbines visible: 100<br>Percent visibility: 26%–50% | Medium | Long term (30 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Importance of natural landscape and natural recreation opportunities, scenic values in a preserved seascape; prominence of turbines. | Major |
| AI06 | Turbines, are noticeable but are not spatially dominant. | Medium | Number of turbines visible: 99<br>Percent visibility: 51%–75% | Medium | Long term (30 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Medium | Importance of recreation along intact shoreline; turbines will be visible along horizon, although will not be a dominant feature in the seascape. | Moderate |
| AI07 | Existing foreground built features attract attention initially, although turbines across the horizon become a dominant focal point of the view. | Large | Number of turbines visible: 100<br>Percent visibility: 2%–25% | Medium | Long term (30 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Importance of natural landscape and natural recreation opportunities, scenic values associated with byway; prominence of turbines. | Major |
| BI04 | Highly visible and likely to attract the attention of lighthouse visitors based on lighting conditions, although not as prominent as the existing BIWF. | Medium | Majority of turbines visible: 97<br>Percent visibility: 26%–50% | Medium | Long term (30 years)/reversible | Fair | Visibility based on lighting conditions, existing BIWF visibility, duration. | Medium | Importance of recreation and historic resources, duration and visibility from KOP based on lighting conditions. | Moderate |
| BI04 | The addition of the flashing warning lights on the WTGs and decks will add evidence of human development and increase visual clutter at the horizon. | Large | Number of turbines visible:<br>Percent visibility: %<br>Information not available in RWF VIA | Large | Long term (30 years)/reversible | Fair | Visibility based on lighting conditions, existing BIWF visibility, duration. | Large | Importance of recreation and historic resources, duration and visibility from KOP based on lighting conditions. | Major |
| BI12 | Visible and likely to attract attention resulting from angle of view of WTGs | Medium | Number of turbines visible: 100<br>Percent visibility: 51%–75% | Medium | Long term (30 years)/reversible | Fair | Visibility of WTGs within viewshed along horizon line within viewshed. | Medium | Importance of preservation of scenic district and uses; proximity and visibility of Project. | Moderate |

| KOP Number | Size or Scale Rationale | Size and Scale Rating (large, medium, small) | Geographic Extent Rationale* | Geographic Extent Rating (large, medium, small) | Duration/Reversibility Rationale | Duration/Reversibility Rating (good, fair, poor) | SLVIA Magnitude Rating Rationale | SLVIA Magnitude Rating (large, medium, small) | SLVIA Overall Impact Level Rationale | SLVIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| **BI13** | Turbines become the focus of views out to the water and the tight spacing and numerous turbines along the horizon draw the viewers' eye away from natural features. | Large | Number of turbines: 100<br>Percent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Importance of recreation and historic resources; proximity of residential viewers, duration and visibility from KOP. | Moderate |
| **CI01** | Turbines and OSS facilities would begin to dominate the horizon and are uncharacteristic of existing conditions. | Large | Number of turbines visible: 99<br>Percent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Prominence and dominance of turbines in non-developed setting. | Large | Importance of recreation and historic resources; size, scale, and visibility from KOP. | Major |
| **C01** | Turbines are perceivable along horizon line, although the degree of change from existing condition would be minor. | Small | Number of turbines visible: 100<br>Percent visibility: 51%–75% | Medium | Long term (35 years)/reversible | Fair | Overall size and scale along with visibility reduces contrast and perceivability | Small | Importance of recreation and historic resources; size, scale and visibility from KOP. | Minor |
| **LI04** | Due to distance and viewer position in relation to other features in the landscape, there would be minor change in the existing condition. | Small | Number of turbines visible: 91<br>Percent visibility: 51%–75% | Medium | Long term (35 years)/reversible | Fair | Project would not be perceivable along horizon due to distance and atmospheric influences. | Small | Project would not be perceivable along horizon due to distance and atmospheric influences. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting. | Negligible |
| **LI04** | Due to distance and viewer position in relation to other features in the landscape, there would be minor change in the existing condition. | Small | Number of turbines visible:<br>Percent visibility: %<br>Information not available in RWF VIA | Small | Long term (35 years)/reversible | Fair | Project would be perceivable along horizon if observer views were focused toward lighting. | Small | The addition of aviation warning lights along the horizon within the viewshed would be perceivable by the focused viewer, but not a dominant element as compared to other existing warning lighting sources associated with BIWF that are in closer proximity (approximately 16 miles). | Negligible |
| **MM01** | Visible and likely to attract the attention resulting from angle of view of WTGs | Medium | Number of turbines visible: 100<br>Percent visibility: 76%–100% | Medium | Long term (35 years)/reversible | Fair | Project blades would be perceivable along horizon. | Medium | Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines. | Minor |
| **MM04** | Degree of change in existing conditions would be minimal due to distance and existing modifications within the foreground. | Small | Number of turbines visible: 90<br>Percent visibility: 51%–75% | Medium | Long term (35 years)/reversible | Fair | Distance to Project, natural and human-made features in the foreground would reduce magnitude. | Small | Importance of natural landscape and recreation opportunities; distance of turbines in relation to KOP. | Minor |
| **MV02** | Turbines are very visible on the horizon line and will dominate the view from the KOP. | Large | Number of turbines visible: 100<br>Percent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines. | Moderate |

| KOP Number | Size or Scale Rationale | Size and Scale Rating (large, medium, small) | Geographic Extent Rationale* | Geographic Extent Rating (large, medium, small) | Duration/Reversibility Rationale | Duration/Reversibility Rating (good, fair, poor) | SLVIA Magnitude Rating Rationale | SLVIA Magnitude Rating (large, medium, small) | SLVIA Overall Impact Level Rationale | SLVIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| **MV03** | Visible and likely to attract the attention resulting from angle of view of WTGs | Medium | Number of turbines visible: 59<br>Percent visibility: 76%–100% | Medium | Long term (35 years)/reversible | Fair | Visibility of WTGs within viewshed along horizon line within viewshed. | Medium | Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines. | Moderate |
| **MV03** | WTGs appear dark gray against the light sky and the position of the sun serves as a focal point, drawing the viewer's eye toward part of the Project. | Large | Number of turbines visible: 59<br>Percent visibility: 76%–100% | Medium | Long term (35 years)/reversible | Fair | Visibility of backlit WTGs within viewshed along horizon line within viewshed. | Large | Scenic values; prominence of turbines- sunset backlighting of turbines along with movement influences prominence. | Major |
| **MV05** | With the proposed RWF in place, the nacelles and rotors from numerous WTGs and two OSSs will be visible from this KOP in the background along the horizon. | Large | Number of turbines visible: 100<br>Percent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines. | Moderate |
| **MV05** | WTGs appear dark gray against the light sky and the position of the sun serves as a focal point, drawing the viewer's eye toward part of the Project. | Large | Number of turbines visible: 100<br>Percent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Visibility of backlit WTGs within viewshed along horizon line within viewshed. | Large | Scenic values; prominence of backlit turbines on the horizon. | Major |
| **MV07** | OSSs appear as static, dark objects on the horizon intermixed with WTGs, providing scale to both the OSS and WTGs, which draw the eye. The overlook is no longer just for views of the ocean but also includes the turbines on the ocean. | Large | Number of turbines visible: 100<br>Percent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Prominent, dedicated viewpoint. | Major |
| **MV07** | OSSs appear as static, dark objects on the horizon intermixed with WTGs, providing scale to both the OSS and WTGs, which draw the eye. The overlook is no longer just for views of the ocean but also includes the turbines on the ocean. | Large | Number of turbines visible: 100<br>Percent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Prominent, dedicated viewpoint. | Major |
| **MV07** | Vertical lines of WTG warning lighting become focal point along the wide, dark horizon. | Large | Number of turbines visible:<br>Percent visibility: N/A<br>Information not available in RWF VIA | Large | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Prominent, dedicated viewpoint; vertical orientation of warning lighting in dark, night sky, with brighter illumination at base of WTGs and as well as OSS lighting that draws eye across horizon and field of view. | Major |
| **MV09** | OSSs appear as static, dark objects on the horizon intermixed with WTGs, providing scale to both the OSS and WTGs, which draw the eye. The overlook is no longer just for views of the ocean but also includes the turbines on the ocean. | Large | Number of turbines visible: 70<br>Percent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Importance of historic lighthouse, scenic values; prominence of turbines and OSSs. | Major |

| KOP Number | Size or Scale Rationale | Size and Scale Rating (large, medium, small) | Geographic Extent Rationale* | Geographic Extent Rating (large, medium, small) | Duration/Reversibility Rationale | Duration/Reversibility Rating (good, fair, poor) | SLVIA Magnitude Rating Rationale | SLVIA Magnitude Rating (large, medium, small) | SLVIA Overall Impact Level Rationale | SLVIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| **MV10** | Nacelles and rotors from numerous WTGs will be visible in the background along the horizon. Turbines are visible on the horizon and provide a focal point. | Large | Number of turbines visible: 100<br>Percent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Medium | Importance of natural landscape and natural recreation opportunities; massing of turbines on horizon. | Moderate |
| **MV11** | Nearest WTG is 24.6 miles (39.6 km) away; the towers are largely obscured due to curvature of the Earth, with their degree of exposure decreasing from left to right. | Medium | Number of turbines visible: 89<br>Percent visibility: 2%–25% | Moderate | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Medium | Importance of natural landscape and natural recreation opportunities; visibility of WTGs due to distance and percentage of visibility. | Minor |
| **MV12** | KOP on Peaked Hill represents a discrete view to the southwest that requires the viewer to be perfectly positioned. | Small | Number of turbines visible:<br>Percent visibility: N/A<br>Information not available in RWF VIA | Small<br><br>Based on simulation graphic all are visible/vegetation and perspective influence | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions, vegetation and viewer perspective. | Small | Importance of cultural significance and natural recreation opportunities; visibility of WTGs due to intervening vegetation and landforms. | Major |
| **MV12** | Sunset illumination and backlighting influences change | Large | Number of turbines visible:<br>Percent visibility: N/A<br>Information not available in RWF VIA | Large<br><br>Based on simulation graphic all are visible/vegetation and perspective influence | Long term (35 years)/reversible | Fair | Backlighting of WTGs, increased visibility. | Large | Importance of cultural significance and natural recreation opportunities; visibility of WTGs due to backlighting. | Major |
| **MV13** | WTGs are visible; light gray towers, nacelles, and rotors are fully visible above the horizon. | Large | Number of turbines visible: 100<br>Percent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Importance of natural landscape and natural recreation opportunities; visibility of WTGs due to distance and percentage of visibility. | Major |
| **NI10** | WTGs are barely visible along the horizon, with a small cluster of turbine blades and nacelle comprising the majority of visible features. | Small | Number of turbines visible: 26<br>Percent visibility: 76%–100% | Small (distance) | Long term (35 years)/reversible | Fair | Not perceivable at distance. | Small | Importance of natural landscape and natural recreation opportunities; visibility of WTGs due to distance influences impact determination. | Negligible |
| **NL01** | WTGs appear as gray vertical lines against the yellow backdrop of the sky that look out of character with the vast extent of open water. | Large | Number of turbines visible: 100<br>Precent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Intact seascape and prominence of WTGs in close proximity, although no viewers. | Major |
| **NL01** | Sunset illumination and backlighting influences change | Large | Number of turbines visible: 100<br>Precent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Backlighting of WTGs, increased visibility. | Large | Intact seascape and prominence of WTGs, although no viewers; backlighting of WTGs and OSS. | Major |

| KOP Number | Size or Scale Rationale | Size and Scale Rating (large, medium, small) | Geographic Extent Rationale* | Geographic Extent Rating (large, medium, small) | Duration/Reversibility Rationale | Duration/Reversibility Rating (good, fair, poor) | SLVIA Magnitude Rating Rationale | SLVIA Magnitude Rating (large, medium, small) | SLVIA Overall Impact Level Rationale | SLVIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| **RI01** | WTGs are barely visible from this location due largely to their distance from the viewer and the screening effects of curvature of the Earth. | Small | Number of turbines visible: 89<br>Percent visibility: 26%–75% | Small (Distance) | Long term (35 years)/reversible | Fair | Not perceivable at distance. | Small | Importance of historic setting and natural recreation opportunities; visibility of WTGs due to distance. | Minor |
| **RI06** | Upper portions of the WTGs are perceptible as slender gray protrusions above the horizon line. | Medium | Number of turbines visible: 99<br>Percent visibility: 2%–25% | Medium | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Medium | Intact seascape and presence of WTGs along horizon. | Minor |
| **RI08** | Nacelles and rotors of numerous WTGs are visible along the horizon, distance | Medium | Number of turbines visible: 99<br>Percent visibility: 76%–100% | Large | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Large | Importance of recreation opportunities; visibility of WTGs due to distance and percentage of visibility. | Moderate |
| **RI09** | WTGs will be visible along the horizon; distance | Medium | Number of turbines visible: 99<br>Percent visibility: 26%–50% | Medium | Long term (35 years)/reversible | Fair | Size and scale in relation to existing conditions along with percentage of visibility. | Medium | Importance of recreation opportunities; visibility of WTGs due to distance and percentage of visibility. | Moderate |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

* Data from (EDR 2023:Appendix A).

### Table G-VIS2a. Seascape Landscape Impact Assessment for Alternative B (Proposed Action) – Seascape Character Areas

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total Land Acres within Analysis Area: 1,488.1 Square Miles | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and Scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shoreline Beach | SCA | AI06, MV02, MV10, MV11, NI10, RI08, RI09 | Unobstructed, expansive water-level view of the shoreline and across open water | High | Viewer activity in this area is primarily recreational, including swimming, sunbathing, walking, beachcombi | High | Iconic eastern shore beach setting with intermixed characteristic built features. | High | 35.3/ 2.4 | Small | Prominence of WTGs based on adjacency of open water to character area, with uninterrupted views to | Large | Long term (35 years)/ reversible | Fair | Overall visible land area in comparison with prominence of Project and duration of time. | Medium | Predominately high sensitivity along with medium degree of magnitude. | Moderate |

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total Land Acres within Analysis Area: 1,488.1 Square Miles | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and Scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ng, fishing, and surfing. Examples include Watch Hill, Narragansett, Horseneck, and Sachuest Beaches. | | Open ocean adjacency. | | | | horizon and Project. | | | | | | | |
| Coastal Bluff | SCA | BI04, BI12, C01, MV07, MV13, NL01 | Elevated views; Because of elevation and lack of tall vegetation, these views typically include significant lengths of shoreline and a broad expanse of open ocean as well as typical inland features. Views are generally only available from discrete public access points and trails. | Medium | Discrete, elevated views along visually variable landscape. Includes the south shore of Block Island including the Clayhead Trail in New Shoreham, at Gay Head in Aquinnah on Martha's Vineyard, along portions of the Cliff Walk in Newport, and at Montauk Point on Long Island. | High | Iconic eastern shore cliff and bluff setting with open ocean adjacency. | High | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |
| Developed Waterfront | SCA | N/A | Dominance of human-made features including docks, boats, and shoreline buildings/structures | Low | Fishing ports, harbors, marinas, and shoreline commercial and industrial areas | Medium | Activity in these areas is generally water-oriented but highly variable and includes commercial fishing, seafood | Low | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total Land Acres within Analysis Area: 1,488.1 Square Miles | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and Scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | processing, boat repair, pleasure boating, retail shopping, and restaurants. | | | | | | | | | | | |
| Shoreline Residential | SCA | AI03, RI01 | Shoreline homes are specifically situated to take advantage of water views. | High | Year-round and seasonal homes situated along the ocean shoreline. The defining characteristic of this zone is a broad, often elevated, view of the ocean from a residential setting. | High | Home are positioned and occupied for the appeal of iconic oceanside views. | High | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |
| Coastal Dunes | SCA | BI13, MV03, MV05 | Views from the dunes are largely restricted to these paths and typically screened by the tight, rolling landform until emerging at the top of the beach. | Medium | Coastal dunes are typically strictly regulated ecological communities, and access is limited to narrow, enclosed footpaths and boardwalks that cut through or over the dunes, providing public access to the beaches. | Medium | Viewer activity in this area is almost exclusively recreational and typically focused on sightseeing and beach access. | Medium | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS2b. Seascape Landscape Impact Assessment for Alternative B (Proposed Action) – Seascape Character Areas and Landscape Character Areas

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total Land Acres within Analysis Area: 1,488.1 Square Miles | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and Scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Salt Pond/ Tidal Marsh | SCA/LCA | RI06 | Views are available across the open water but are generally interrupted by adjacent dunes, barrier spits, and/or scrub vegetation that separates the ponds and the adjacent land from the ocean. | Low | Residences often occur along the edges of these ponds, as indicated by docks and boats along their shorelines. Recreational activity in the form of boating, fishing, and clamming is common in these areas. | Medium | Multi-use setting with localized views, increased distance from the open ocean. | Medium | 35.3/ 2.4 | Small | Intermix of vegetation, topography, and viewer position in relation to Project begins to influence the degree to which Project is perceived. | Medium | Long term (35 years)/ reversible | Fair | Overall visible land area in comparison with prominence of Project and duration of time. | Medium | Combination of high, medium, and low sensitivity (combined for and overall medium) along with medium degree of magnitude. | Moderate |
| Inland Lakes and Ponds | SCA/ LCA | N/A | The dominant visual feature of this zone is an open expanse of flat water that is enclosed by a vegetated shoreline. Occasionally interrupted by human-made features, such as homes and boat launches | Low | Given their locations and surrounding screening, views to the ocean are relatively rare. Human activity on the lakes and along the shoreline includes boating, fishing, and swimming. | Low | Views are constrained within immediate area with ocean views obscured by vegetation. | Low | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |
| Maintained Recreation Area | SCA/LCA | AI01, AI03, BI04, C01, LI04, MM04, MV09, RI01 | Views of the ocean are highly variable, depending on the proximity to the shoreline. The open, maintained landscape generally allows for expansive, unobstructed views of the surrounding seascape. | High | Recreation focused with open lawns at public parks, lighthouses, USCG stations, and golf courses. Lighthouses and state parks are often associated. | High | Iconic settings, with lighthouses, open ocean views with a recreation focus. | High | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |
| Highway Transportation | SCA/LCA | N/A | High-volume vehicular travel corridors that | Low | Dominated by adjacent buildings/structures | Medium | Viewer focus is associated | Low | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total Land Acres within Analysis Area: 1,488.1 Square Miles | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and Scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | traverse the landscape and are dominated by automobiles. Travel is at moderate to high speed, and outward peripheral views are fleeting. | | and trees with limited elevated long-distance views available. | | with driving activity and with limited duration views. | | | | | | | | | | | |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS2c. Seascape Landscape Impact Assessment for Alternative B (Proposed Action) – Landscape Character Areas

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total Land Acres within Analysis Area: 1,488.1 Square Miles | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and Scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coastal Scrub/ Shrub Forest | LCA | AI05, AI07, CI01, MM01, | Outward views are largely enclosed by surrounding vegetation and are limited to the orientation and width of the cleared corridor. | Low | Viewer activity is primarily local travel and recreational trail use. | Medium | Views are constrained within the immediate area with ocean views obscured by vegetation. | Low | 35.3/ 2.4 | Small | As distance from Project increases, the degree to which Project is noticeable decreases due to the influence of the built and naturally vegetated environment associated with these character areas. | Medium/ Small | Long term (35 years)/ reversible | Fair | Overall visible land area in comparison with prominence of Project and duration of time. | Medium | Overall low sensitivity with medium degree of magnitude | Minor |

| **Character Area Name** | **Character Area Association (SCA/LCA/OCA)** | **Key Observation Points with Simulations** | **Susceptibility Rationale** | **Susceptibility Rating (high, medium, low)** | **Value Rationale** | **Value Rating (high, medium, low)** | **SLIA Sensitivity Rating Rationale** | **SLIA Sensitivity Rating (high, medium, low)** | **Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action Total Land Acres within Analysis Area: 1,488.1 Square Miles** | **Geographic Extent Rating (large, medium, small)** | **Size or Scale Rating Rationale (degree of change from existing conditions)** | **Size and Scale Rating (large, medium, small)** | **Duration/ Reversibility Rationale** | **Duration/ Reversibility Rating (good, fair, poor)** | **SLIA Magnitude Rating Rationale** | **SLIA Magnitude Rating (large, medium, small)** | **SLIA Overall Impact Level Rationale** | **SLIA Overall Impact Level (major, moderate, minor, negligible)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agricultural/ Open Field | LCA | N/A | Open farmland provides for long-distance views in this zone; adjacent forest, coastal scrub, and buildings/structures typically frame/enclose these views and provide significant screening. | Low | Occurs primarily inland of the coast, views to the ocean are relatively rare. | Low | Setting is not influenced by views of the ocean, and pastoral/agricultural character dominates. | Low | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |
| Forest | LCA | MV12 | Long-distance views within the zone are generally either fully or partially screened by vegetation and, when present, are tightly enclosed by the surrounding trees. | Low | Variable vegetation characteristics in relation to typical ocean, seascape environment provides more enclosed setting for users. | Low | Views are constrained within the immediate area with ocean views obscured by vegetation. | Low | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |
| Rural Residential | LCA | N/A | Rural residences tend to be located along narrow, tree-lined roads, with intervening vegetation. Long-distance views are largely restricted to | Low | Typical viewer activity includes residential activity, outdoor recreation, and local travel. | Low | Views are constrained within the immediate area with ocean views obscured by vegetation. | Low | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action Total Land Acres within Analysis Area: 1,488.1 Square Miles | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and Scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | small open fields. | | | | | | | | | | | | | | | |
| Suburban Residential | LCA | N/A | Medium to high-density residential neighborhoods that typically occur on the outskirts of villages and town centers and along secondary roads and cul-de-sacs spurring off the main roads. | Low | Views are generally limited by the surrounding forest vegetation, adjacent buildings/structures, and/or undulating topography that surrounds the subdivisions. | Low | Localized views and influence of built residential environment. | Low | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |
| Village/ Town Center | LCA | N/A | Moderate to high-density residential and commercial development includes larger town center areas. Buildings (typically two- to three-stories tall) and other human-made features dominate the landscape. | Low | Outward views that are available will typically exist in areas on the outskirts of the villages and town centers and will generally be partially screened by existing buildings/structures and surrounding native vegetation. | Low | Localized views and influence of built environment. | Low | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |
| Commercial | LCA | N/A | Commercial development along a highway includes retail businesses, restaurants, convenience | Low | Views are focused along the axis of the highway and the foreground is dominated by buildings, | Low | Urbanized built environment dominates and is the primary focus. | Low | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. | Same as above. |

| Character Area Name | Character Area Association<br><br>(SCA/LCA/OCA) | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total Land Acres within Analysis Area: 1,488.1 Square Miles | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and Scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | stores, automobile dealers, shopping centers, and malls. | | automobiles, paved roads, and parking lots. | | | | | | | | | | | | | |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

**Table G-VIS2d. Seascape Landscape Impact Assessment for Alternative B (Proposed Action) – Ocean Character Areas**

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) *Alternative B – Proposed Action*<br><br>*Total OCA area within Analysis Area: 6,113.4 Square Miles* | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and Scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Open Ocean | OCA | N/A | Presence of open water as a dominant foreground element in all directions. Human-made features in the water are limited but may include occasional jetties, buoys, and boats. | High | Human activity on the water can be extensive, especially near major ports and navigation. | High | Presence of open ocean environment with unobstructed horizon is of high importance to users and visitors. | High | 5,882.2/96.2<br><br>Maximum ocean visibility as compared to all alternatives | Large | Predominantly intact open ocean within immediate proximity of WTGs and OSS facilities not characteristic of the OCA. | Large | Long term (35 years)/ reversible | Fair | Proximity of OCA to Project with uninterrupted ocean views surrounding Project for duration of Project. Approximately 96% of OCA total acres with visibility. | Large | Intact open ocean setting, in immediate proximity of Project components for the duration of Project. | Major |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

**Table G-VIS2e. Seascape Landscape Impact Assessment for Alternative B (Proposed Action) – Specially Designated Areas**

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Specially Designated Area with Visibility of Alternative (Acres/Percentage) *Proposed Action (Alternative B)* | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Historic Sites and National Landmarks | 12,308.0 | AI01, AI03, BI04, BI12, BI13, C01, C02, BI13, MM04, MV07, MV09, MV13, RI01 | 161 districts and individual properties listed or eligible for the NRHP and 13 properties or districts listed as National Historic Landmarks (NHL). These include historic districts, homes, lighthouses, churches, and government buildings. | High | Properties have historic, regional and national significance. | High | Historic properties and sites generally have high than average sensitivity based on the nature of the property and its relationship to the setting. | High | 1,222.08/9.9 | Medium | General proximity of Project in relation to sensitive resource and experiences associated with historic/ culturally significant locations. | Large | Long term (35 years)/ reversible | Fair | General proximity of Project in relation to sensitive resource and experiences associated with historic/ culturally significant locations. | Large | Importance of iconic sites, settings and experiences associated with locations in contrast to introduction of Project. | Major |

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Specially Designated Area with Visibility of Alternative (Acres/Percentage) *Proposed Action (Alternative B)* | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| National Natural Landmarks | 349.7 | MV07 | Sites that contain outstanding biological and geological resources and encourages the conservation of these areas. | Medium | Two locations identified within analysis area. Primary importance is related to physical resources, with lesser potential importance on experiences. | Medium | Preservation of physical resources associated with landmarks. | Medium | 255.5/73.1 | Large | Proximity of Gay Head Cliffs is approximate 14 miles from Project. Muskeget Island is approximately 31.6 miles. | Medium | Long term (35 years)/ reversible | Fair | Variable distances of resource from Project. | Large | two identified localized resources with variable proximity to Project and localized focus on physical resources. | Moderate |
| State Scenic Areas | 105,777.6 | BI12, CI01, MV07 | 93 state-designated scenic areas, including 56 in Rhode Island; 34 in Massachusetts; 3 in New York | High | Importance of iconic landscapes (ex. Martha's Vineyard) that surround the Lease Area. | High | Often associated with iconic settings and places which most often have regional and national significance related to sense of place. | High | 18,205.6/17.2 | Small | Overall percentage of visible areas and distribution of locations often in relative proximity to Project. | Large | Long term (35 years)/ reversible | Fair | Variability of visibility in relation to resource with approximately ¼ of acres having visibility of Project. | Medium | Overall higher sensitivity to change based on nature of resource and iconic landscapes. | Major |
| National Wildlife Refuges | 15,176.1 | AI05, NL01, RI06 | System of public lands and waters set aside to conserve the nation's fish, wildlife, and plants. Nine refuges occur within the analysis area. | Low | Preservation of natural resources specific to refuge. | Low | Preservation of physical resources associated with refuges. | Medium | 767.7/5.1 | Small | Percentage of visibility of Project in relation to distributed areas and refuge locations | Small | Long term (35 years)/ reversible | Fair | Minimal to no change to physical resource visually. | Small | Refuges are focused on the preservation of natural resources, with closest refuge not occupied by humans. | Minor |
| State/Non-Profit Wildlife Management Areas | 31,967.8 | AI07 | 18 State Wildlife Management Areas: nine in Rhode Island and nine in Massachusetts. Lands are managed to provide wildlife habitat and accommodate wildlife-related recreation (hunting, bird watching, etc.). | Low | Preservation of natural resources specific to management areas. | Low | Preservation of physical resources associated with management area. Variable uses and activities. | Medium | 1,31.4/.4 | Small | Small percentage of Project visibility. | Small | Long term (35 years)/ reversible | Fair | Minimal to no change to physical resource visually. | Small | Management areas are focused on the preservation of natural resources and providing recreation resources. | Minor |

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Specially Designated Area with Visibility of Alternative (Acres/Percentage) *Proposed Action (Alternative B)* | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| National Parks | 31.2 | N/A | New Bedford Whaling National Historical Park, New Bedford, Massachusetts. Approximately 26 miles from Project. | Low | Associated with historical maritime activities, localized interest. | Low | Higher sensitivity as a result of National Park designation | Medium | .2/.7 | Small | Overall distance from Project is approximately 26 miles with one WTG visible. | Small | Long term (35 years)/ reversible | Fair | No perceivable change related to Project | Small | Importance as a National Park, though physically distanced from Project to have negligible impacts or visibility. | Negligible |
| State Parks | 10,473.8 | AI01, LI04, MV10, RI08 | 17 State parks and reservations that occur within the analysis area and provide recreation and sight-seeing opportunities. | Medium | Variable recreation sites and opportunities for local and national interests. | Medium | Importance of recreation destinations and associated ocean viewing opportunities. | High | 2,731.7/26.1 | Medium | Over ¼ of area with visibility and proximity of Project. | Medium | Long term (35 years)/ reversible | Fair | Physical presence of Project 16 miles to 30+ miles; with variable visibility. | Medium | Recreation and ocean focused recreation with multiple user groups and interests. | Moderate |
| State Nature and Historic Preserves | 248.4 | N/A | John H. Chafee State Nature Preserve. Open to the public and provides agricultural, educational, and scenic values, as well as natural and historical resources | Low | Preservation of local heritage and resources. | Low | Preservation of heritage resources of the region. | Medium | 3.1/1.2 | Small | Resource is approximately 24 miles from nearest WTG with minimal visibility. | Low | Long term (35 years)/ reversible | Fair | Physical distance from Project and overall visibility. | Low | Localized interests with preservation focus, limited to no visibility of Project. | Negligible |
| State Forests | 5,301.6 | N/A | Manuel F. Correllus State Forest, located on the inland portion of Martha's Vineyard, Massachusetts, is the only state forest. Inland forest with vegetation and topography. | Low | Located in the center of Martha's Vineyard, multi-use recreation activities. | Low | Large local recreation resource with internally focused activities, surrounded by urban development. | Low | 7.8/.2 | Small | Inland recreation resource with limited visibility of Project. | Low | Long term (35 years)/ reversible | Fair | Inland location with intervening influence of vegetation, topography and built environment. | Low | Localized recreation resource, surrounded by urban development with intervening features that limit Project visibility. | Negligible |
| State Beaches | 165.1 | N/A | Nine state beaches; heavily used bathing beaches that typically include large | Medium | Recreation destination for high number of users with focus of activities | High | Iconic eastern shore beach destinations with high user interest. | High | 78.2/ 47.4 | Medium | Approximately ½ of beach areas with visibility of Project | Medium | Long term (35 years)/ reversible | Fair | Beach locations are at or beyond 20 miles from Project where scale decreases but | Medium | Popular beach destinations with viewer focus toward ocean and beach activities. | Moderate |

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Specially Designated Area with Visibility of Alternative (Acres/Percentage) *Proposed Action (Alternative B)* | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | parking areas, bathhouses, pavilions, and concession buildings. | | towards ocean environment. | | | | | | beyond 20 miles. | | | | Project is perceivable. | | Overall distance from Project is approximately 20 miles. | |
| Highways Designated or Eligible as Scenic | 411.6 | N/A | Two scenic byways are located within Rhode Island with waterfront, shoreline and coastline views. | Medium | Scenic Byway designation indicates value and importance of resources associated. | High | Protection of designation and associated iconic views. | High | 43.4/10.5 | Small | Overall low percentage of visibility in relation to linear resource. | Low | Long term (35 years)/ reversible | Fair | Low to intermittent visibility and associated intervening features. | Medium | Importance of scenic byway designation and preservation of resource with intermittent and variable viewing conditions from motorists. | Moderate |
| National Historic Trails | 990.1 | N/A | Washington-Rochambeau Revolutionary Route – national resource with period significance related to setting. | High | Congressionally designated trail resource with historic significance. | High | Changes in visual setting related to the trail. | High | .8/.1 | Small | Small percentage of visibility related to resource. | Low | Long term (35 years)/ reversible | Fair | Low visibility with intermix of urban and natural features with WTG distance ranging from 18 to 40 miles. | Low | National Trail designation significance (high sensitivity) with low visibility of Project. | Minor |
| National Recreation Trails | 88.6 | AI03 | Cliff Walk within Ochre Point Cliffs Historic District with iconic setting and views. | High | Views of the Atlantic Ocean historic mansions, wildflowers, wildlife, and shorelines. | Medium | Iconic setting with interests associated with preservation of resource and views. | High | 65.1/73.4 | Large | Large percentage of resource has visibility of Project. | High | Long term (35 years)/ reversible | Fair | Visibility of Project in relation to resource within approximately 15 miles. | High | Importance of resources in relation to setting and natural environment with a large portion of the trail having visibility of Project. | Major |
| State Fishing and Boating Access Sites | 371.4 | N/A | 45 state-owned and/or -managed fishing and boating access sites with focus on maritime or ocean related activities. | Low | Recreational focus with inter-related views of ocean and setting. | Low | Primary focus of resources is related to recreation activities in interrelated ocean setting. | Medium | 78.4/21.1 | Medium | Approximately ¼ of acres with visibility of Project and are at least 16 miles from Lease Area. | Low | Long term (35 years)/ reversible | Fair | Resources in relation to Project and visibility. | Medium | Recreation resource with interrelated interest in ocean setting and views, variable distances from Project beyond 16 miles. | Moderate |

| **Specially Designated Areas** | **Specially Designated Area Total Acres** | **Key Observation Points with Simulations** | **Susceptibility Rationale** | **Susceptibility Rating (high, medium, low)** | **Value Rationale** | **Value Rating (high, medium, low)** | **SLIA Sensitivity Rating Rationale** | **SLIA Sensitivity Rating (high, medium, low)** | **Geographic Extent of Specially Designated Area with Visibility of Alternative (Acres/Percentage) *Proposed Action (Alternative B)*** | **Geographic Extent Rating (large, medium, small)** | **Size or Scale Rating Rationale (degree of change from existing conditions)** | **Size and scale Rating (large, medium, small)** | **Duration/ Reversibility Rationale** | **Duration/ Reversibility Rating (good, fair, poor)** | **SLIA Magnitude Rating Rationale** | **SLIA Magnitude Rating (large, medium, small)** | **SLIA Overall Impact Level Rationale** | **SLIA Overall Impact Level (major, moderate, minor, negligible)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lighthouses | 23.0 | BI04, C01, MM04, MV09, RI01 | 32 lighthouses; with proximity to ocean edge based on nature of resource and setting. | High | Lighthouses are characteristically associated with shoreline areas and settings with ocean focus. | High | Visitors and users of lighthouse resources as destination and iconic setting. | High | 6.6/28.7 | Medium | One lighthouse within approximately 9 miles of Project. All others are associated with ocean proximity that orients them closer to Project. | High | Long term (35 years)/ reversible | Fair | Proximity of lighthouses in relation to Project influences potential visibility and prominence. | High | Nature of lighthouses in relation to iconic ocean setting and proximity of Project. | Major |
| Public Beaches | 4,221.0 | AI06, MM01, MV02, MV03, MV05, MV11, NI10, RI09 | 178 public beaches with recreation focus and ocean facing views, iconic settings | Medium | Iconic recreation destination for high number of users with focus towards ocean and beach activities. | Medium | Typically higher interests in ocean setting with variable activities and user focus. | Medium | 11,38.8/27.0 | Medium | Approximately ¼ of acres with visibility of Project. Viewer position along beaches is often inline with Project. | Medium | Long term (35 years)/ reversible | Fair | Closest beach is approximately 13 miles; variable viewer perspectives and positioning. | Medium | Iconic beach setting with high user interest and activity though viewer position and visibility of Project can be variable. | Moderate |
| Ferry Routes | 10,641.7 | N/A | 20 different ferry routes originating from multiple locations around Project. Proximity of routes to Project. | Medium | Dedicated ocean focused uses used for either pleasure or utility purposes. | Medium | Variability in users and interests intermixed with other seagoing vessels. | Medium | 6,365.0/59.8 | Large | Over 1.2 of ferry routes with visibility due to open ocean environment. | High | Long term (35 years)/ reversible | Fair | Resource is ocean based and in closer proximity to Project, though duration of view can be short term and directional. | High | Variability in viewer interest and overall sensitivity within dedicated ferry lanes. Proximity of Project in relation to routes influences prominence based on duration and direction. | Moderate |
| Seaports | 90.1 | N/A | Five seaports associated with working waterfront activity | Low | Industrial and seagoing areas with associated infrastructure. | Low | Variable users and interests; with primary focus related to industry. | Low | 2.3/2.5 | Small | Overall low visibility and perception of Project due to intermix of other built features and distance. | Low | Long term (35 years)/ reversible | Fair | Perceivability of Project in relation to other seaport uses and activities. | Low | Primary focus of seaports related to industrial and commercial uses with surrounding infrastructure and built environment. | Negligible |

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Susceptibility Rationale | Susceptibility Rating (high, medium, low) | Value Rationale | Value Rating (high, medium, low) | SLIA Sensitivity Rating Rationale | SLIA Sensitivity Rating (high, medium, low) | Geographic Extent of Specially Designated Area with Visibility of Alternative (Acres/Percentage) *Proposed Action (Alternative B)* | Geographic Extent Rating (large, medium, small) | Size or Scale Rating Rationale (degree of change from existing conditions) | Size and scale Rating (large, medium, small) | Duration/ Reversibility Rationale | Duration/ Reversibility Rating (good, fair, poor) | SLIA Magnitude Rating Rationale | SLIA Magnitude Rating (large, medium, small) | SLIA Overall Impact Level Rationale | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Other State Land with Public Access | 9,361.8 | N/A | Variability of other resources associated with natural resources, recreation activities and locally sensitive uses. | Medium | Variability of uses and interests. | Medium | Variable users and interests | Medium | 325.3/3.5 | Small | Overall small percentage of visibility in relation to total acres. | Low | Long term (35 years)/ reversible | Fair | Variability of locations, which based on visibility can be assumed to be inland focused. | Low | High variability in use, interest and sensitivity; low overall visibility as compared to total acres. | Negligible |

## Table G-VIS3. Visual Impact Assessment Impacts Matrix for Alternative C (Habitat Alternative)

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Proposed Action | Distance to Nearest Turbine miles/nautical miles) Alternative C1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative C1 | Distance to Nearest Turbine (miles/nautical miles) Alternative C2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative C2 | Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| CI01 | Cuttyhunk Island | High | 13.9/12.1 | 13.9/12.1 | 17.8/15.5 | 13.9/12.1 | 17.8/15.5 | C2 | The reduction of WTGs in close proximity of the KOP would not decrease visibility of the WTGs. WTG reduction would be localized to the center view of the KOP, where turbines are removed surrounding the eastern most OSS. The Lease Area would appear to have two separate WTG areas. | Major |
| MM01 | Gooseberry Island | Medium | 15.2/13.2 | 15.2/13.2 | 22.4/19.5 | 15.2/13.2 | 22.3/19.4 | C1 and C2 | The reduction of WTGs associated with each alternative would not decrease visibility of the WTGs within 20 miles of the KOP. WTG reduction would be localized to areas beyond 20 miles and would remove turbines that have WTG blades visible along the horizon. | Minor |
| MV02 | Philbin Beach | High | 13.6/11.8 | 13.8/12.0 | 13.6/11.8 | 13.8/12.0 | 13.6/11.8 | C1 and C2 | The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15 miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative C1 where 3 WTGs remain in the center of view from the KOP. | Moderate |
| MV05 | Moshup Beach | High | 13.8/12.0 | 13.7/11.9 | 13.7/11.9 | 13.7/11.9 | 13.7/11.9 | C1 and C2 | Alternatives C1 and C2 would have similar impacts. The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15 miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative C1 where 3 WTGs remain in the center of view from the KOP. | Major |
| MV05 | Moshup Beach – Sunset | High | 13.8/12.1 | 13.7/11.9 | 13.7/11.9 | 13.7/11.9 | 13.7/11.9 | C1 and C2 | Alternatives C1 and C2 would have similar impacts. The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15 miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative C1 where 3 WTGs remain in the center of view from the KOP. The backlighting resulting from sunset conditions would enhance the distinctiveness of the break in continuity of the WTG massing. | Major |
| MV07 | Aquinnah Overlook | High | 13.7/12.0 | 13.7/12.0 | 14.0/12.1 | 13.7/12.0 | 14.0/12.1 | C1 and C2 | The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15 miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative C1 where 3 WTGs remain in the center of view from the KOP. | Moderate |

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Proposed Action | Distance to Nearest Turbine miles/nautical miles) Alternative C1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative C1 | Distance to Nearest Turbine (miles/nautical miles) Alternative C2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative C2 | Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| MV07 | Aquinnah Overlook – Sunset | High | 13.7/12.0 | 13.7/12.0 | 14.0/12.2 | 13.7/12.1 | 14.0/12.2 | C1 and C2 | The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15 miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative C1 where 3 WTGs remain in the center of view from the KOP. The backlighting resulting from sunset conditions would enhance the distinctiveness of the break in continuity of the WTG massing. | Major |
| MV07 | Aquinnah Overlook – Night | High | 13.7/12.0 | 13.7/12.0 | 14.0/12.3 | 13.7/12.2 | 14.0/12.3 | C2 | Alternative C2 would have slightly fewer nighttime impacts with the reduction of 3 WTGs within the center of view. The reduction of WTGs within the center of the Lease Area would reduce the density of the Project within the viewshed at night, though would not decrease visibility of the WTGs left and right of center of the KOP. The Alternative would visually appear as two separate projects based on visible lighting, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP. WTG lighting would be visible right and left of center of the KOP. | Major |
| MV09 | Gay Head Lighthouse | High | 13.9/12.1 | 13.9/12.1 | 14.1/12.3 | 13.9/12.1 | 14.1/12.3 | C1 and C2 | The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15 miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative C1 where 3 WTGs remain in the center of view from the KOP. | Moderate |
| MV10 | South Beach State Park | High | 22.0/19.1 | 22.0/19.1 | 25.3/22.0 | 22.0/19.1 | 25.3/22.0 | C1 and C2 | The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project along the center of the horizon of the viewshed, though would not decrease predominant visibility of the WTGs left of center of the KOP. | Major |
| MV11 | Wasque Point | Low | 24.8/21.5 | 24.8/21.5 | 28.5/24.8 | 24.8/21.5 | 28.5/24.8 | C1 and C2 | he reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the visibility of WTG blades visible along the right of center of KOP along the horizon, though would not decrease visibility of the WTGs center and left of center of the KOP. | Minor |
| MV12 | Peaked Hill Reservation | High | 16.3/14.2 | 16.3/14.2 | 17.3/15.1 | 16.3/14.2 | 17.3/15.1 | C1 and C2 | The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative C1 where 3 WTGs remain in the center of view from the KOP. | Major |
| MV12 | Peaked Hill Reservation – Sunset | High | 16.3/14.2 | 16.3/14.2 | 17.3/15.1 | 16.3/14.2 | 17.3/15.1 | C1 and C2 | The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative C1 where 3 WTGs remain in the center of view from the KOP. | Major |
| MV13 | Edwin DeVries Vanderhoop Homestead | Medium | 13.8/12.0 | 13.8/12.0 | 14.0/12.1 | 13.8/12.0 | 14.0/12.1 | C1 and C2 | Alternatives C1 and C2 would have similar impacts. The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15 miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative C1 where 3 WTGs remain in the center of view from the KOP. | Moderate |
| NI10 | Madaket Beach | Medium | 34.6/30.0 | 34.6/30.0 | 39.0/34.0 | 34.6/30.0 | 39.7/34.5 | C1 and C2 | No change from Proposed Action. Views of eastern portion of the Lease Area from the KOP would be the same as the Proposed Action. A small portion of the turbine blades would be visible on the distance horizon under clear viewing conditions. | Minor |
| NL01 | Nomans Land Island NWR *(not occupied)* | Medium | 8.7/7.5 | 8.7/7.5 | 9.0/7.8 | 8.7/7.5 | 9.0/7.8 | C1 and C2 | The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 8 to 12 miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative C1 where 3 WTGs remain in the center of view from the KOP. | Moderate |
| NL01 | Nomans Land Island NWR – | Medium | 8.7/7.5 | 8.7/7.5 | 9.0/7.9 | 8.7/7.6 | 9.0/7.9 | C1 and C2 | The reduction of WTGs associated with each alternative within the center of the Lease Area would reduce the density of the Project within the viewshed, though would not decrease | Major |

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Proposed Action | Distance to Nearest Turbine miles/nautical miles) Alternative C1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative C1 | Distance to Nearest Turbine (miles/nautical miles) Alternative C2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative C2 | Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sunset *(not occupied)* | | | | | | | | visibility of the WTGs left and right of center of the KOP. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative C1 where 3 WTGs remain in the center of view from the KOP. The backlighting resulting from sunset conditions would enhance the distinctiveness of the break in continuity of the WTG massing. | |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS4a. Seascape Landscape Impact Assessment for Alternative C (Habitat Alternative) – Character Areas

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative C1<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative C2<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|
| Shoreline Beach | SCA | AI06, MV02, MV10, MV11, NI10, RI08, RI09 | 35.3/ 2.4 | 35.0/ 2.4 | 34.7/ 2.3 | Alternative C2 would have negligible reduction in visible acres across all SCAs and LCAs as compared to the Proposed Action.<br><br>The importance of SCAs for recreation and other uses along with residential areas of LCAs in close proximity of SCAs where ocean views dominate or are of high value, influence the overall impact level associated with the Project and associated alternatives. | SCA – Moderate |
| Coastal Bluff | SCA | BI04, BI12, C01, MV07, MV13, NL01 | | | | | |
| Developed Waterfront | SCA | N/A | | | | | |
| Shoreline Residential | SCA | AI03, RI01 | | | | | |
| Coastal Dunes | SCA | BI13, MV03, MV05 | | | | | |
| Salt Pond/ Tidal Marsh | SCA/LCA | RI06 | | | | | SCA/ LCA -Moderate |
| Inland Lakes and Ponds | SCA/LCA | N/A | | | | | |
| Maintained Recreation Area | SCA/LCA | AI01, AI03, BI04, C01, LI04, MM04, MV09, RI01 | | | | | |
| Highway Transportation | SCA/LCA | N/A | | | | | |
| Coastal Scrub/ Shrub Forest | LCA | AI05 , AI07, CI01, MM01, | | | | | LCA – Minor |
| Agricultural/ Open Field | LCA | N/A | | | | | |
| Forest | LCA | MV12 | | | | | |
| Rural Residential | LCA | N/A | | | | | |
| Suburban Residential | LCA | N/A | | | | | |
| Village/ Town Center | LCA | N/A | | | | | |
| Commercial | LCA | N/A | | | | | |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

**Table G-VIS4b. Seascape Landscape Impact Assessment for Alternative C (Habitat Alternative) – Ocean Character Areas**

| Character Area Name | Character Area Association<br><br>(SCA/LCA/OCA) | Key Observation Points with Simulations | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total OCA area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative C1<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative C2<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|
| Open Ocean | OCA | N/A | 5,882.2/96.2<br><br>Maximum ocean visibility for all alternatives | See Alternative B | See Alternative B | Intact open ocean setting, in immediate proximity of Project (all alternatives) components for duration of Project. | Major |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

**Table G-VIS4c. Seascape Landscape Impact Assessment for Alternative C (Habitat Alternative) – Specially Designated Areas**

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Proposed Action (Alternative B) | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative C1 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative C2 | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|
| Historic Sites and National Landmarks | 12,308.0 | AI01, AI03, BI04, BI12, BI13, C01, C02, BI13, MM04, MV07, MV09, MV13, RI01 | 1,222.08/9.9 | 1,218.8/9.9 | 1,218.6/ 9.9 | Alternative C2 would have negligible reduction in visible acres across all SDAs as compared to the Proposed Action and overall impacts would remain similar. | Major |
| National Natural Landmarks | 349.7 | MV07 | 255.5/73.1 | 252.3/ 72.2 | 249.5/71.4 | | Moderate |
| State Scenic Areas | 105,777.6 | BI12, CI01, MV07 | 18,205.6/17.2 | 18,069.1/17.1 | 17,986.7/17.0 | | Major |
| National Wildlife Refuges | 15,176.1 | AI05, NL01, RI06 | 767.7/5.1 | 764.2/5.0 | 762.9/5.0 | | Minor |
| State/ Non-Profit Wildlife Management Areas | 31,967.8 | AI07 | 1,31.4/.4 | 131.2/.4 | 131.1/.4 | | Minor |
| National Parks | 31.2 | N/A | .2/.7 | .2/.7 | .2/.7 | | Negligible |
| State Parks | 10,473.8 | AI01, LI04, MV10, RI08 | 27,31.7/26.1 | 27,29.6/26.1 | 2,728.6/26.1 | | Moderate |
| State Nature and Historic Preserves | 248.4 | N/A | 3.1/1.2 | 3.1/1.2 | 3.1/1.2 | | Negligible |
| State Forests | 5,301.6 | N/A | 7.8/.2 | 7.6/.1 | 7.7/.1 | | Negligible |
| State Beaches | 165.1 | N/A | 78.2/ 47.4 | 78.2/47.4 | 78.1/47.3 | | Moderate |
| Highways Designated or Eligible as Scenic | 411.6 | N/A | 43.4/10.5 | 43.1/10.5 | 43.1/10.5 | | Moderate |
| National Historic Trails | 990.1 | N/A | .8/.1 | .8/.1 | .75/.1 | | Minor |
| National Recreation Trails | 88.6 | AI03 | 65.1/73.4 | 65.1/73.4 | 65.1/73.4 | | Major |
| State Fishing and Boating Access Sites | 371.4 | N/A | 78.4/21.1 | 78.2/21.1 | 78.0/21.0 | | Moderate |
| Lighthouses | 23.0 | BI04, C01, MM04, MV09, RI01 | 6.6/28.7 | 6.6/28.6 | 6.6/28.6 | | Major |
| Public Beaches | 4,221.0 | AI06, MM01, MV02, MV03, MV05, MV11, NI10, RI09 | 11,38.8/27.0 | 1,137.3/27.0 | 1,135.7/26.9 | | Moderate |
| Ferry Routes | 10,641.7 | N/A | 6,365.0/59.8 | 6,364.8/59.8 | 6,364.7/59.8 | | Moderate |
| Seaports | 90.1 | N/A | 2.3/2.5 | 2.0/2.2 | 1.8/2.1 | | Negligible |

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Proposed Action (Alternative B) | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative C1 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative C2 | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|
| Other State Land with Public Access | 9,361.8 | N/A | 325.3/3.5 | 324.1/3.5 | 323.1/3.5 | | Negligible |
| **Total Acres for Comparison** | **208,009** | | **30,208.0/14.5** | **30,058.6/14.5** | **29,967.9/14.4** | **–** | **–** |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS5a. Visual Impact Assessment Impacts Matrix – Alternative D (Transit Alternative) (see Table G-VIS5b for continuation table)

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Proposed Action | Distance to Nearest Turbine miles/nautical miles) Alternative D1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D1 | Distance to Nearest Turbine (miles/nautical miles) Alternative D2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D2 | Distance to Nearest Turbine (miles/nautical miles) Alternative D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D2 |
|---|---|---|---|---|---|---|---|---|---|---|
| AI01 | Brenton Point State Park | Medium | 16.7/14.5 | 16.7/14.5 | 26.9/23.4 | N/A | N/A | 18.5/16.1 | 16.7/14.5 | N/A |
| AI01 | Brenton Point State Park – Night | Medium | 16.7/14.5 | 16.7/14.5 | 27.0/23.4 | N/A | N/A | 18.5/16.1 | 16.7/14.5 | N/A |
| AI03 | Newport Cliff Walk | High | 15.3/13.3 | 15.3/13.3 | 26.5/23.0 | N/A | N/A | 17.2/14.9 | 15.3/13.3 | N/A |
| AI05 | Sachuest Point National Wildlife Refuge | High | 14.8/12.9 | 14.8/12.9 | 27.5/23.9 | N/A | N/A | 17.0/14.7 | 14.8/12.9 | N/A |
| AI06 | Sachuest Beach (Second Beach) | Medium | 16.0/13.9 | 16.0/13.9 | 28.6/24.9 | N/A | N/A | 18.2/15.8 | 16.0/13.9 | N/A |
| AI07 | Hanging Rock (Norman Bird Sanctuary) | High | 16.2/14.1 | 16.2/14.1 | 28.8/25.1 | N/A | N/A | 18.4/16.0 | 16.2/14.1 | N/A |
| BI04 | Southeast Lighthouse | High | 15.3/13.3 | 15.3/13.3 | 18.5/16.1 | N/A | N/A | 15.5/13.4 | 15.3/13.3 | N/A |
| BI04 | Southeast Lighthouse – Night | High | 15.3/13.4 | 15.3/13.3 | 18.5/16.1 | N/A | N/A | 15.5/13.4 | 15.3/13.3 | N/A |
| BI12 | Clayhead Trail | High | 15.9/13.8 | 15.9/13.8 | 20.3/17.6 | N/A | N/A | 16.7/14.5 | 15.9/13.8 | N/A |
| BI13 | North Light | High | 17.2/15.0 | 17.2/15.0 | 21.7/18.9 | N/A | N/A | 18.0/15.7 | 17.2/15.0 | N/A |
| CI01 | Cuttyhunk Island | High | 13.9/12.1 | 13.9/12.1 | 17.8/15.5 | N/A | N/A | 13.9/12.1 | 14.2/12.4 | N/A |
| C01 | Beavertail Lighthouse | Medium | 18.4/15.9 | 18.4/15.9 | 27.6/24.0 | N/A | N/A | 20.0/17.4 | 18.4/15.9 | N/A |
| LI04 | Montauk Point State Park | Medium | 31.5/27.4 | 31.5/27.4 | 33.8/29.4 | N/A | N/A | 31.5/27.3 | 31.9/27.7 | 31.5/27.4 |
| LI04 | Montauk Point State Park – Night | High | 31.5/27.4 | 31.5/27.4 | 33.8/29.4 | N/A | N/A | 31.5/27.4 | 31.9/27.7 | 31.5/27.4 |
| MM01 | Gooseberry Island | Medium | 15.2/13.2 | 15.2/13.2 | 22.4/19.5 | N/A | N/A | 16.6/14.5 | 15.1/13.2 | N/A |
| MM04 | Nobska Lighthouse | Medium | 28.2/24.5 | 28.2/24.5 | 33.7/29.3 | N/A | N/A | N/A | N/A | N/A |
| MV02 | Philbin Beach | High | 13.6/11.8 | 13.6/11.8 | 18.8/16.4 | 13.6/11.8 | 14.2/12.3 | N/A | N/A | 13.6/11.8 |
| MV03 | Lucy Vincent Beach | High | 15.5/13.5 | 15.5/13.5 | 21.3/18.5 | 16.9/14.7 | 15.5/13.5 | N/A | N/A | 16.9/14.7 |
| MV03 | Lucy Vincent Beach – Sunset | Medium | 15.5/13.5 | 15.5/13.5 | 21.3/18.5 | 16.9/14.7 | 15.5/13.5 | N/A | N/A | 16.9/14.7 |

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Proposed Action | Distance to Nearest Turbine miles/nautical miles) Alternative D1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D1 | Distance to Nearest Turbine (miles/nautical miles) Alternative D2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D2 | Distance to Nearest Turbine (miles/nautical miles) Alternative D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D2 |
|---|---|---|---|---|---|---|---|---|---|---|
| MV05 | Moshup Beach | High | 13.8/12.0 | 13.7/11.9 | 19.2/16.5 | 13.7/11.9 | 14.5/12.6 | N/A | N/A | 13.7/11.9 |
| MV05 | Moshup Beach – Sunset | High | 13.8/12.1 | 13.7/11.9 | 19.2/16.5 | 13.7/11.9 | 14.5/12.6 | N/A | N/A | 13.7/11.9 |
| MV07 | Aquinnah Overlook | High | 13.7/12.0 | 13.7/12.0 | 19.3/16.8 | 13.7/11.9 | 14.9/12.9 | N/A | N/A | 13.7/11.9 |
| MV07 | Aquinnah Overlook – Sunset | High | 13.7/12.0 | 13.7/12.0 | 19.3/16.8 | 13.7/11.9 | 14.9/12.9 | N/A | N/A | 13.7/11.9 |
| MV07 | Aquinnah Overlook – Night | High | 13.7/12.0 | 13.7/12.0 | 19.3/16.8 | 13.7/11.9 | 14.9/12.9 | N/A | N/A | 13.7/11.9 |
| MV09 | Gay Head Lighthouse | High | 13.9/12.1 | 13.9/12.1 | 19.4/16.9 | 13.9/12.1 | 15.0/13.0 | N/A | N/A | 13.9/12.1 |
| MV10 | South Beach State Park | High | 22.0/19.1 | 22.0/19.1 | 28.6/24.9 | 25.3/22.0 | 22.0/19.1 | N/A | N/A | 25.3/22.0 |
| MV11 | Wasque Point | Low | 24.8/21.5 | 24.8/21.5 | 31.5/27.4 | N/A | N/A | N/A | N/A | N/A |
| MV12 | Peaked Hill Reservation | Medium | 16.3/14.2 | 16.3/14.2 | 22.0/19.1 | 17.3/15.1 | 16.3/14.2 | N/A | N/A | 17.3/15.1 |
| MV12 | Peaked Hill Reservation – Sunset | High | 16.3/14.2 | 16.3/14.2 | 22.0/19.1 | 17.3/15.1 | 16.3/14.2 | N/A | N/A | 17.3/15.1 |
| MV13 | Edwin DeVries Vanderhoop Homestead | Medium | 13.8/12.0 | 13.8/12.0 | 19.3/16.8 | 13.8/12.0 | 14.8/12.9 | N/A | N/A | 13.8/12.0 |
| NL01 | Nomans Land Island NWR – Sunset *(not occupied)* | Low | 8.7/7.5 | 8.7/7.5 | 13.7/11.9 | 9.0/7.8 | 8.7/7.5 | N/A | N/A | 9.0/7.8 |
| NL01 | Nomans Land Island NWR *(not occupied)* | Medium | 8.7/7.5 | 8.7/7.5 | 13.7/11.9 | 9.0/7.8 | 8.7/7.5 | N/A | N/A | 9.0/7.8 |
| NI10 | Madaket Beach | Medium | 34.6/30.0 | 34.6/30.0 | 41.1/35.7 | 39.0/34.0 | 34.6/30.0 | N/A | N/A | 39.0/34.0 |
| RI01 | Watch Hill Lighthouse | Medium | 32.8/28.5 | N/A | N/A | N/A | N/A | 33.6/29.3 | 32.8/28.5 | N/A |
| RI06 | Trustom Pond NWR | Medium | 22.6/19.6 | 22.6/19.6 | 28.3/24.6 | N/A | N/A | 23.5/20.4 | 22.6/19.6 | N/A |
| RI08 | Scarborough Beach State Park | Medium | 19.1/16.6 | 19.1/16.6 | 25.6/22.3 | N/A | N/A | 19.9/17.3 | 19.1/16.6 | N/A |
| RI09 | Narragansett Beach | Medium | 20.0/17.4 | 20.0/17.4 | 28.0/24.3 | N/A | N/A | 21.4/18.6 | 20.0/17.4 | N/A |

### Table G-VIS5b. Visual Impact Assessment Impacts Matrix – Alternative D (Transit Alternative)

| KOP Number | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D2 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D2 & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D2 & D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1, D2, & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1, D2, & D3 | Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| AI01 | N/A | 18.5/16.1 | 16.7/14.5 | 18.5/16.1 | 16.7/14.5 | 18.5/16.1 | 16.7/14.5 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2 miles which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible, though appear small in scale. | Moderate |

| KOP Number | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D2 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D2 & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D2 & D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1, D2, & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1, D2, & D3 | Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| AI01 | N/A | 18.5/16.1 | 16.7/14.5 | 18.5/16.1 | 16.7/14.5 | 18.5/16.1 | 16.7/14.5 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2 miles which removes the first row of visible WTGs along the horizon. When viewed at night, warning lights will be visible along horizon where nighttime lighting does not currently exist. | Moderate |
| AI03 | N/A | 17.2/14.9 | 15.3/13.3 | 17.2/14.9 | 15.3/13.3 | 17.2/14.9 | 15.3/13.3 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2 miles which reduces the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible, though appear small in scale. | Moderate |
| AI05 | N/A | 17.0/14.7 | 14.8/12.9 | 17.0/14.7 | 14.8/12.9 | 17.0/14.7 | 14.8/12.9 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2 miles which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible, though appear small in scale. | Moderate |
| AI06 | N/A | 18.2/15.8 | 16.0/13.9 | 18.2/15.8 | 16.0/13.9 | 18.2/15.8 | 16.0/13.9 | D1, D2, and D3 | Alternative D2 would increase the distance between the KOP and nearest turbine by approximately 2 miles which reduces the overall visibility of the WTGs along the horizon. | Minor |
| AI07 | N/A | 18.4/16.0 | 16.2/14.1 | 18.4/16.0 | 16.2/14.1 | 18.4/16.0 | 16.2/14.1 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2 miles which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible and prominent. | Moderate |
| BI04 | N/A | 15.5/13.4 | 15.3/13.3 | 15.5/13.4 | 15.3/13.3 | 15.5/13.4 | 15.3/13.3 | D1, D2, and D3 | Alternative D3 would negligibly increase the distance between the KOP and nearest WTGs as only one WTG would be removed that is nearest the KOP. Overall the combinations of Alternatives D1 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon. | Moderate |
| BI04 | N/A | 15.5/13.4 | 15.3/13.3 | 15.5/13.4 | 15.3/13.3 | 15.5/13.4 | 15.3/13.3 | D1, D2, and D3 | Alternative D3 would negligibly increase the distance between the KOP and nearest WTGs as only one WTG would be removed that is nearest the KOP. Overall the combinations of Alternatives D1 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. When viewed at night, warning lights will continue be visible along horizon similar to the Proposed Action where nighttime lighting does not currently exist. | Major |
| BI12 | N/A | 16.7/14.5 | 15.9/13.8 | 16.7/14.5 | 15.9/13.8 | 16.7/14.5 | 15.9/13.8 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1 mile removing 1 string of WTGs. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon. | Moderate |
| BI13 | N/A | 18.0/15.7 | 17.2/15.0 | 18.0/15.7 | 17.2/15.0 | 18.0/15.7 | 17.2/15.0 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1 mile removing 1 string of WTGs. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon. | Moderate |
| CI01 | N/A | 13.9/12.1 | 14.2/12.4 | 13.9/12.1 | 14.2/12.4 | 13.9/12.1 | 14.2/12.4 | D1, D2, and D3 | Alternative D3 would negligibly increase the distance between the KOP and nearest WTGs as only two WTGs would be removed that is nearest the KOP. Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon. | Major |
| C01 | N/A | 20.0/17.4 | 18.4/15.9 | 20.0/17.4 | 18.4/15.9 | 20.0/17.4 | 18.4/15.9 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2 miles. The overall massing of the WTGs within the Lease Area would appear smaller in scale along the horizon as a result of the increased distance and influence of the curvature of the earth. | Minor |
| LI04 | 33.8/29.4 | 31.5/27.4 | 31.9/27.7 | 31.5/27.4 | 31.9/27.7 | 31.5/27.4 | 31.9/27.7 | D1, D2, and D3 | Alternative D1 would not be perceivable along horizon due to distance (over 30 miles) and atmospheric influences. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting. | Negligible |
| LI04 | 33.8/29.4 | 31.5/27.4 | 31.9/27.7 | 31.5/27.4 | 31.9/27.7 | 31.5/27.4 | 31.9/27.7 | D1, D2, and D3 | The addition of aviation warning lights along the horizon within the viewshed would be perceivable by the focused viewer, but not a dominant element as | Negligible |

| KOP Number | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D2 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D2 & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D2 & D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1, D2, & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1, D2, & D3 | Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | compared to other existing warning lighting sources associated with BIWF that are in closer proximity (approximately 16 miles). | |
| MM01 | N/A | 16.6/14.5 | 15.1/13.2 | 16.6/14.5 | 15.1/13.2 | 16.6/14.5 | 15.1/13.2 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1.5 miles removing two of the WTGs. The overall massing of the WTGs (blades) within the Lease Area would continue to be perceivable along the horizon. | Minor |
| MM04 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | D1, D2, and D3 | Alternative D3 would negligibly increase the distance between the KOP and nearest WTGs as only one WTG would be removed that is nearest the KOP. D3 would remove outer strings of WTGs when viewed far right of center. The overall massing of the WTGs (hub and blades) within the Lease Area would continue to be perceivable along the horizon. | Minor |
| MV02 | 14.2/12.3 | N/A | N/A | 13.6/11.8 | 14.2/12.3 | 13.6/11.8 | 14.2/12.3 | D1, D2, and D3 | Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon. | Moderate |
| MV03 | 15.5/13.5 | N/A | N/A | 16.9/14.7 | 15.5/13.5 | 16.9/14.7 | 15.5/13.5 | D1, D2, and D3 | Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the left of Nomans Land Island which are unobstructed and prominent along the horizon. The remaining WTGs visible within the Lease Area would be partially obscured (towers) with hubs and blades still visible above the landform, but not a major focus of attention by beach users. | Minor |
| MV03 | 15.5/13.5 | N/A | N/A | 16.9/14.7 | 15.5/13.5 | 16.9/14.7 | 15.5/13.5 | D1, D2, and D3 | Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the left of Nomans Land Island which are unobstructed and prominent along the horizon. The remaining WTGs visible within the Lease Area would be partially obscured (towers) with hubs and blades still visible above the landform, which, when backlit would continue to draw the viewers eye due to movement. | Moderate |
| MV05 | 14.5/12.6 | N/A | N/A | 13.7/11.9 | 14.5/12.6 | 13.7/11.9 | 14.5/12.6 | D1, D2, and D3 | Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon. | Major |
| MV05 | 14.5/12.6 | N/A | N/A | 13.7/11.9 | 14.5/12.6 | 13.7/11.9 | 14.5/12.6 | D1, D2, and D3 | Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the left of Nomans Land Island which are unobstructed and prominent along the horizon. The remaining WTGs visible within the Lease Area, when backlit would continue to draw the viewers eye due to movement. | Moderate |
| MV07 | 14.9/12.9 | N/A | N/A | 13.7/11.9 | 14.9/12.9 | 13.7/11.9 | 14.9/12.9 | D1, D2, and D3 | Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon and be the center of focus from the KOP. | Major |
| MV07 | 14.9/12.9 | N/A | N/A | 13.7/11.9 | 14.9/12.9 | 13.7/11.9 | 14.9/12.9 | D1, D2, and D3 | Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon and be the center of focus from the KOP. The remaining WTGs visible within the Lease Area, when backlit would continue to draw the viewers eye due to movement and dark contrast. | Major |
| MV07 | 14.9/12.9 | N/A | N/A | 13.7/11.9 | 14.9/12.9 | 13.7/11.9 | 14.9/12.9 | D1, D2, and D3 | Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon and be the center of focus from the KOP. WTG hazard lighting would be visible along the horizon based on turbine distance, with platform and tower lighting more prevalent with the first four strings of WTGs. | Major |
| MV09 | 15.0/13.0 | N/A | N/A | 13.9/12.1 | 15.0/13.0 | 13.9/12.1 | 15.0/13.0 | D1, D2, and D3 | Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of | Major |

| KOP Number | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D2 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D2 & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D2 & D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1, D2, & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1, D2, & D3 | Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | the WTGs within the Lease Area would continue to be visually prominent along the horizon and be the center of focus from the KOP. | |
| MV10 | 22.0/19.1 | N/A | N/A | 25.3/22.0 | 22.0/19.1 | 25.3/22.0 | 22.0/19.1 | D1, D2, and D3 | Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the left of Nomans Land Island which are unobstructed and prominent along the horizon. The remaining WTGs visible within the Lease Area would be partially obscured (towers) with hubs and blades still visible continue to draw the viewers eye due to movement. | Moderate |
| MV11 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | D1, D2, and D3 | Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the left of Nomans Land Island which are unobstructed and prominent along the horizon. The remaining WTGs visible within the Lease Area would be partially obscured (towers) with hubs and blades perceivable along the horizon based on lighting conditions. | Minor |
| MV12 | 16.3/14.2 | N/A | N/A | 17.3/15.1 | 16.3/14.2 | 17.3/15.1 | 16.3/14.2 | D1, D2, and D3 | Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon. | Major |
| MV12 | 16.3/14.2 | N/A | N/A | 17.3/15.1 | 16.3/14.2 | 17.3/15.1 | 16.3/14.2 | D1, D2, and D3 | Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs and geometric form of the OSSs within the Lease Area would continue to be visually prominent along the horizon and be the center of focus from the KOP. The remaining WTGs visible within the Lease Area, when backlit would continue to draw the viewers eye due to movement and dark contrast. | Major |
| MV13 | 14.8/12.9 | N/A | N/A | 13.8/12.0 | 14.8/12.9 | 13.8/12.0 | 14.8/12.9 | D1, D2, and D3 | Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the right of Nomans Land Island which are unobstructed and prominent along the horizon. A portion of the Lease Area would continue to be visible left of the OSS with the remaining predominantly obscured to the right of center of the KOP (right of the OSS) by intervening topography. | Major |
| NL01 | 8.7/7.5 | N/A | N/A | 9.0/7.8 | 8.7/7.5 | 9.0/7.8 | 8.7/7.5 | D1, D2, and D3 | Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon. | Major |
| NL01 | 8.7/7.5 | N/A | N/A | 9.0/7.8 | 8.7/7.5 | 9.0/7.8 | 8.7/7.5 | D1, D2, and D3 | Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 1 mile though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon. WTGs would continue to be visible center and left of center of the KOP. | Major |
| NI10 | 34.6/30.0 | N/A | N/A | 39.0/34.0 | 34.6/30.0 | 39.0/34.0 | 34.6/30.0 | D1, D2, and D3 | Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the Lease Area would continue to be visually prominent along the horizon and be the center of focus from the KOP. The remaining WTGs visible within the Lease Area, when backlit would continue to draw the viewers eye due to movement and dark contrast. | Negligible |
| RI01 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1 mile which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row would not be visible. | Negligible |
| RI06 | N/A | 23.5/20.4 | 22.6/19.6 | 23.5/20.4 | 22.6/19.6 | 23.5/20.4 | 22.6/19.6 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1 miles which reduces the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible, though appear small in scale. | Minor |
| RI08 | N/A | 19.9/17.3 | 19.1/16.6 | 19.9/17.3 | 19.1/16.6 | 19.9/17.3 | 19.1/16.6 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 0.5 mile which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible, though appear small in scale. | Moderate |

| KOP Number | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D2 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D2 & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D2 & D3 | Distance to Nearest Turbine (miles/nautical miles) Alternatives D1, D2, & D3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1, D2, & D3 | Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| RI09 | N/A | 21.4/18.6 | 20.0/17.4 | 21.4/18.6 | 20.0/17.4 | 21.4/18.6 | 20.0/17.4 | D1, D2, and D3 | Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1.5 miles which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible, though appear small in scale. | Moderate |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS6a. Seascape Landscape Impact Assessment for Alternative D (Transit Alternative) – Character Areas

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D2<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D3<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D2<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D3<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D3<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1, D2, & D3<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shoreline Beach | SCA | AI06, MV02, MV10, MV11, NI10, RI08, RI09 | 35.3/ 2.4 | 35.3/2.4 | 32.0/2.2 | 34.7/2.3 | 31.8/2.1 | 34.6/2.3 | 34.6/2.3 | 31.1/2.1 | Alternatives D1, D2, and D3 would have minor reduction in visible acres across all SCAs and LCAs (approximately 4.2 square miles) as compared to the Proposed Action.<br><br>The importance of SCAs for recreation and other uses along with residential areas of LCAs in close proximity of SCAs where ocean views dominate or are of high value, influence the overall impact level associated with the Project and associated alternatives. | SCA – Moderate |
| Coastal Bluff | SCA | BI04, BI12, C01, MV07, MV13, NL01 | | | | | | | | | | |
| Developed Waterfront | SCA | N/A | | | | | | | | | | |
| Shoreline Residential | SCA | AI03, RI01 | | | | | | | | | | |
| Coastal Dunes | SCA | BI13, MV03, MV05 | | | | | | | | | | |
| Salt Pond/ Tidal Marsh | SCA/LCA | RI06 | | | | | | | | | | SCA/LCA – Moderate |
| Inland Lakes and Ponds | SCA/LCA | N/A | | | | | | | | | | |
| Maintained Recreation Area | SCA/LCA | AI01, AI03, BI04, C01, LI04, MM04, MV09, RI01 | | | | | | | | | | |
| Highway Transportation | SCA/LCA | N/A | | | | | | | | | | |
| Coastal Scrub/ Shrub Forest | LCA | AI05, AI07, CI01, MM01, | | | | | | | | | | LCA – Minor |
| Agricultural/ Open Field | LCA | N/A | | | | | | | | | | |
| Forest | LCA | MV12 | | | | | | | | | | |

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D2<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D3<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D2<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D3<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D3<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1, D2, & D3<br><br>Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rural Residential | LCA | N/A | | | | | | | | | | |
| Suburban Residential | LCA | N/A | | | | | | | | | | |
| Village/ Town Center | LCA | N/A | | | | | | | | | | |
| Commercial | LCA | N/A | | | | | | | | | | |

## Table G-VIS6b. Seascape Landscape Impact Assessment for Alternative D (Transit Alternative) – Ocean Character Areas

| Character Area Name | Character Area Association (SCA/LCA/ OCA) | Key Observation Points with Simulations | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total OCA area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1<br><br>Total OCA area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D2<br><br>Total OCA area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D3<br><br>Total OCA area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D2<br><br>Total OCA area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D3<br><br>Total OCA area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D2 & D3<br><br>Total OCA area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1, D2, & D3<br><br>Total OCA area within Analysis Area: 6,113.4 Square Miles | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Open Ocean | OCA | N/A | 5,882.2/96.2<br><br>Maximum ocean visibility as compared to all alternatives | See Alternative B | See Alternative B | See Alternative B | See Alternative B | See Alternative B | See Alternative B | See Alternative B | Intact open ocean setting, in immediate proximity of Project components for duration of Project. | Major |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

## Table G-VIS6c. Seascape Landscape Impact Assessment for Alternative D (Transit Alternative) – Specially Designated Areas

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Proposed Action (Alternative B) | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D2 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D3 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 & D2 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 & D3 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D2 & D3 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1, D2, & D3 | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Historic Sites and National Landmarks | 12,308.0 | AI01, AI03, BI04, BI12, BI13, C01, C02, BI13, MM04, MV07, MV09, MV13, RI01 | 1,222.1/9.9 | 1,211.2/9.8 | 1,188.8/9.7 | 1,183.7/9.6 | 1,177.5/9.6 | 1172.3/9.5 | 1,150/9.3 | 1,139/9.2 | Alternatives D1, D2, and D3 would have a minor reduction in visible acres across all SDAs as compared to the Proposed Action, | Major |

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Proposed Action (Alternative B) | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D2 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D3 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 & D2 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 & D3 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D2 & D3 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1, D2, & D3 | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| National Natural Landmarks | 349.7 | MV07 | 255.5/73.1 | 255.5/73.1 | 248.9/71.2 | 254.6/72.8 | 247.6/70.8 | 254.6/72.8 | 248.0/70.9 | 246.7/70.5 | though overall impacts would remain similar.<br><br>The combination of alternatives reduces a greater area of visibility resulting from the reduction of turbines along the eastern and northwestern portions of the Lease Area. | Moderate |
| State Scenic Areas | 105,777.6 | BI12, CI01, MV07 | 18,205.6/17.2 | 18,179.6/17.2 | 17,365.0/16.4 | 17,944.7/17.0 | 17,303.0/16.4 | 17,912.6/16.9 | 17,092.3/16.2 | 17,029.4/16.1 | | Major |
| National Wildlife Refuges | 15,176.1 | AI05, NL01, RI06 | 767.7/5.1 | 767.3/5.1 | 738.7/4.9 | 754.3/5.0 | 736.7/4.9 | 753.7/5.0 | 725.11/4.8 | 723.1/4.8 | | Minor |
| State/ Non-Profit Wildlife Management Areas | 31,967.8 | AI07 | 1,31.4/.4 | 130.9 /.4 | 125.5/.4 | 120.6/.4 | 123.7/.4 | 120.1/.4 | 114.7/.4 | 112.9/.4 | | Minor |
| National Parks | 31.2 | N/A | 0.2/0.7 | 0.2 /.7 | 0.0/0 | 0.2/.7 | 0.0/0 | 0.2/.7 | 0.0/0 | 0.0/0 | | Negligible |
| State Parks | 10,473.8 | AI01, LI04, MV10, RI08 | 2,731.7/26.1 | 2,730.4/62.1 | 2,704.0/25.8 | 2,724.1/26.0 | 2,702.0/25.8 | 2,722.5/26.0 | 2,695.7/25.7 | 2,693.6/25.7 | | Moderate |
| State Nature and Historic Preserves | 248.4 | N/A | 3.1/1.2 | 3.1/1.2 | 3.1/1.2 | 3.1/1.2 | 3.1/1.2 | 3.1/1.2 | 3.1/1.2 | 3.1/1.2 | | Negligible |
| State Forests | 5,301.6 | N/A | 7.8/.2 | 7.8/.2 | 2.2/.04 | 7.8/.1 | 2.1/.04 | 7.8/.1 | 2.2/.04 | 2.1/.04 | | Negligible |
| State Beaches | 165.1 | N/A | 78.2/ 47.4 | 78.2/47.4 | 78.2/47.3 | 76.4/46.2 | 78.1/47.3 | 76.4/46.2 | 76.3/46.2 | 76.3/46.2 | | Moderate |
| Highways Designated or Eligible as Scenic | 411.6 | N/A | 43.4/10.5 | 43.3/10.5 | 43.0/10.4 | 41.9/10.2 | 42.8/10.4 | 41.7/10.1 | 41.4/10.1 | 41.2/10.1 | | Moderate |
| National Historic Trails | 990.1 | N/A | 0.8/0.1 | 0.7/.1 | 0.7/.1 | 0.6/.1 | 0.7/.1 | 0.6/.1 | 0.6 /.1 | 0.6/.1 | | Minor |
| National Recreation Trails | 88.6 | AI03 | 65.1/73.4 | 65.1/73.4 | 64.2/72.4 | 65.1/73.4 | 64.2/72.4 | 65.1/73.4 | 64.2/72.4 | 64.2/72.4 | | Major |
| State Fishing and Boating Access Sites | 371.4 | N/A | 78.4/21.1 | 78.0/21.0 | 78.2/21.1 | 77.1/20.7 | 77.7/20.9 | 76.7/20.6 | 76.9/20.7 | 76.4/20.6 | | Moderate |
| Lighthouses | 23.0 | BI04, C01, MM04, MV09, RI01 | 6.6/28.7 | 6.6/28.7 | 6.2/27.0 | 6.6/28.5 | 6.2/27.0 | 6.6/28.5 | 6.2/27.0 | 6.2/27.0 | | Major |
| Public Beaches | 4,221.0 | AI06, MM01, MV02, MV03, MV05, MV11, NI10, RI09 | 11,38.8/27.0 | 1,137.1/27.0 | 1,099.5/26.1 | 1,126.0/26.7 | 1,097.5/26.0 | 1,124.2/26.6 | 1,086.5/25.7 | 1,084.4/25.7 | | Moderate |
| Ferry Routes | 10,641.7 | N/A | 6,365.0/59.8 | 6,365.0/59.8 | 6,364.9/59.8 | 6,364.5/59.8 | 6,364.8/59.8 | 6,364.4/59.8 | 6,364.5/59.8 | 6,364.4/59.8 | | Moderate |
| Seaports | 90.1 | N/A | 2.3/2.5 | 2.3/2.5 | 1.8/2.0 | 2.3/2.5 | 1.8/2.0 | 2.3/2.5 | 1.8/2.0 | 1.8/2.0 | | Negligible |
| Other State Land with Public Access | 9,361.8 | N/A | 325.3/3.5 | 322.3/3.4 | 325.3/3.5 | 315.9/3.4 | 322.3/3.4 | 312.8/3.3 | 315.9/3.4 | 312.8/3.3 | | Negligible |
| **Total Acres for Comparison** | **208,009** | | **30,208.0/14.5** | **30,174.3/14.5** | **29,250.8/14.1** | **29,886.8/14.4** | **29,175.7/14.0** | **29,846.3/14.3** | **30,066.5/14.5** | **28,840.4/13.9** | – | – |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS7. Visual Impact Assessment Impacts Matrix – Alternative E (Viewshed Alternative)

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Proposed Action | Distance to Nearest Turbine miles/nautical miles) Alternative E1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E1 | Distance to Nearest Turbine (miles/nautical miles) Alternative E2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E2 | Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| AI01 | Brenton Point State Park | Medium | 16.7/14.5 | 18.6/16.2 | 16.7/14.5 | 20.7/18.0 | 16.7/14.5 | E2 | Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4 miles which reduces the overall visibility of the WTGs along the horizon. | Negligible |

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Proposed Action | Distance to Nearest Turbine miles/nautical miles) Alternative E1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E1 | Distance to Nearest Turbine (miles/nautical miles) Alternative E2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E2 | Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| AI01 | Brenton Point State Park – Night | Medium | 16.7/14.5 | 18.6/16.3 | 16.7/14.6 | 20.7/18.1 | 16.7/14.5 | E2 | Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4 miles. When viewed at night, dual aviation warning lights on nacelle may be visible intermittently along horizon where nighttime lighting does not currently exist. | Moderate |
| AI03 | Newport Cliff Walk | High | 15.3/13.3 | 17.8/15.5 | 15.3/13.3 | 19.4/16.9 | 15.3/13.3 | E2 | Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4 miles which reduces the overall visibility of the WTGs along the horizon. | Negligible |
| AI05 | Sachuest Point National Wildlife Refuge | High | 14.8/12.9 | 18.4/16.0 | 14.8/12.9 | 18.9/16.4 | 14.8/12.9 | E1 and E2 | Alternatives E1 and E2 would increase the distance between the KOP and nearest turbine by approximately 4 miles which reduces the overall visibility of the WTGs along the horizon. | Negligible |
| AI06 | Sachuest Beach (Second Beach) | Medium | 16.0/13.9 | 19.5/17.0 | 16.0/13.9 | 20.1/17.4 | 16.0/13.9 | E2 | Alternative E2 would increase the distance between the KOP and nearest turbine by approximately 4 miles which reduces the overall visibility of the WTGs along the horizon. | Negligible |
| AI07 | Hanging Rock (Norman Bird Sanctuary) | High | 16.2/14.1 | 19.8/17.2 | 16.2/14.1 | 20.3/17.7 | 16.2/14.1 | E2 | Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4 miles which reduces the overall visibility of the WTGs along the horizon. | Negligible |
| BI04 | Southeast Lighthouse | High | 15.3/13.3 | 15.3/13.3 | 19.9/17.3 | 15.5/13.4 | 15.3/13.3 | E2 | Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4 miles which reduces the overall visibility of the WTGs along the horizon. | Moderate |
| BI04 | Southeast Lighthouse – Night | High | 15.3/13.4 | 15.3/13.3 | 19.9/17.3 | 15.5/13.4 | 15.3/13.3 | E2 | Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4 miles which reduces the overall visibility of the WTGs along the horizon. | Moderate |
| BI12 | Clayhead Trail | High | 15.9/13.8 | 15.9/13.8 | 19.9/17.3 | 16.7/14.5 | 15.9/13.8 | E2 | Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4 miles which reduces the overall visibility of the WTGs along the horizon. | Minor |
| BI13 | North Light | High | 17.2/15.0 | 17.2/15.0 | 21.0/18.2 | 18.0/15.7 | 17.2/15.0 | E2 | Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4 miles which reduces the overall visibility of the WTGs along the horizon. | Minor |
| CI01 | Cuttyhunk Island | High | 13.9/12.1 | 19.2/16.7 | 13.9/12.1 | 14.9/12.9 | 13.9/12.1 | E1 | Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4 miles which reduces the overall visibility of the WTGs along the horizon. | Moderate |
| MM01 | Gooseberry Island | Medium | 15.2/13.2 | 20.7/18.0 | 15.1/13.2 | 17.8/15.5 | 15.1/13.2 | E1 | Alternative E1 would increase the distance between the KOP and nearest turbine by approximately 5.5 miles which reduces the overall visibility of the WTGs along the horizon. | Negligible |
| MM04 | Nobska Lighthouse | Medium | 28.2/24.5 | 28.2/24.5 | 28.3/24.6 | 28.2/24.5 | 28.3/24.6 | E1 | Alternative E1 would increase the distance between the KOP and nearest WTGs to a distance that would not be perceivable along horizon due to distance, intervening landforms and atmospheric influences. | Negligible |
| MV02 | Philbin Beach | High | 13.6/11.8 | 14.2/12.3 | 13.6/11.8 | 13.6/11.8 | 13.8/12.0 | E1 | Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 0.5 mile though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon. WTGs would continue to be visible left of center of the KOP beyond Nomans Land Island. | Moderate |
| MV03 | Lucy Vincent Beach | High | 15.5/13.6 | 15.5/13.4 | 16.9/14.7 | 15.5/13.5 | 18.7/16.3 | E1 | Alternative E1 would increase the distance between the KOP and turbines far right of center of the KOP along the horizon of the landform removing visibility, where WTGs are visible as part of the Proposed Action. WTGs would continue to be visible left of center of the KOP, similar to the Proposed Action. | Moderate |
| MV03 | Lucy Vincent Beach – Sunset | Medium | 15.5/13.7 | 15.5/13.5 | 16.9/14.8 | 15.5/13.5 | 18.7/16.3 | E1 | Alternative E1 would increase the distance between the KOP and turbines far right of center of the KOP along the horizon of the landform removing visibility, where WTGs are visible as part of the Proposed Action. WTGs would continue to be visible left of center of the KOP, similar to the Proposed Action. | Major |

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Proposed Action | Distance to Nearest Turbine miles/nautical miles) Alternative E1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E1 | Distance to Nearest Turbine (miles/nautical miles) Alternative E2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E2 | Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| MV05 | Moshup Beach | High | 13.8/12.0 | 14.5/12.6 | 13.7/11.9 | 13.7/11.9 | 13.7/11.9 | E1 | Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 1 mile though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon. WTGs would continue to be visible center and left of center of the KOP. | Moderate |
| MV05 | Moshup Beach – Sunset | High | 13.8/12.1 | 14.5/12.7 | 13.7/11.9 | 13.7/11.9 | 13.7/11.9 | E1 | Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 1 mile though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon. WTGs would continue to be visible center and left of center of the KOP where backlighting creates contrast. | Moderate |
| MV07 | Aquinnah Overlook | High | 13.7/12.0 | 14.9/12.9 | 13.7/11.9 | 14.0/12.2 | 13.7/11.9 | E1 | Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 1 mile though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon, particularly with atmospheric conditions. WTGs would continue to be visible center and left of center of the KOP. | Moderate |
| MV07 | Aquinnah Overlook – Sunset | High | 13.7/12.0 | 14.9/12.9 | 13.7/11.9 | 14.0/12.2 | 13.7/11.9 | E1 | Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 1 mile though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon. WTGs would continue to be visible center and left of center of the KOP. | Moderate |
| MV07 | Aquinnah Overlook – Night | High | 13.7/12.0 | 14.9/12.9 | 13.7/11.9 | 14.0/12.2 | 13.7/11.9 | E1 | Alternative E1 would increase the distance between the KOP and nearest WTG (lighting) by approximately 1 mile though a greater reduction of WTG lighting when viewed from center to right of center of the KOP would be reduced along the horizon. WTG lighting would continue to be visible center and left of center of the KOP. | Moderate |
| MV09 | Gay Head Lighthouse | High | 13.9/12.1 | 15.0/13.0 | 13.9/12.1 | 14.1/12.3 | 13.9/12.1 | E1 | Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 2 miles. Though a greater reduction of WTGs when viewed from left of center of the KOP would be reduced to the far horizon (approximately 16–20 miles). WTGs would continue to be visible right of center KOP to include the OSS. | Moderate |
| MV10 | South Beach State Park | High | 22.0/19.1 | 22.0/19.1 | 25.3/22.0 | 22.0/19.1 | 28.6/24.9 | E1 and E2 | WTGs along eastern portion of Lease Area would remain for both Alternatives as compared to the Proposed Action with no visible change. | Moderate |
| MV11 | Wasque Point | Low | 24.8/21.5 | 24.8/21.5 | 28.5/24.8 | 24.8/21.5 | 32.1/28.0 | E1 and E2 | WTGs along eastern portion of Lease Area would remain for both Alternatives as compared to the Proposed Action with no visible change. | Minor |
| MV12 | Peaked Hill Reservation | Medium | 16.3/14.2 | 16.3/14.2 | 17.3/15.1 | 16.3/14.2 | 18.7/16.2 | E1 | Alternative E1 would increase the distance (approximately 10 miles) between the KOP and turbines at the far right of center of the KOP along the horizon. WTGs would continue to be visible center and left of center of the KOP, similar to the Proposed Action. | Moderate |
| MV12 | Peaked Hill Reservation – Sunset | High | 16.3/14.2 | 16.3/14.2 | 17.3/15.1 | 16.3/14.2 | 18.7/16.2 | E1 | Alternative E1 would increase the distance (approximately 10 miles) between the KOP and turbines at the far right of center of the KOP along the horizon. WTGs would continue to be visible center and left of center of the KOP, similar to the Proposed Action where backlighting creates contrast. | Major |
| MV13 | Edwin DeVries Vanderhoop Homestead | Medium | 13.8/12.0 | 14.8/12.9 | 13.8/12.0 | 14.0/12.1 | 13.8/12.0 | E1 | Alternative E1 would increase the distance (approximately 20 miles) between the KOP and turbines at the far right of center of the KOP, though topography blocks right of KOP views. WTGs would continue to be visible center and left of center of the KOP, similar to the Proposed Action. | Major |
| NI10 | Madaket Beach | Medium | 34.6/30.0 | 34.6/30.0 | 39.7/34.5 | 34.6/30.0 | 45.0/39.0 | E1 and E2 | Alternatives E1 and E2 would have similar views of WTGs along the far horizon, with turbine blade tips visible within a narrow view, during clear viewing conditions. Due to distance, WTGs would be predominately obscured. | Minor |
| NL01 | Nomans Land Island NWR *(not occupied)* | Low | 8.7/7.5 | 8.7/7.5 | 9.0/7.8 | 8.7/7.5 | 12.1/10.5 | E1 | Alternative E1 would increase the distance (approximately 16 to 19 miles) between the KOP and turbines at the far right of center of the KOP. WTGs would continue to be visible center and left of center of the KOP, similar to the Proposed Action. | Moderate |

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Proposed Action | Distance to Nearest Turbine miles/nautical miles) Alternative E1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E1 | Distance to Nearest Turbine (miles/nautical miles) Alternative E2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E2 | Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|
| NL01 | Nomans Land Island NWR – Sunset *(not occupied)* | Medium | 8.7/7.5 | 8.7/7.6 | 9.0/7.8 | 8.7/7.5 | 12.1/10.5 | E1 | Alternative E1 would increase the distance (approximately 16 to 19 miles) between the KOP and turbines at the far right of center of the KOP. WTGs would continue to be visible center and left of center of the KOP, similar to the Proposed Action. | Major |
| RI06 | Trustom Pond NWR | Medium | 22.6/19.6 | 22.6/19.6 | 23.8/20.7 | 23.5/20.4 | 22.6/19.6 | E2 | The reduction of WTGs would remove visibility of the WTGs along the horizon within the Lease Area. an occasional blade tip may be perceivable but not an influencing factor in overall impact. | Negligible |
| RI08 | Scarborough Beach State Park | Medium | 19.1/16.6 | 19.1/16.6 | 19.3/16.7 | 20.2/17.5 | 19.1/16.6 | E2 | E2 would have slightly less impacts as compared to E1. The reduction of WTGs in close proximity of the KOP would not decrease visibility of the WTGs along the horizon. WTG reduction would be localized to the far left of center of the KOP, with the majority of the WTGs remaining within the center of view. | Moderate |
| RI09 | Narragansett Beach | Medium | 20.0/17.4 | 20.7/18.0 | 20.0/17.4 | 22.3/19.4 | 20.0/17.4 | E2 | Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 2 miles. WTG reduction would be localized to the center of the KOP, with the majority of the WTGs remaining to the right of center of the KOP. | Moderate |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS8a. Seascape Landscape Impact Assessment for Alternative E (Viewshed Alternative) – Character Areas

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative E1<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative E2<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|
| Shoreline Beach | SCA | AI06, MV02, MV10, MV11, NI10, RI08, RI09 | 35.3/2.4 | 32.7/2.2 | 33.5/2.3 | Alternative E1 would have negligible reduction in visible acres across all SCAs and LCAs (approximately 2.6 square miles) as compared to the Proposed Action.<br>The importance of SCAs for recreation and other uses along with residential areas of LCAs in close proximity of SCAs where ocean views dominate or are of high value, influence the overall impact level associated with the Project and associated alternatives. | SCA – Moderate |
| Coastal Bluff | SCA | BI04, BI12, C01, MV07, MV13, NL01 | | | | | |
| Developed Waterfront | SCA | N/A | | | | | |
| Shoreline Residential | SCA | AI03, RI01 | | | | | |
| Coastal Dunes | SCA | BI13, MV03, MV05 | | | | | |
| Salt Pond/ Tidal Marsh | SCA/LCA | RI06 | | | | | SCA/LCA – Moderate |
| Inland Lakes and Ponds | SCA/LCA | N/A | | | | | |
| Maintained Recreation Area | SCA/LCA | AI01, AI03, BI04, C01, LI04, MM04, MV09, RI01 | | | | | |
| Highway Transportation | SCA/LCA | N/A | | | | | |
| Coastal Scrub/ Shrub Forest | LCA | AI05, AI07, CI01, MM01, | | | | | LCA – Minor |
| Agricultural/ Open Field | LCA | N/A | | | | | |
| Forest | LCA | MV12 | | | | | |
| Rural Residential | LCA | N/A | | | | | |
| Suburban Residential | LCA | N/A | | | | | |

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative E1<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative E2<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|
| Village/ Town Center | LCA | N/A | | | | | |
| Commercial | LCA | N/A | | | | | |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS8b. Seascape Landscape Impact Assessment for Alternative E (Viewshed Alternative) – Ocean Character Areas

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B – Proposed Action<br><br>Total Ocean area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative E1<br><br>Total Ocean area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative E2<br><br>Total Ocean area within Analysis Area: 6,113.4 Square Miles | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|
| Open Ocean | OCA | N/A | 5,882.2/96.2<br><br>Maximum ocean visibility as compared to all alternatives | See Alternative B | See Alternative B | Intact open ocean setting, in immediate proximity of Project components for duration of Project. | Major |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS8c. Seascape Landscape Impact Assessment for Alternative E (Viewshed Alternative) – Specially Designated Areas

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Proposed Action (Alternative B) | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative E1 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative E2 | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|
| Historic Sites and National Landmarks | 12,308.0 | AI01, AI03, BI04, BI12, BI13, C01, C02, BI13, MM04, MV07, MV09, MV13, RI01 | 1,222.8/9.9 | 1,103.3/9.0 | 1,121.7/9.1 | Alternative E1 would have negligible reduction in visible acres across all SDAs as compared to the Proposed Action and overall impacts would remain similar. | Major |
| National Natural Landmarks | 349.7 | MV07 | 255.5/73.1 | 252.1/72.2 | 252.7/72.3 | | Moderate |
| State Scenic Areas | 105,777.6 | BI12, CI01, MV07 | 18,205.6/17.2 | 17,359.2/ 16.4 | 17,528.0/16.5 | | Major |
| National Wildlife Refuges | 15,176.1 | AI05, NL01, RI06 | 767.7/5.1 | 737.6/4.9 | 734.3/4.8 | | Minor |
| State/ Non-Profit Wildlife Management Areas | 31,967.8 | AI07 | 131.4/.4 | 123.7/.4 | 114.1/.4 | | Minor |
| National Parks | 31.2 | N/A | .2/.7 | 0.2/.7 | 0.2/.7 | | Negligible |
| State Parks | 10,473.8 | AI01, LI04, MV10, RI08 | 27,31.7/26.1 | 2,638/25.2 | 2,699.8/25.8 | | Moderate |
| State Nature and Historic Preserves | 248.4 | N/A | 3.1/1.2 | 2.6/1.0 | 2.4/1.0 | | Negligible |
| State Forests | 5,301.6 | N/A | 7.8/.2 | 7.7/.1 | 7.7/.1 | | Negligible |

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Proposed Action (Alternative B) | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative E1 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative E2 | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|
| State Beaches | 165.1 | N/A | 78.2/ 47.4 | 75.1/45.5 | 74.3/45.0 | | Moderate |
| Highways Designated or Eligible as Scenic | 411.6 | N/A | 43.4/10.5 | 39.7/9.7 | 39.3/9.6 | | Moderate |
| National Historic Trails | 990.1 | N/A | .8/.1 | .7 /.1 | .5/.04 | | Minor |
| National Recreation Trails | 88.6 | AI03 | 65.1/73.4 | 64.8/73.2 | 64.9/73.2 | | Major |
| State Fishing and Boating Access Sites | 371.4 | N/A | 78.4/21.1 | 74.5/20.1 | 74.8/20.2 | | Moderate |
| Lighthouses | 23.0 | BI04, C01, MM04, MV09, RI01 | 6.6/28.7 | 6.5/28.3 | 6.5/28.3 | | Major |
| Public Beaches | 4,221.0 | AI06, MM01, MV02, MV03, MV05, MV11, NI10, RI09 | 11,38.8/27.0 | 1,053/25.0 | 1,109.2/26.3 | | Moderate |
| Ferry Routes | 10,641.7 | N/A | 6,365.0/59.8 | 6363.8/59.8 | 6,363.0/59.8 | | Moderate |
| Seaports | 90.1 | N/A | 2.3/2.5 | 2.2/2.5 | 2.3/2.5 | | Negligible |
| Other State Land with Public Access | 9,361.8 | N/A | 325.3/3.5 | 282.1/3.0 | 309.2/3.3 | | Negligible |
| **Total Acres For Comparison** | **208,009** | | **30,208.0/14.5** | **29,084.8/14.0** | **29,384.5/14.1** | – | – |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS9. Visual Impact Assessment Impacts Matrix – Alternative G (Preferred Alternative)

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Alternative B (Proposed Action) | Distance to Nearest Turbine miles/nautical miles) Alternative G (Preferred Alternative) | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G (Preferred Alternative) | Distance to Nearest Turbine miles/nautical miles) Alternative G1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G1 | Distance to Nearest Turbine (miles/nautical miles) Alternative G2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G2 | Distance to Nearest Turbine (miles/nautical miles) Alternative G3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G3 | Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AI01 | Brenton Point State Park | Medium | 16.7/14.5 | 17.6/15.3 | 16.7/14.5 | 18.1/15.8 | 16.7/14.5 | 18.6/16.2 | 16.7/14.5 | 18.1/15.8 | 16.7/14.5 | G2 | Alternative G2 would increase the distance between the KOP and nearest WTGs by approximately 2 miles which removes the first three-plus rows of visible WTGs along the horizon. WTGs would be visible from center to right field of view, though appear small in scale as those in closer proximity to the KOP are removed | Moderate |
| AI01 | Brenton Point State Park – Night | High | 16.7/14.5 | 17.6/15.3 | 16.7/14.5 | 18.1/15.8 | 16.7/14.5 | 18.6/16.2 | 16.7/14.5 | 18.1/15.8 | 16.7/14.5 | G2 | Alternative G2 would increase the distance between the KOP and nearest WTGs by approximately 2 miles which removes the first three-plus rows of visible WTGs along the horizon. WTGs would be visible from center to right field of view, though appear small in scale as those in closer proximity to the KOP are removed. When viewed at night, warning lights will be visible along horizon where nighttime lighting does not currently exist. | Moderate |
| AI03 | Newport Cliff Walk | High | 15.3/13.3 | 16.2/14.1 | 15.3/13.3 | 17.1/14.9 | 15.3/13.3 | 17.8/15.5 | 15.3/13.3 | 17.1/14.9 | 15.3/13.3 | G2 | Alternative G2 would increase the distance between the KOP and nearest WTGs by approximately 2.5 miles which removes the first three-plus rows of visible WTGs along the horizon. WTGs would be visible from center to right field of view, though appear small in scale as those in closer proximity to the KOP are removed | Moderate |

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Alternative B (Proposed Action) | Distance to Nearest Turbine miles/nautical miles) Alternative G (Preferred Alternative) | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G (Preferred Alternative) | Distance to Nearest Turbine miles/nautical miles) Alternative G1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G1 | Distance to Nearest Turbine (miles/nautical miles) Alternative G2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G2 | Distance to Nearest Turbine (miles/nautical miles) Alternative G3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G3 | Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AI05 | Sachuest Point National Wildlife Refuge | High | 14.8/12.9 | 15.9/13.8 | 14.8/12.9 | 17.5/15.2 | 14.8/12.9 | 18.1/15.7 | 14.8/12.9 | 17.5/15.2 | 14.8/12.9 | G2 | Alternative G2 would increase the distance between the KOP and nearest WTGs by approximately 3.3 miles which removes the first three-plus rows of visible WTGs along the horizon. WTGs would be visible from center to right field of view, though appear small in scale as those in closer proximity to the KOP are removed | Moderate |
| AI06 | Sachuest Beach (Second Beach) | Medium | 16.0/13.9 | 17.1/14.8 | 16.0/13.9 | 18.6/16.2 | 16.0/14.0 | 19.2/16.7 | 16.0/13.9 | 18.6/16.2 | 16.0/13.9 | G2 | Alternative G2 would increase the distance between the KOP and nearest WTGs by approximately 3.3 miles which removes the first three-plus rows of visible WTGs along the horizon. WTGs would be visible from center to right field of view, though appear small in scale. | Minor |
| AI07 | Hanging Rock (Norman Bird Sanctuary) | High | 16.2/14.1 | 17.3/15.1 | 16.2/14.1 | 18.9/16.4 | 16.2/14.1 | 19.5/16.9 | 16.2/14.1 | 18.9/16.4 | 16.2/14.1 | G2 | Alternative G2 would increase the distance between the KOP and nearest WTGs by approximately 3.3 miles which removes the first three-plus rows of visible WTGs along the horizon. WTGs would be visible from center to right field of view, though appear small in scale as those in closer proximity to the KOP are removed. | Moderate |
| BI04 | Southeast Lighthouse | High | 15.3/13.4 | 15.3/13.3 | 15.5/13.3 | 15.3/13.3 | 15.5/13.4 | 15.3/13.3 | 15.5/13.4 | 15.3/13.3 | 15.5/13.4 | G, G1, G2, and G3 | For all alternatives the nearest WTG at 15.3 miles would remain and WTGs to the left of view would remain, similar to the Proposed Action. Turbines visible to the right of view at approximate 15.5 miles would be removed. | Moderate |
| BI04 | Southeast Lighthouse – Night | High | 15.3/13.4 | 15.3/13.3 | 15.5/13.3 | 15.3/13.3 | 15.5/13.4 | 15.3/13.3 | 15.5/13.4 | 15.3/13.3 | 15.5/13.4 | G, G1, G2, and G3 | For all alternatives the nearest WTG at 15.3 miles would remain and WTGs to the left of view would remain, similar to the Proposed Action. Turbines visible to the right of view at approximate 15.5 miles would be removed. When viewed at night, warning lights will continue be visible along horizon similar to the Proposed Action where nighttime lighting does not currently exist. | Major |
| BI12 | Clayhead Trail | High | 15.9/13.8 | 15.9/13.8 | 16.7/14.5 | 15.9/13.8 | 16.7/14.5 | 15.9/13.8 | 16.7/14.5 | 15.9/13.8 | 16.7/14.5 | G2 | Alternative G2 would maintain nearest WTG at 15.9 miles and WTG massing would remain in the center of view, similar to the Proposed Action. WTGs to the far left and far right of view would be removed. | Moderate |
| BI13 | North Light | High | 17.2/15.0 | 17.2/15.0 | 18.0/15.7 | 17.2/15.0 | 18.0/15.7 | 17.2/15.0 | 18.0/15.7 | 17.2/15.0 | 18.0/15.7 | G2 | Alternative G2 would maintain nearest WTG at 17.2 miles and WTGs would remain to the center of view, similar to the Proposed Action. Turbines visible to the far left of view would be removed reducing the overall horizontal field of view though a massing of WTGs would remain in the center view of the KOP. | Moderate |
| CI01 | Cuttyhunk Island | High | 13.9/12.1 | 13.9/12.1 | 14.2/12.4 | 14.9/12.9 | 13.9/12.1 | 14.9/13.0 | 13.9/12.1 | 15.9/13.8 | 13.9/12.1 | G3 | Alternative G3 would increase the distance of the nearest WTG approximately 2 miles. The overall field of view would be occupied similar to the Proposed Action though the horizon to the left of view would have areas with reduced densities of WTGs. | Moderate |
| C01 | Beavertail Lighthouse | Medium | 18.4/15.9 | 19.1/16.6 | 18.4/15.9 | 19.4/16.9 | 18.4/15.9 | 19.7/17.1 | 18.4/15.9 | 19.4/16.9 | 18.4/15.9 | G2 | Alternative G2 would increase the distance of the nearest WTG approximately 1.3 miles and WTG massing would remain in the center of view, similar to the Proposed Action. WTGs to the left of center view and far right of view would be removed. | Minor |

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Alternative B (Proposed Action) | Distance to Nearest Turbine miles/nautical miles) Alternative G (Preferred Alternative) | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G (Preferred Alternative) | Distance to Nearest Turbine miles/nautical miles) Alternative G1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G1 | Distance to Nearest Turbine (miles/nautical miles) Alternative G2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G2 | Distance to Nearest Turbine (miles/nautical miles) Alternative G3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G3 | Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LI04 | Montauk Point State Park | Medium | 31.5/27.4 | 31.9/27.7 | 31.5/27.4 | 31.9/27.7 | 31.5/27.4 | 31.7/27.7 | 31.5/27.4 | 31.9/27.7 | 31.5/27.4 | G1, G2, and G3 | Alternatives G1, G2, and G3 would not be perceivable along horizon due to distance (over 30 miles) and atmospheric influences. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting. | Negligible |
| LI04 | Montauk Point State Park – Night | High | 31.5/27.4 | 31.9/27.7 | 31.5/27.4 | 31.9/27.7 | 31.5/27.4 | 31.5/27.4 | 31.5/27.4 | 31.9/27.4 | 31.5/27.4 | G1 and G3 | The addition of aviation warning lights along the horizon within the viewshed would be perceivable by the focused viewer, but not a dominant element as compared to other existing warning lighting sources associated with BIWF that are in closer proximity (approximately 16 miles). WTGs removed from the center of view further reduces the massing of aviation warning lighting in proximity of the KOP. | Negligible |
| MM01 | Gooseberry Island | Medium | 15.1/13.2 | 16.3/14.1 | 15.1/13.2 | 17.8/15.5 | 15.1/13.2 | 17.8/15.5 | 15.1/13.2 | 18.2/15.8 | 15.1/13.2 | G3 | Alternative G3 would increase the distance between the KOP and nearest WTG by approximately 3 miles though WTGs would remain visible and clustered along the horizon within the viewshed. | Moderate |
| MM04 | Nobska Lighthouse | Medium | 28.2/24.5 | 28.2/24.5 | 28.8/25.0 | 28.2/24.5 | 28.3/24.6 | 28.2/24.5 | 28.3/24.6 | 28.2/24.5 | 28.3/24.6 | G3 | Alternative G3 would increase the distance between the KOP and nearest WTGs to a distance that would not be perceivable along horizon due to distance, intervening landforms and atmospheric influences or remove WTGs that are framed by landforms. | Negligible |
| MV02 | Philbin Beach | High | 13.6/11.8 | 13.8/12.0 | 13.6/11.8 | 14.2/12.3 | 13.6/11.8 | 14.2/12.3 | 13.6/11.8 | 14.2/12.3 | 13.6/11.8 | G3 | Alternative G3 would increase the distance of the nearest WTG approximately 0.5 mile and WTG massing would remain in the center of view, similar to the Proposed Action. WTGs to the left of center view and far right of view would be removed. | Moderate |
| MV03 | Lucy Vincent Beach | High | 15.5/13.5 | 15.5/13.5 | 16.9/14.7 | 15.5/13.5 | 16.9/14.7 | 15.5/13.5 | 16.9/14.7 | 15.5/13.5 | 16.9/14.7 | G3 | Alternative G3 would increase the distance between the KOP and WTGs within the center of view in relation to Nomans Land Island along the horizon. WTGs would continue to be visible left of center of the KOP, similar to the Proposed Action. Intervening landforms would continue to obscure views of WTGs to the right field of view. | Moderate |
| MV03 | Lucy Vincent Beach – Sunset | Medium | 15.5/13.5 | 15.5/13.5 | 16.9/14.7 | 15.5/13.5 | 16.9/14.7 | 15.5/13.5 | 16.9/14.7 | 15.5/13.5 | 16.9/14.7 | G3 | Alternative G3 would increase the distance between the KOP within the center of view in relation of Nomans Land Island along the horizon. WTGs would continue to be visible left of center of the KOP, similar to the Proposed Action. Intervening landforms would continue to obscure views of WTGs to the right field of view. | Moderate |
| MV05 | Moshup Beach | High | 13.7/12.0 | 13.7/12.0 | 13.7/12.0 | 14.3/12.4 | 13.7/12.0 | 14.3/12.4 | 13.7/12.0 | 14.3/12.5 | 13.7/12.0 | G3 | Alternative G3 would increase the distance of the nearest WTGs within the right of center field of view. Though WTGs would continue to be visible within the full field of view similar to the Proposed Action. | Major |
| MV05 | Moshup Beach – Sunset | High | 13.7/12.0 | 13.7/12.0 | 13.7/12.0 | 14.3/12.4 | 13.7/12.0 | 14.3/12.4 | 13.7/12.0 | 14.3/12.5 | 13.7/12.0 | G3 | Alternative G3 would increase the distance of the nearest WTGs within the right of center field of view. Though WTGs would continue to be visible within the full field of view similar to the Proposed Action. | Major |

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Alternative B (Proposed Action) | Distance to Nearest Turbine miles/nautical miles) Alternative G (Preferred Alternative) | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G (Preferred Alternative) | Distance to Nearest Turbine miles/nautical miles) Alternative G1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G1 | Distance to Nearest Turbine (miles/nautical miles) Alternative G2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G2 | Distance to Nearest Turbine (miles/nautical miles) Alternative G3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G3 | Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MV07 | Aquinnah Overlook | High | 13.7/12.0 | 13.7/12.0 | 14.0/12.2 | 14.3/12.5 | 13.7/12.0 | 14.3/12.5 | 13.7/12.0 | 14.6/12.7 | 13.7/12.0 | G3 | Alternative G3 would increase the distance of the nearest WTGs within the right of center field of view. Though WTGs would continue to be visible within the full field of view similar to the Proposed Action. | Major |
| MV07 | Aquinnah Overlook – Sunset | High | 13.7/12.0 | 13.7/12.0 | 14.0/12.2 | 14.3/12.5 | 13.7/12.0 | 14.3/12.5 | 13.7/12.0 | 14.6/12.7 | 13.7/12.0 | G3 | Alternative G3 would increase the distance of the nearest WTGs within the right of center field of view. Though WTGs would continue to be visible within the full field of view similar to the Proposed Action. | Major |
| MV09 | Gay Head Lighthouse | High | 13.9/12.1 | 13.9/12.1 | 14.2/12.3 | 14.5/12.6 | 13.9/12.1 | 14.5/12.6 | 13.9/12.1 | 14.7/12.8 | 13.9/12.1 | G3 | Alternative G3 would increase the distance of the nearest WTGs within the right of center field of view. Though WTGs would continue to be visible within the full field of view similar to the Proposed Action and the OSSs would continue to be prominent on the horizon. | Major |
| MV10 | South Beach State Park | High | 22.0/19.1 | 22.0/19.1 | 25.3/22.0 | 22.0/19.1 | 25.3/22.0 | 22.0/19.1 | 25.3/22.0 | 22.0/19.1 | 25.3/22.0 | G1, G2, and G3 | Alternatives G1, G2, and G3 would remove a portion of the WTGs visible in the center of view to the left of Nomans Land Island. The remaining WTGs visible within the Lease Area would be partially obscured (towers) with hubs and blades still visible continue to draw the viewers eye to the left of view due to movement. | Moderate |
| MV11 | Wasque Point | Low | 24.8/21.5 | 24.8/21.5 | 28.5/24.8 | 24.8/21.5 | 28.5/24.8 | 24.8/21.6 | 28.5/24.8 | 24.8/21.6 | 28.5/24.8 | G1, G2, and G3 | Alternatives G1, G2, and G3 would remove the majority of the WTGs visible in the center of view along the horizon where WTG blade movement would be noticeable. The remaining WTGs visible along the horizon would be partially obscured (towers) with hubs and blades still visible to the left field of view. | Minor |
| MV12 | Peaked Hill Reservation | High | 16.3/14.2 | 16.3/14.2 | 17.3/15.1 | 16.3/14.2 | 17.3/15.1 | 16.4/14.2 | 17.3/15.1 | 16.4/14.2 | 17.3/15.1 | G3 | Alternative G3 would maintain nearest WTGs located to the left field of view at approximately 16.4 miles. WTG massing would be similar to the Proposed Action in relation to the OSSs within the center of view. Six WTGs would be removed from the far-right field of view. | Major |
| MV12 | Peaked Hill Reservation – Sunset | High | 16.3/14.2 | 16.3/14.2 | 17.3/15.1 | 16.3/14.2 | 17.3/15.1 | 16.2/21.6 | 17.3/15.1 | 16.4/14.2 | 17.3/15.1 | G3 | Alternative G3 would maintain nearest WTGs located to the left field of view at approximately 16.4 miles. WTG massing would be similar to the Proposed Action in relation to the OSSs within the center of view. Six WTGs would be removed from the far-right field of view. | Major |
| MV13 | Edwin DeVries Vanderhoop Homestead | Medium | 13.8/12.0 | 13.8/12.0 | 14.0/12.1 | 14.4/12.5 | 13.8/12.0 | 14.4/12.5 | 13.8/12.0 | 14.5/12.6 | 13.8/12.0 | G3 | Alternative G3 would maintain nearest WTGs located to the left and center fields of view, similar to the Proposed Action. Landform obstructions would continue to obscure the right field of view. | Major |
| NI10 | Madaket Beach | Medium | 34.6/30.0 | 34.6/30.1 | 39.7/34.5 | 34.6/30.1 | 39.0/33.9 | 34.6/30.1 | 39.0/33.9 | 34.6/30.1 | 39.0/33.9 | G, G1, G2, and G3 | Alternatives G, G1, G2, and G3 would maintain nearest WTGs located to the left and center fields of view, similar to the Proposed Action. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting. | Negligible |
| NL01 | Normans Land Island NWR *(not occupied)* | Medium | 8.7/7.6 | 8.7/7.5 | 9.0/7.8 | 8.7/7.5 | 9.0/7.8 | 8.7/7.5 | 9.0/7.8 | 8.7/7.5 | 9.0/7.8 | G3 | Alternative G3 would maintain nearest WTGs to the far-left field of view at approximately 8.7 miles. Although WTGs are removed within the center of the Lease Area, the massing of WTGs and visibility of the OSSs on the horizon would be prominent. | Major |

| KOP Number | KOP Name | SLVIA Sensitivity Rating (high, medium, low) | Distance to Nearest Turbine (miles/nautical miles) Alternative B (Proposed Action) | Distance to Nearest Turbine miles/nautical miles) Alternative G (Preferred Alternative) | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G (Preferred Alternative) | Distance to Nearest Turbine (miles/nautical miles) Alternative G1 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G1 | Distance to Nearest Turbine (miles/nautical miles) Alternative G2 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G2 | Distance to Nearest Turbine (miles/nautical miles) Alternative G3 | Distance to Nearest Turbine Removed (miles/nautical miles) Alternative G3 | Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action | VIA Overall Impact Level Rationale | VIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NL01 | Nomans Land Island NWR – Sunset *(not occupied* | Medium | 8.7/7.6 | 8.7/7.5 | 9.0/7.8 | 8.7/7.5 | 9.0/7.8 | 8.7/7.5 | 9.0/7.8 | 8.7/7.5 | 9.0/7.8 | G3 | Alternative G3 would maintain nearest WTGs to the far-left field of view at approximately 8.7 miles. Although WTGs are removed within the center of the Lease Area, the massing of WTGs and visibility of the OSSs on the horizon would be prominent. | Major |
| RI01 | Watch Hill Lighthouse | Medium | 32.8/28.5 | 32.8/28.5 | 33.7/29.2 | 32.8/28.5 | 33.7/29.3 | 32.8/28.5 | 33.7/29.3 | 32.8/28.5 | 33.7/29.3 | G1, G2, and G3 | Alternatives G, G1, G2, and G3 would maintain nearest WTGs located in the center field of view similar to the Proposed Action. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting. | Negligible |
| RI06 | Trustom Pond NWR | Medium | 22.6/19.6 | 22.6/19.6 | 24.2/21.0 | 22.6/19.6 | 24.2/21.0 | 22.6/19.6 | 23.8/20.7 | 22.6/19.6 | 24.2/21.0 | G2 | Alternative G2 would maintain nearest WTGs located in the center field of view similar to the Proposed Action. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting. | Negligible |
| RI08 | Scarborough Beach State Park | Medium | 19.1/16.6 | 19.1/16.6 | 19.4/16.9 | 19.1/16.6 | 19.4/16.9 | 19.1/16.6 | 19.3/16.7 | 19.1/16.6 | 19.4/16.9 | G2 | Alternative G2 would maintain nearest WTGs located in the center field of view similar to the Proposed Action. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting though WTGs would appear small on the horizon. | Minor |
| RI09 | Narragansett Beach | Medium | 20.0/17.4 | 20.6/17.9 | 20.0/17.4 | 20.6/17.9 | 20.0/17.4 | 20.7/18.0 | 20.0/17.4 | 20.6/17.9 | 20.0/17.4 | G2 | Alternative G2 would maintain WTGs located in the center field of view similar to the Proposed Action. WTGs to the far-left field of view (approximately 20 miles) would be removed. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting though WTGs would appear small on the horizon. | Moderate |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS10a. Seascape Landscape Impact Assessment for Alternative G (Preferred Alternative) – Character Areas

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B (Proposed Action)<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G (Preferred Alternative)<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G1<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G2<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G3<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|
| Shoreline Beach | SCA | AI06, MV02, MV10, MV11, NI10, RI08, RI09 | 35.3/2.4 | 34.5/2.3 | 33.7/2.3 | 33.5/2.3 | 33.4/2.2 | Alternatives G, G1, G2, and G3 would have minor reduction in visible acres across all SCAs and LCAs | SCA – Moderate |

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B (Proposed Action)<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G (Preferred Alternative)<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G1<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G2<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G3<br><br>Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|
| Coastal Bluff | SCA | BI04, BI12, C01, MV07, MV13, NL01 | | | | | | (approximately 1.1 to 1.9 square miles) as compared to the Proposed Action.<br><br>The importance of SCAs for recreation and other uses along with residential areas of LCAs in proximity of SCAs where ocean views dominate or are of high value, influence the overall impact level associated with the Project and associated alternatives. | |
| Developed Waterfront | SCA | N/A | | | | | | | |
| Shoreline Residential | SCA | AI03, RI01 | | | | | | | |
| Coastal Dunes | SCA | BI13, MV03, MV05 | | | | | | | |
| Salt Pond/ Tidal Marsh | SCA/LCA | RI06 | | | | | | | SCA/LCA – Moderate |
| Inland Lakes and Ponds | SCA/LCA | N/A | | | | | | | |
| Maintained Recreation Area | SCA/LCA | AI01, AI03, BI04, C01, LI04, MM04, MV09, RI01 | | | | | | | |
| Highway Transportation | LCA | N/A | | | | | | | LCA – Minor |
| Coastal Scrub/ Shrub Forest | LCA | AI05, AI07, CI01, MM01, | | | | | | | |
| Agricultural/ Open Field | LCA | N/A | | | | | | | |
| Forest | LCA | MV12 | | | | | | | |
| Rural Residential | LCA | N/A | | | | | | | |
| Suburban Residential | LCA | N/A | | | | | | | |
| Village/ Town Center | LCA | N/A | | | | | | | |
| Commercial | LCA | N/A | | | | | | | |

**Table G-VIS10b. Seascape Landscape Impact Assessment for Alternative G (Preferred Alternative) – Ocean Character Areas**

| Character Area Name | Character Area Association (SCA/LCA/OCA) | Key Observation Points with Simulations | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B (Proposed Action)<br><br>Total Ocean area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G (Preferred Alternative)<br><br>Total Ocean area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G1<br><br>Total Ocean area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G2<br><br>Total Ocean area within Analysis Area: 6,113.4 Square Miles | Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative G3<br><br>Total Ocean area within Analysis Area: 6,113.4 Square Miles | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|
| Open Ocean | OCA | N/A | 5,882.2/96.2<br><br>Maximum Ocean visibility as compared to all alternatives | See Alternative B | See Alternative B | See Alternative B | See Alternative B | Intact open ocean setting, in immediate proximity of Project components for duration of Project. | Major |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS10c. Seascape Landscape Impact Assessment for Alternative G (Preferred Alternative) – Specially Designated Areas

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative B (Proposed Action) | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative G (Preferred Alternative) | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative G1 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative G2 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative G3 | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|
| Historic Sites and National Landmarks | 12,308.0 | AI01, AI03, BI04, BI12, BI13, C01, C02, BI13, MM04, MV07, MV09, MV13, RI01 | 1,222.8/9.9 | 1,167.9/9.4 | 1,122.1/9.9 | 1,114.6/9.1 | 1,118.8/9.1 | Alternatives G, G1, G2, and G3 would have a minor reduction in visible acres across all SDAs as compared to the Proposed Action,G-291hough overall impacts would remain similar.<br><br>The combination of alternatives reduces a greater area of visibility resulting from the reduction of turbines along the eastern and northwestern portions of the Lease Area. | Major |
| National Natural Landmarks | 349.7 | MV07 | 255.5/73.1 | 254.6/72.8 | 252.2/72.2 | 251.8/71.9 | 252.2/72.2 | | Moderate |
| State Scenic Areas | 105,777.6 | BI12, CI01, MV07 | 18,205.6/17.2 | 17,876.9/16.9 | 17,591.3/16.6 | 17,502.6/16.5 | 17,550.2/16.5 | | Major |
| National Wildlife Refuges | 15,176.1 | AI05, NL01, RI06 | 767.7/5.1 | 745.4/4.9 | 732.0/4.8 | 728.3/4.8 | 730.5/4.8 | | Minor |
| State/ Non-Profit Wildlife Management Areas | 31,967.8 | AI07 | 131.4/.4 | 114.8/.4 | 111.4/.3 | 109.5/.3 | 111.2/.3 | | Minor |
| National Parks | 31.2 | N/A | .2/.7 | .2/.6 | .2/.6 | .2/.6 | .2/.6 | | Negligible |
| State Parks | 10,473.8 | AI01, LI04, MV10, RI08 | 2,731.7/26.1 | 2702.0/25.8 | 2686.4/25.6 | 2684.0/25.6 | 2682.3/25.6 | | Moderate |
| State Nature and Historic Preserves | 248.4 | N/A | 3.1/1.2 | 3.1/1.2 | 3.1/1.2 | 3.1/1.2 | 3.1/1.2 | | Negligible |
| State Forests | 5,301.6 | N/A | 7.8/.2 | 7.8/.2 | 7.7/.1 | 7.7/.1 | 7.7/.1 | | Negligible |
| State Beaches | 165.1 | N/A | 78.2/ 47.4 | 75.1/45.5 | 74.1/44.9 | 73.2/44.2 | 74.0/44.8 | | Moderate |
| Highways Designated or Eligible as Scenic | 411.6 | N/A | 43.4/10.5 | 40.2/9.7 | 39.3/9.5 | 39.1/9.5 | 39.0/9.5 | | Moderate |
| National Historic Trails | 990.1 | N/A | .8/.1 | .5/.1 | .5/.1 | .5/.1 | .5/.1 | | Minor |
| National Recreation Trails | 88.6 | AI03 | 65.1/73.4 | 65.0/73.3 | 64.9/73.1 | 64.9/73.1 | 64.9/73.1 | | Major |

| Specially Designated Areas | Specially Designated Area Total Acres | Key Observation Points with Simulations | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative B (Proposed Action) | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative G (Preferred Alternative) | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative G1 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative G2 | Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative G3 | SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action | SLIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|
| State Fishing and Boating Access Sites | 371.4 | N/A | 78.4/21.1 | 76.1/20.5 | 75.2/20.3 | 75.1/19.1 | 75.0/20.2 | | Moderate |
| Lighthouses | 23.0 | BI04, C01, MM04, MV09, RI01 | 6.6/28.7 | 6.6/28.7 | 6.5/28.3 | 6.5/28.3 | 6.5/28.3 | | Major |
| Public Beaches | 4,221.0 | AI06, MM01, MV02, MV03, MV05, MV11, NI10, RI09 | 11,38.8/27.0 | 1127.1/26.7 | 1117.6/26.5 | 1116.1/26.4 | 1096.5/26.0 | | Moderate |
| Ferry Routes | 10,641.7 | N/A | 6,365.0/59.8 | 6363.4/59.8 | 6363.0/59.8 | 6362.5/59.8 | 6363.0/59.8 | | Moderate |
| Seaports | 90.1 | N/A | 2.3/2.5 | 2.2/2.4 | 2.1/2.3 | 2.1/2.3 | 2.1/2.3 | | Negligible |
| Other State Land with Public Access | 9,381.8 | N/A | 325.3/3.5 | 310.9/3.3 | 307.1/3.3 | 305.9/3.3 | 306.2/3.3 | | Negligible |
| **Total Acres For Comparison** | **208,009** | | **31,430.0/15.1** | **30,941.2/14.9** | **30,557.9/14.7** | **30,449.0/14.6** | **30,477.2/14.7** | | **–** |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

### Table G-VIS11. Visual Impact Assessment Impacts Matrix for Cumulative Impacts

| KOP Number | KOP Name | Representative Character Area (SCA, LCA, OCA) | Viewing Direction | Elevation (feet) | Cumulative Simulation | Visibility Threshold | Distance to Nearest Turbine (miles/nautical miles) | Horizontal Field of View Occupied (Degrees) | Size or Scale Rationale | Size and Scale Rating (large, medium, small) | Lease Area within Viewshed in Addition to Proposed Action | Geographic Extent Rating (large, medium, small) | SLVIA Magnitude Rating Rationale | SLVIA Magnitude Rating (large, medium, small) | SLVIA Overall Impact Level Rationale | SLVIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BI04 | Southeast Lighthouse | SCA | East | 161.1 | Yes | VTL2 | 15.3/13.3 | 81 | Highly visible and likely to attract the attention of lighthouse visitors based on lighting conditions, although not as prominent as the existing BIWF. | Medium | OCS-A 0517 OCS-A 0487 | Medium | Visibility based on lighting conditions, existing BIWF visibility, duration. | **Medium** | Importance of recreation and historic resources, duration and visibility from KOP based on lighting conditions. | **Moderate** |
| BI04 | Southeast Lighthouse – Night | SCA | East | 161.1 | Yes | VTL 5 | 15.3/13.4 | 81 | The addition of the flashing warning lights on the WTGs and decks will add evidence of human development and increase visual clutter at the horizon. | Large | OCS-A 0517 OCS-A 0487 | Large | Visibility based on lighting conditions, existing BIWF visibility, duration. | **Large** | Importance of recreation and historic resources, duration and visibility from KOP based on lighting conditions. | **Major** |
| BI12 | Clayhead Trail | SCA | East | 78.8 | No | VTL1 | 15.9/13.8 | 75 | Visible and likely to attract attention resulting from angle of view of WTGs . | Medium | OCS-A 0517 OCS-A 0487 | Medium | Visibility of WTGs within viewshed along horizon line within viewshed. | **Medium** | Importance of preservation of scenic district and uses; proximity and visibility of Project. | **Moderate** |
| BI13 | North Light | SCA | East | 27.5 | No | VTL4 | 17.2/15.0 | 69 | Turbines become the focus of views out to the water and the tight spacing and numerous turbines along the horizon draw the viewers' eye away from natural features. | Large | OCS-A 0517 OCS-A 0487 | Large | Size and scale in relation to existing conditions along with percentage of visibility. | **Large** | Importance of recreation and historic resources; proximity of residential viewers, duration and visibility from KOP. | **Moderate** |

| KOP Number | KOP Name | Representative Character Area (SCA, LCA, OCA) | Viewing Direction | Elevation (feet) | Cumulative Simulation | Visibility Threshold | Distance to Nearest Turbine (miles/nautical miles) | Horizontal Field of View Occupied (Degrees) | Size or Scale Rationale | Size and Scale Rating (large, medium, small) | Lease Area within Viewshed in Addition to Proposed Action | Geographic Extent Rating (large, medium, small) | SLVIA Magnitude Rating Rationale | SLVIA Magnitude Rating (large, medium, small) | SLVIA Overall Impact Level Rationale | SLVIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LI04 | Montauk Point State Park | SCA/LCA | East | 48.0 | Yes | VTL1 | 31.5/27.4 | 59 | Due to distance and viewer position in relation to other features in the landscape, the right field of view would have some visibility of WTG blades associated with OCS-A 0487. | Small | OCS-A 0517<br>OCS-A 0487 | Large | Projects would become perceivable along horizon, though will be variable due to distance and atmospheric influences. | **Medium** | Project would not be perceivable along horizon due to distance and atmospheric influences. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting. | **Minor** |
| LI04 | Montauk Point State Park – Night | SCA/LCA | East | 48.0 | Yes | VTL2 | 31.5/27.4 | 59 | Due to distance and viewer position in relation to other features in the landscape, there would be a negligible change. | Small | OCS-A 0517<br>OCS-A 0487 | Small | Additional projects would not be perceivable along horizon if observer views were focused toward lighting. Light house illumination is most prominent. | **Small** | Additional lighting is negligible on horizon right of KOP viewshed. Lighthouse illumination is the focus. | **Negligible** |
| MV02 | Philbin Beach | SCA | South-Southwest to West-Southwest | 10.5 | No | VTL5 | 13.6/11.8 | 135 | Turbines are very visible on the horizon line and will dominate the view from the KOP. | Large | OCS-A 0487<br>OCS-A 0500 | Large | Additional WTGs visible to left of KOP at approximately same distance as eastern portion of Proposed Action. | **Large** | Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines within viewshed. | **Moderate** |
| MV03 | Lucy Vincent Beach | SCA | South-Southwest to Southwest | 27.7 | No | VTL 3 | 15.5/13.5 | 126 | More direct views of additional Lease Areas. Visible and likely to attract the attention resulting from angle of view of WTGs. | Medium | OCS-A 0487<br>OCS-A 0500 | Medium | Visibility of WTGs within viewshed along horizon line within viewshed, through further visibility is beyond horizon. | **Medium** | Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines. | **Moderate** |
| MV03 | Lucy Vincent Beach – Sunset | SCA | South-Southwest to Southwest | 27.7 | No | VTL 4 | 15.5/13.6 | 126 | WTGs appear dark gray against the light sky and the position of the sun serves as a focal point, drawing the viewer's eye toward part of the Project. | Large | OCS-A 0487<br>OCS-A 0500 | Medium | Visibility of backlit WTGs within viewshed along horizon line within viewshed. | **Large** | Scenic values; prominence of turbines- sunset backlighting of turbines along with movement influences prominence. | **Major** |
| MV05 | Moshup Beach | SCA | South-Southwest to West-Southwest | 23.1 | No | VTL 5 | 13.7/11.9 | 134 | With the proposed RWF in place, the nacelles and rotors from numerous WTGs and two OSSs will be visible from this KOP in the background along the horizon. | Large | OCS-A 0487<br>OCS-A 0500 | Large | Size and scale in relation to existing conditions along with percentage of visibility. | **Large** | Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines. | **Moderate** |
| MV05 | Moshup Beach – Sunset | SCA | South-Southwest to West-Southwest | 23.1 | No | VTL 5 | 13.7/11.10 | 134 | WTGs appear dark gray against the light sky and the position of the sun serves as a focal point, drawing the viewer's eye toward part of the Project. | Large | OCS-A 0487<br>OCS-A 0500 | Large | Visibility of backlit WTGs within viewshed along horizon line within viewshed. | **Large** | Scenic values; prominence of backlit turbines on the horizon. | **Major** |
| MV07 | Aquinnah Overlook | SCA | South to Southwest | 145.5 | Yes | VTL 3 | 13.7/11.9 | 132 | OSSs become focal points along the wide horizon and the overlook is no longer just for views of the ocean | Large | OCS-A 0487<br>OCS-A 0500 | Large | Size and scale in relation to existing conditions along with percentage of visibility. | **Large** | Prominent, dedicated viewpoint. | **Major** |

| KOP Number | KOP Name | Representative Character Area (SCA, LCA, OCA) | Viewing Direction | Elevation (feet) | Cumulative Simulation | Visibility Threshold | Distance to Nearest Turbine (miles/nautical miles) | Horizontal Field of View Occupied (Degrees) | Size or Scale Rationale | Size and Scale Rating (large, medium, small) | Lease Area within Viewshed in Addition to Proposed Action | Geographic Extent Rating (large, medium, small) | SLVIA Magnitude Rating Rationale | SLVIA Magnitude Rating (large, medium, small) | SLVIA Overall Impact Level Rationale | SLVIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | but includes the turbines on the ocean. | | | | | | | |
| MV07 | Aquinnah Overlook – Sunset | SCA | South to Southwest | 145.5 | Yes | VTL 5 | 13.7/11.10 | 132 | OSSs become focal points along the wide horizon and the overlook is no longer just for views of the ocean but includes the turbines on the ocean. | Large | OCS-A 0487 OCS-A 0500 | Large | Size and scale in relation to existing conditions along with percentage of visibility. | **Large** | Prominent, dedicated viewpoint. | **Major** |
| MV07 | Aquinnah Overlook – Night | SCA | South to Southwest | 145.5 | Yes | VTL 3 | 13.7/11.11 | 132 | OSSs become focal points along the wide horizon and the overlook is no longer just for views of the ocean but includes the turbines on the ocean. | Large | OCS-A 0487 OCS-A 0500 | Large | Size and scale in relation to existing conditions along with percentage of visibility. | **Large** | Prominent, dedicated viewpoint; warning lighting appears low on the horizon. | **Major** |
| MV09 | Gay Head Lighthouse | SCA | South to West-Southwest | 162.1 | No | VTL 4 | 13.9/12.1 | 132 | The two OSSs appear as dark elements on the horizon suspended above the water surface. From this superior vantage point, the entirety of the Project is visible. | Large | OCS-A 0487 OCS-A 0500 | Large | Size and scale in relation to existing conditions along with percentage of visibility. | **Large** | Importance of historic lighthouse, scenic values; prominence of turbines and OSSs. | **Major** |
| MV10 | South Beach State Park | SCA | Southwest to West-Southwest | 17.0 | No | VTL3 | 15.0/13.0 | 109 | Nacelles and rotors from numerous WTGs will be visible in the background along the horizon. Turbines are visible on the horizon and provide a focal point. | Large | OCS-A 0487 OCS-A 0500 OCS-A 501 | Large | Size and scale in relation to existing conditions along with percentage of visibility. | **Large** | Importance of natural landscape and natural recreation opportunities; massing of turbines on horizon within full viewshed. | **Major** |
| MV11 | Wasque Point | SCA | West-Southwest | 13.6 | Yes | VTL 2 | 15.0/13.0 | 100 | Nearest WTG is approximately 15 miles away; the towers are largely obscured due to curvature of the Earth, with their degree of exposure decreasing from left to right. | Large | OCS-A 0487 OCS-A 0500 OCS-A 501 | Large | Size and scale in relation to existing conditions along with percentage of visibility. | **Large** | Importance of natural landscape and natural recreation opportunities; massing of turbines on horizon within full viewshed. | **Major** |
| MV12 | Peaked Hill Reservation | LCA | South-Southwest to Southwest | 305.1 | No | VTL 1 | 16.3/14.2 | 123 | KOP on Peaked Hill represents a discrete view to the southwest that requires the viewer to be perfectly positioned. | Small | OCS-A 0487 OCS-A 0500 | Small<br><br>Based on simulation graphic all are visible/vegetation and perspective influence | Size and scale in relation to existing conditions, vegetation and viewer perspective. | **Small** | Importance of cultural significance and natural recreation opportunities; visibility of WTGs due to intervening vegetation and landforms. | **Major** |
| MV12 | Peaked Hill Reservation – Sunset | LCA | South-Southwest to Southwest | 305.1 | No | VTL4 | 16.3/14.2 | 123 | Sunset illumination and backlighting influences change. | Large | OCS-A 0487 OCS-A 0500 | Large<br><br>Based on simulation graphic all are visible/vegetation and perspective influence | Backlighting of WTGs, increased visibility. | **Large** | Importance of cultural significance and natural recreation opportunities; visibility of WTGs due to backlighting. | **Major** |
| MV13 | Edwin DeVries Vanderhoop Homestead | SCA | South to Southwest | 17.0 | No | VTL5 | 13.8/12.0 | 134 | WTGs are visible; light gray towers, nacelles, and | Large | OCS-A 0487 OCS-A 0500 | Large | Size and scale in relation to existing conditions | **Large** | Importance of natural landscape and natural recreation opportunities; | **Major** |

| KOP Number | KOP Name | Representative Character Area (SCA, LCA, OCA) | Viewing Direction | Elevation (feet) | Cumulative Simulation | Visibility Threshold | Distance to Nearest Turbine (miles/nautical miles) | Horizontal Field of View Occupied (Degrees) | Size or Scale Rationale | Size and Scale Rating (large, medium, small) | Lease Area within Viewshed in Addition to Proposed Action | Geographic Extent Rating (large, medium, small) | SLVIA Magnitude Rating Rationale | SLVIA Magnitude Rating (large, medium, small) | SLVIA Overall Impact Level Rationale | SLVIA Overall Impact Level (major, moderate, minor, negligible) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | rotors are fully visible above the horizon. | | | | along with percentage of visibility. | | visibility of WTGs due to distance and percentage of visibility. | |
| NI10 | Madaket Beach | SCA | West | 20.6 | Yes | VTL1 | 17.0/ 14.8 | 109 | WTGs are barely visible along the horizon, with a small cluster of turbine blades and nacelle comprising the majority of visible features. | Small | OCS-A 0500<br>OCS-A 501<br>OCS-A 520<br>OCS-A 521<br>OCS-A 522 | Small although numerous Lease Areas are within viewshed | Variable lighting and atmospheric conditions influence visibility. | **Small** | Numerous Lease Areas are within viewshed, though perceivability of WTGs from KOP is highly influenced on visibility conditions. | **Major** |
| NL01 | Nomans Land Island NWR *(not occupied)* | SCA | West-Southwest | 42.1 | Yes | VTL5 | 8.7/7.5 | 109 | WTGs appear as gray vertical lines against the yellow backdrop of the sky that look out of character with the vast extent of open water. | Large | OCS-A 0487<br>OCS-A 0500 | Large | Size and scale in relation to existing conditions along with percentage of visibility. | **Large** | Intact seascape and prominence of WTGs in close proximity, although no viewers. | **Major** |
| NL01 | Nomans Land Island NWR – Sunset *(not occupied)* | SCA | West-Southwest | 42.1 | Yes | VTL6 | 8.7/7.6 | 165 | Sunset illumination and backlighting influences change. | Large | OCS-A 0487<br>OCS-A 0500 | Large | Backlighting of WTGs, increased visibility. | **Large** | Intact seascape and prominence of WTGs, although no viewers; backlighting of WTGs and OSS. | **Major** |

Note: Nighttime impacts would be reduced to negligible, as described in EIS Table 3.3-2 (Definitions of Potential Adverse Impact Levels), when FAA warning lights are not activated though the use of ADLS.

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## Literature Cited

Environmental Design and Research, Landscape Architecture, Engineering and Environmental Services, D.P.C. (EDR). 2023. *Visual Impact Assessment Revolution Wind Farm*. Appendix U3 in *Construction & Operations Plan Revolution Wind Farm*. Syracuse, New York: EDR.

Sullivan, R.G. 2021. *Methodology for Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States.* OCS Study BOEM 2021-032. Washington, D.C.: U.S. Department of the Interior, Bureau of Ocean Energy Management.

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# APPENDIX H

## List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent

# Contents



# Tables

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# List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent

**Table H-1. Federal Agencies**

| Cooperating Federal Agencies | Contact | Location |
|---|---|---|
| Bureau of Safety and Environmental Enforcement | Cheri Hunter<br>(571) 474-6969<br>cheri.hunter@bsee.gov | Sterling, Virginia |
| National Oceanic and Atmospheric Administration | Sue Tuxbury<br>(978) 281-9176<br>susan.tuxbury@noaa.gov | Gloucester, Massachusetts |
| U.S. Army Corps of Engineers, New England District | Christine Jacek<br>(978) 318-8026<br>(978) 578-7548<br>christine.m.jacek@usace.army.mil | Concord, Massachusetts |
| U.S. Coast Guard | George Detweiler<br>(202) 372-1566<br>George.H.Detweiler@uscg.mil | Washington, D.C. |
| U.S. Environmental Protection Agency | Timothy Timmermann<br>(617) 918-1025<br>Timmermann.Timothy@epa.gov | Boston, Massachusetts |
| **Participating Federal Agencies** | **Contact** | **Location** |
| Advisory Council on Historic Preservation | Chris Daniel<br>(202) 517-0223<br>cdaniel@achp.gov | Washington, D.C. |
| Federal Aviation Administration | Cindy Whitten<br>(816) 329-2528<br>Cindy.whitten@faa.gov | Washington, D.C. |
| National Park Service | Mary Krueger<br>(978) 342-2719<br>Mary_C_Krueger@nps.gov | Fitchburg, Massachusetts |
| U.S. Department of Defense | Terry Bowers<br>(703) 693-9447<br>(571) 232-2482<br>terry.l.bowers14.civ@mail.mil | New Alexandria, Virginia |
| U.S. Department of the Navy | Matthew Senska<br>(703) 614-2201<br>Matthew.senska@navy.mil | Washington, D.C. |
| U.S. Fish and Wildlife Service | Jane Ledwin<br>(703) 358-2585<br>Jane_Ledwin@fws.gov | Falls Church, Virginia |

### Table H-2. State and Local Agencies or Other Interested Parties

| Agency | Contact | Location |
|---|---|---|
| Commonwealth of Massachusetts; Massachusetts Office of Coastal Zone Management | Lisa Engler<br>(617) 626-1230<br>lisa.engler@state.ma.us | Boston, Massachusetts |
| Rhode Island Coastal Resources Management Council | Jeffrey Willis<br>(401) 783-3370<br>jwillis@crmc.ri.gov | Wakefield, Rhode Island |
| State of Rhode Island; Rhode Island Department of Environmental Management | Terry Gray<br>(401) 222-2771<br>terry.gray@dem.ri.gov | Providence, Rhode Island |
| Connecticut State Historic Preservation Office, Connecticut Department of Economic and Community Development | Mary Dunne<br>(860) 500-2356<br>mary.dunne@ct.gov | Hartford, Connecticut |
| Rhode Island Historical Preservation & Heritage Commission | Jeffery Emidy<br>(401) 222-4134<br>jeffrey.emidy@preservation.ri.gov | Providence, Rhode Island |
| New York State Division for Historic Preservation | Tim Lloyd<br>(518) 268-2186<br>timothy.lloyd@parks.ny.gov | Waterford, New York |
| Massachusetts Historical Commission | Brona Simon<br>(617) 727-2816<br>brona.simon@sec.state.ma.us | Boston, Massachusetts |

### Table H-3. Tribes

| Tribes and Native Organizations | Location |
|---|---|
| Delaware Nation | Anadarko, Oklahoma |
| Delaware Tribe of Indians | Bartlesville, Oklahoma |
| Mashantucket (Western) Pequot Tribal Nation | Mashantucket, Connecticut |
| Mashpee Wampanoag Tribe | Mashpee, Massachusetts |
| Mohegan Tribe of Indians of Connecticut | Uncasville, Connecticut |
| Narragansett Indian Tribe | Charlestown, Rhode Island |
| Shinnecock Indian Tribe | Southampton, New York |
| Wampanoag Tribe of Gay Head (Aquinnah) | Aquinnah, Massachusetts |

# APPENDIX I

## Other Impacts

# Contents



# Tables

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# Unavoidable Adverse Impacts of the Proposed Action

Table I-1 summarizes unavoidable adverse impacts for each resource analyzed in the Revolution Wind Farm and Revolution Wind Export Cable Project (the Project) environmental impact statement (EIS). These impacts are subject to applicable environmental protection measures (EPMs) (see Table F-1 in Appendix F). Table I-1 does not include potential additional mitigation measures that could avoid or further minimize or mitigate Project impacts. Please see the individual resource discussions in Chapter 3 for detailed analyses.

**Table I-1. Potential Unavoidable Adverse Impacts of the Action Alternatives by Resource**

| Resource Area | Potential Unavoidable Adverse Impacts of the Action Alternatives |
|---|---|
| Air quality | • Impacts from emissions from engines associated with vessel traffic, construction activities, equipment operation, and decommissioning activities |
| Bats | • Displacement and avoidance behavior due to habitat loss and alteration, equipment noise, and vessel traffic<br>• Individual mortality due to collisions with operating wind turbine generator (WTGs) |
| Benthic habitat and invertebrates | • Increase in suspended sediments and resulting effects due to seafloor disturbance<br>• Habitat quality impacts, including reduction in habitat as a result of seafloor surface alterations<br>• Displacement, disturbance, and avoidance behavior due to habitat loss and alteration, equipment noise, vessel traffic, increased turbidity, sediment deposition, and electromagnetic fields (EMFs)<br>• Individual mortality due to construction and installation, operations and maintenance (O&M), and decommissioning<br>• Conversion of soft-bottom habitat to new hard-bottom habitat |
| Birds | • Displacement and avoidance behavior due to habitat loss and alteration, lighting, equipment noise, and vessel traffic<br>• Individual mortality due to collisions with operating WTGs |
| Coastal habitats and fauna | • Displacement and avoidance behavior from habitat loss and alteration and equipment noise<br>• Individual mortality from collisions with vehicles or construction equipment<br>• Short-term habitat alteration and increased invasive species risk |
| Commercial fisheries and for-hire recreational fishing | • Disruption to access or temporary restriction in port access or harvesting activities due to construction of offshore Project elements<br>• Disruption to harvesting activities during operations of offshore wind facility<br>• Changes in vessel transit and fishing patterns<br>• Changes in risk of gear entanglement or target species |
| Cultural resources | • Impacts to unidentified or undefined submerged marine resources from Project construction and installation, O&M, and decommissioning Impacts to terrestrial cultural resources and the viewshed from Project construction and installation and O&M<br>• Visual impacts to onshore cultural resources |

| Resource Area | Potential Unavoidable Adverse Impacts of the Action Alternatives |
|---|---|
| Demographics, employment, and economics | • Disruption of commercial fishing, for-hire recreational fishing, and marine recreational businesses during offshore construction and cable installation<br>• Hindrances to ocean economy sectors due to the presence of the offshore wind facility, including commercial fishing, recreational fishing, sailing, sightseeing, and supporting businesses |
| Environmental justice | • Changes to air quality, water quality, land use and coastal infrastructure, and commercial fisheries and for-hire recreational fishing that are disproportionately borne by minority or low-income populations from Project construction and installation, O&M, and decommissioning |
| Finfish and essential fish habitat | • Increase in suspended sediments and resulting effects due to seafloor disturbance<br>• Habitat quality impacts, including a reduction in habitat as a result of seafloor surface alterations<br>• Displacement, disturbance, and avoidance behavior due to habitat loss and alteration, equipment noise, vessel traffic, increased turbidity, sediment deposition, and EMFs<br>• Individual mortality due to construction and installation, O&M, and decommissioning<br>• Conversion of soft-bottom habitat to new hard-bottom habitat (for some species) |
| Land use and coastal infrastructure | • Land use disturbance due to construction as well as effects due to noise, vibration, and travel delays |
| Marine mammals | • Displacement, disturbance, and avoidance behavior due to habitat loss and alteration, equipment noise, vessel traffic, increased turbidity, and sediment deposition during construction and installation and O&M<br>• Temporary loss of current ambient acoustic habitat and increased potential for vessel strikes |
| Navigation and vessel traffic | • Changes in vessel transit patterns<br>• Increased navigational complexity and allision risk within the offshore wind farm area |
| Other marine uses | • Changes in access to marine mineral resource, and cable placement<br>• Disruption of scientific surveys, radar systems, military, and aviation traffic |
| Recreation and tourism | • Disruption of coastal recreation activities during onshore construction, such as beach access<br>• Viewshed effects from the WTGs altering enjoyment of marine and coastal recreation and tourism activities<br>• Disruption to access or temporary restriction of in-water recreational activities from construction of offshore Project elements<br>• Hindrances to some types of recreational fishing from the WTGs during operation |
| Sea turtles | • Disturbance, displacement, and avoidance behavior due to habitat loss and alteration, equipment noise, vessel traffic, increased turbidity, sediment deposition, and EMFs |
| Visual resources | • Change in scenic quality of landscape and seascape |
| Water quality | • Increase in erosion, turbidity and sediment resuspension, and inadvertent spills during construction and installation, O&M, and decommissioning |
| Wetlands and non-tidal waters | • Increase in soil erosion, sedimentation, and discharges and releases from land disturbance during construction and installation, O&M, and decommissioning |

# Irreversible and Irretrievable Commitment of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time, such as the short-term loss of timber productivity in forested areas that are kept clear for a power line or a road. Table I-2 summarizes irreversible or irretrievable impacts for each resource analyzed in the EIS, subject to applicable EPMs. Table I-2 does not include potential additional mitigation measures that could avoid or further minimize or mitigate Project impacts. Chapter 3 provides a detailed discussion of effects associated with the Project.

**Table I-2. Irreversible and Irretrievable Commitment of Resources by Resource Area for the Proposed Action**

| Resource Area | Irreversible Impacts | Irretrievable Impacts | Explanation |
|---|---|---|---|
| Air quality | No | No | The Bureau of Ocean Energy Management (BOEM) expects air emissions to be in compliance with permits regulating air quality standards, and emissions would be temporary during construction activities. If the Proposed Action displaces fossil fuel energy generation, overall improvement of air quality would be expected. |
| Bats | No | No | Irreversible impacts on bats could occur if one or more individuals were injured or killed; however, implementation of mitigation measures developed in consultation with the U.S. Fish and Wildlife Service (USFWS) would reduce or eliminate the potential for such impacts. Decommissioning of the Project would reverse the impacts of bat displacement from foraging habitat. |
| Benthic habitat and invertebrates | No | No | Although local mortality could occur, BOEM does not anticipate population-level impacts. The Project could alter habitat during construction and operations but could restore the habitat after decommissioning. |
| Birds | No | No | Irreversible impacts on birds could occur if one or more individuals were injured or killed; however, implementation of mitigation measures developed in consultation with the USFWS would reduce or eliminate the potential for such impacts. Decommissioning of the Project would reverse the impacts of bird displacement from foraging habitat. |
| Coastal habitats and fauna | No | No | Although local mortality could occur, BOEM does not anticipate population-level impacts on other coastal habitats or fauna. The Project could alter habitat during construction and operations but could restore the habitat after decommissioning. |

| Resource Area | Irreversible Impacts | Irretrievable Impacts | Explanation |
|---|---|---|---|
| Commercial fisheries and for-hire recreational fishing | No | Yes | Based on the anticipated duration of construction and installation and O&M, BOEM does not anticipate impacts on commercial fisheries to be irreversible. The Project could alter habitat during construction and operations, limit access to fishing areas during construction, or reduce vessel maneuverability during operations. However, decommissioning of the Project would reverse those impacts. Irretrievable impacts (lost revenue) could occur due to the loss of use of fishing areas at an individual level. |
| Cultural resources | Yes | Yes | Although unlikely, unanticipated removal or disturbance of previously unidentified cultural resources onshore and offshore could result in irreversible or irretrievable impacts. |
| Demographics, employment, and economics | No | No | Based on the anticipated duration of construction and installation and O&M, BOEM does not anticipate that contractor needs, housing needs, and supply requirements would lead to an irretrievable loss of workers for other projects or increase housing and supply costs. |
| Environmental justice | No | No | Potential environmental justice impacts, if any, would be short term and localized. |
| Finfish and essential fish habitat | No | No | Although local mortality could occur, BOEM does not anticipate population-level impacts. The Project could alter habitat during construction and operations but could restore the habitat after decommissioning. |
| Land use and coastal infrastructure | Yes | Yes | Land use required for construction and operations activities, such as the land proposed for the interconnection facility, could result in a minor irreversible impact. Construction activities could result in a minor irretrievable impact due to the temporary loss of use of the land for otherwise typical activities. Onshore facilities may or may not be decommissioned. |
| Marine mammals | No | Yes | Irreversible impacts on marine mammals could occur if one or more individuals of species listed under the Endangered Species Act (ESA) were injured or killed; however, NMFS consultation mitigation measures would reduce or eliminate the potential for such impacts on listed species. Irretrievable impacts could occur if individuals or populations grow more slowly as a result of displacement from the Lease Area. |
| Navigation and vessel traffic | No | Yes | Based on the anticipated duration of construction and installation and O&M, BOEM does not anticipate impacts on vessel traffic to result in irreversible impacts. Irretrievable impacts could occur due to changes in transit routes, which could be less efficient during the life of the Project. |
| Other marine uses | No | Yes | BOEM does not anticipate the potential impacts to be irreversible; however, disruption of offshore scientific research and surveys would occur during proposed Project construction, operations, and decommissioning activities. |

| Resource Area | Irreversible Impacts | Irretrievable Impacts | Explanation |
|---|---|---|---|
| Recreation and tourism | No | No | Construction activities near the shore could result in a minor temporary loss of use of the land for recreation and tourism purposes, but these impacts would not be irreversible or irretrievable. |
| Sea turtles | No | Yes | Irreversible impacts on sea turtles could occur if one or more individuals of species listed under the ESA were injured or killed; however, NMFS consultation mitigation measures would reduce or eliminate the potential for impacts on listed species. Irretrievable impacts could occur if individuals or populations grow more slowly as a result of displacement from the Lease Area. |
| Visual resources | No | Yes | Viewshed changes would persist for the life of the Project, until decommissioning is complete. |
| Water quality | No | No | BOEM does not expect activities to cause loss of or major impacts on existing inland waterbodies or wetlands. Turbidity and other water quality impacts in the marine and coastal environment would be short term, with the rare exception of a major spill. |
| Wetlands and non-tidal waters | No | No | BOEM does not expect activities to cause loss of or major impacts on existing wetlands or other non-tidal waters. |

# Relationship between the Short-Term Use of the Human Environment and the Maintenance and Enhancement of Long-Term Productivity

The Council on Environmental Quality's National Environmental Policy Act implementing regulations (40 CFR 1502.16) require that an EIS address the relationship between short-term use of the environment and the potential impacts of such use on the maintenance and enhancement of long-term productivity. Such impacts could occur as a result of a reduction in the flexibility to pursue other options in the future, or assignment of a specific area (land or marine) or resource to a certain use that would not allow other marine uses, particularly beneficial uses, to occur at a later date. An important consideration when analyzing such effects is whether the short-term environmental effects of the action would result in detrimental effects to long-term productivity of the affected areas or resources.

As assessed in EIS Chapter 3, BOEM anticipates that most of the potential adverse effects associated with the Proposed Action would occur during construction activities and would be temporary and minor or moderate. Table I-1 and Table I-2 identify unavoidable, irretrievable, or irreversible impacts that would be associated with the Project. However, the Bureau of Ocean Energy Management (BOEM) expects most of the marine and onshore environments to return to normal long-term productivity levels after Project decommissioning. Based on these findings, BOEM also anticipates that the Proposed Action would not result in impacts that would significantly narrow the range of future uses of the environment.

Additionally, the Project would provide the following long-term benefits:

- Promotion of clean and safe development of domestic energy sources and clean energy job creation
- Promotion of renewable energy to help ensure geopolitical security; combat climate change; and provide electricity that is affordable, reliable, safe, secure, and clean
- Delivery of power to the New England region to contribute to Connecticut’s and Rhode Island’s renewable energy goals
- Increased habitat for certain fish species

# APPENDIX J

## Finding of Adverse Effect for Historic Properties and Draft Memorandum of Agreement

# Introduction

Attached to this appendix are the Bureau of Ocean Energy Management's (BOEM's) *Finding of Adverse Effect for the Revolution Wind Farm and Revolution Wind Export Cable Construction and Operations Plan* (Finding) and *Draft Memorandum of Agreement Among the Bureau of Ocean Energy Management, the State Historic Preservation Officers of Connecticut, Massachusetts, New York, and Rhode Island, and the Advisory Council on Historic Preservation Regarding the Revolution Wind Farm and Revolution Wind Export Cable Project* (MOA).

The Finding documents BOEM's determination of adverse effect on historic properties pursuant to this environmental impacts statement (EIS) analysis and to Sections 106 and 110 of the National Historic Preservation Act (NHPA), as guided by the Section 106 regulations in 36 Code of Federal Regulations 800. BOEM has found that the Revolution Wind Farm and Revolution Wind Export Cable Project (Project) would have an adverse effect on historic properties.

BOEM is completing the MOA in consultation with consulting parties under NHPA Section 106 and with opportunity for public review of draft iterations of the MOA as presented in this appendix of the Draft EIS and the Final EIS. This draft MOA includes stipulations, measures for resolving adverse effects, and treatment plans and other attachments. The MOA will be finalized through this consultation process and posted for public access after completion of the Final EIS and before a record of decision.

Mitigation measures for cultural resources are drafted in the MOA and its historic property treatment plans attached in this appendix. Under the MOA, adverse effects from the Project to National Register of Historic Places (NRHP)–eligible cultural resources, including national historic landmarks (NHLs) and traditional cultural places (TCPs), would be avoided, minimized, or mitigated in accordance with the NHPA Section 106 regulations (36 CFR 800) and in compliance with Section 110(f).

The MOA also has attached post-review discovery plans for onshore and offshore cultural resources, should previously undiscovered or unimpacted historic properties be identified and moderate to major negative effects cannot be avoided. The post-review discovery plans would be implemented to assess and resolve any negative effects to these cultural resources. NRHP-eligible cultural resources that are discovered post-review, if adversely affected, would be mitigated through the NHPA Section 106 process.

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# Finding of Adverse Effect for the Revolution Wind Farm and Revolution Wind Export Cable Construction and Operations Plan

# Finding of Adverse Effect for the Revolution Wind Farm and Revolution Wind Export Cable Construction and Operations Plan

**June 2023**

## CONFIDENTIAL

U.S. Department of the Interior
Bureau of Ocean Energy Management
Sterling, Virginia

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# List of Abbreviations

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ADLS | aircraft detection lighting system |
| APE | area of potential effects |
| ASLF | ancient submerged landform |
| BOEM | Bureau of Ocean Energy Management |
| B.P. | before present |
| bsb | below seabed |
| ca. | circa |
| CATEX | Categorical Exclusion |
| CHRVEA | Cumulative Historic Resources Visual Effects Analysis |
| confidential | contains material that meets the criteria for confidentiality under Section 304 of the NHPA |
| CT | Connecticut |
| EA | Environmental Assessment |
| EIS | environmental impact statement |
| Finding | Finding of Effect |
| FONSI | Finding of No Significant Impact |
| GIS | geographic information system |
| HDD | horizontal directional drilling |
| HPTPs | historic property treatment plans |
| HRVEA | Historic Resources Visual Effects Analysis |
| IAC | inter-array cable |
| ICF | interconnection facility |
| MA | Massachusetts |
| MARA | Marine Archaeological Resources Assessment |
| MHC | Massachusetts Historical Commission |
| MOA | memorandum of agreement |
| MW | megawatt |
| NEPA | National Environmental Policy Act |
| NHL | National Historic Landmark |
| NHPA | National Historic Preservation Act |
| NOI | notice of intent |
| NPS | National Park Service |
| NMFS | National Marine Fisheries Service |
| NRHP | National Register of Historic Places |
| NY | New York |
| O&M | operations and maintenance |
| OCS | Outer Continental Shelf |
| OnSS | onshore substation |
| OSS | offshore substation |

| | |
|---|---|
| PA | programmatic agreement |
| PAL | Public Archaeology Laboratory, Inc. |
| PDE | project design envelope |
| PPAs | power purchase agreements |
| RI | Rhode Island |
| RIHPHC | Rhode Island Historical Preservation & Heritage Commission |
| RI/MA WEA | Rhode Island/Massachusetts Wind Energy Area |
| ROD | Record of Decision |
| RODA | Responsible Offshore Development Alliance |
| RWEC | Revolution Wind Export Cable |
| RWF | Revolution Wind Farm |
| SAP | Site Assessment Plan |
| SHPO | State Historic Preservation Officer |
| SWCA | SWCA Environmental Consultants |
| TARA | Terrestrial Archaeological Resources Assessment |
| TCP | Traditional Cultural Place |
| TNEC | The Narragansett Electric Company |
| Tribal Nation | Federally-recognized Indian Tribe |
| vhb | Vanasse Hangen Brustlin, Inc. |
| VIA | Visual Impact Assessment |
| WTG | wind turbine generator |

# 1 Introduction

The Bureau of Ocean Energy Management (BOEM) is reviewing the construction and operations plan (COP) prepared by Vanasse Hangen Brustlin, Inc. (vhb) (2023) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (the Project). The RWF is located in the Rhode Island-Massachusetts Wind Energy Area (RI/MA WEA), and the RWEC connects to Rhode Island (RI).

BOEM has made a Finding of Adverse Effect (Finding) for the Project pursuant to Section 106 of the National Historic Preservation Act (NHPA) (54 USC 306108), the implementing regulations for the Section 106 process ("Protection of Historic Properties" 36 CFR Part 800). BOEM has determined the Project would adversely affect National Historic Landmarks (NHLs) and, in compliance with Section 110(f) of the NHPA (54 USC 306107) BOEM, to the maximum extent possible, conducted early planning and actions as may be necessary to minimize harm to the NHLs. This Finding documents potential effects to historic properties in marine, terrestrial, and above ground historical contexts, including the NHLs. As defined in 36 CFR 800.16(l)(1), "Historic property means any prehistoric [or pre-contact] or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places [NRHP] maintained by the Secretary of the Interior." The term historic property includes all NHLs as well as properties of traditional religious and cultural importance to Tribal Nations that are eligible for NRHP listing (36 CFR 800.16(l)(1)). Historic properties include "properties formally determined as such in accordance with regulations [in 36 CFR 63] of the Secretary of the Interior and all other properties that meet the National Register criteria" (36 CFR 800.16(l)(2)).

## 1.1 Marine Cultural Resources

In the COP, Revolution Wind, LLC (Revolution Wind) has identified 32 marine cultural resources in the Project's area of potential effects (APE) that are of archaeological interest. Based on potential connections to significant historical events and on the important information these resources could provide, BOEM is treating these 32 resources as eligible for listing in the NRHP and, therefore, as historic properties. These marine cultural resources consist of 19 potential submerged archaeological marine resources, designated as shipwrecks/possible historic shipwrecks; although, they may also include other sunken crafts and structures. The 32 resources further consist of 13 geomorphic features, also referred to as ancient submerged landforms (ASLFs), that are of importance to Tribal Nations as well as being of potential archaeological significance. The COP indicates that all 19 shipwrecks/possible historic shipwrecks would be avoided with sufficient buffers by all proposed activities that are part of the Project and, as a result, there would be no effects to these potential historic properties (SEARCH, Inc. [SEARCH] 2023). Nine of the 13 ASLFs on the Outer Continental Shelf (OCS) and in RI state waters (Table 1) are not determined fully avoidable by physical disturbance from Project construction activities and, as a result, BOEM has determined these nine would be adversely affected.

**Table 1. Historic Properties, Consisting of Ancient Submerged Landforms (Geomorphic Features), Adversely Affected by the Project**

| Geomorphic Feature ID | Location | Description |
|---|---|---|
| Target-21 | RWEC (RI) | [redacted] |
| Target-22 | RWEC (RI) | [redacted] |

| Geomorphic Feature ID | Location | Description |
|---|---|---|
| Target-23 | RWEC (OCS) | [redacted] |
| Target-24 | RWF (OCS) | [redacted] |
| Target-25 | RWF (OCS) | [redacted] |
| Target-26 | RWF (OCS) | [redacted] |
| Target-28 | RWF (OCS) | [redacted] |
| Target-29 | RWEC (RI) | [redacted] |
| Target-30 | RWEC (RI) | [redacted] |

Source: SEARCH (2023:Table 4-2). Mapped ASLF extents and locations (SEARCH 2023) contain material that meets the criteria for confidentiality under Section 304 of the NHPA and are not publicly distributed.

## 1.2 Terrestrial Cultural Resources

In the COP, Revolution Wind identified four archaeological sites not fully avoidable in the construction of onshore Project components. BOEM has determined that two of the archaeological sites (Table 2) are historic properties and would be adversely affected by onshore substation (OnSS) development.

**Table 2. Historic Properties, Consisting of Terrestrial Cultural Resources, Adversely Affected by the Project**

| Terrestrial Cultural Resources | Portion of Project | Description |
|---|---|---|
| [redacted] #1 | [redacted] | [redacted] Archaeological |
| [redacted] #2 | [redacted] | [redacted] Archaeological |

Source: Forrest and Waller (2023)

## 1.3 Above Ground Historic Properties

In the COP, the offshore Historic Resources Visual Effects Analysis (HRVEA) (EDR 2023; Revolution Wind 2022a) identified 451 above ground historic properties in the APE. The onshore HRVEA (EDR 2021a) identified 80 above ground historic properties and found two of these to be in the APE. Quonset Point Historic Naval Air station was addressed in both HRVEAs (EDR 2021a, 2023). The above ground historic properties range from individual structures to complex sites, historic districts, and Traditional Cultural Places (TCPs) that are within the viewshed of offshore and onshore Project facilities. BOEM has determined that offshore Project facilities would adversely affect 101 historic properties in RI and Massachusetts (MA) (Table 3) by introducing visual impacts from the Project wind turbine generators (WTGs) and offshore substations (OSSs).

**Table 3. Above Ground Historic Properties Adversely Affected by the Project, in Order of Nearest Distance to Project WTGs**

| Survey ID | Visually Sensitive Resource | Municipality | County | State | Property Designation | Distance to nearest RWF WTG (miles) |
|---|---|---|---|---|---|---|
| TCP-3 | [redacted] TCP | [redacted] | [redacted] | MA | NRHP-eligible (BOEM determined) | 6* |
| 300 | Sakonnet Light Station | Little Compton | Newport | RI | NRHP-listed resource | 12.7 |

| Survey ID | Visually Sensitive Resource | Municipality | County | State | Property Designation | Distance to nearest RWF WTG (miles) |
|---|---|---|---|---|---|---|
| 297 | Warren Point Historic District | Little Compton | Newport | RI | NRHP-eligible resource (RIHPHC determined) | 12.9 |
| 299 | Abbott Phillips House | Little Compton | Newport | RI | RIHPHC historic resource | 13 |
| 504 | Flaghole | Chilmark | Dukes | MA | MHC historic inventory site | 13.3 |
| 296 | Stone House Inn | Little Compton | Newport | RI | NRHP-listed resource | 13.4 |
| 503 | Simon Mayhew House | Chilmark | Dukes | MA | MHC historic inventory site | 13.5 |
| 496 | 71 Moshup Trail | Aquinnah | Dukes | MA | MHC historic inventory site | 13.7 |
| 484 | Vanderhoop, Edwin DeVries Homestead | Aquinnah | Dukes | MA | NRHP-listed resource | 13.7 |
| 480 | Gay Head - Aquinnah Shops Area | Aquinnah | Dukes | MA | MHC historic inventory site | 13.7 |
| 474 | Flanders, Ernest House, Shop, Barn | Aquinnah | Dukes | MA | MHC historic inventory site | 13.8 |
| 495 | 3 Windy Hill Drive | Aquinnah | Dukes | MA | MHC historic inventory site | 13.9 |
| 479 | Gay Head Light | Aquinnah | Dukes | MA | NRHP-listed resource | 13.9 |
| 485 | Tom Cooper House | Aquinnah | Dukes | MA | MHC historic inventory site | 14 |
| 497 | Leonard Vanderhoop House | Aquinnah | Dukes | MA | MHC historic inventory site | 14 |
| 490 | Theodore Haskins House | Aquinnah | Dukes | MA | MHC historic inventory site | 14.1 |
| 486 | Gay Head - Aquinnah Coast Guard Station Barracks | Aquinnah | Dukes | MA | MHC historic inventory site | 14.1 |
| 491 | Gay Head - Aquinnah Town Center Historic District | Aquinnah | Dukes | MA | NRHP-listed resource | 14.2 |
| 303 | Gooseneck Causeway | Westport | Bristol | MA | MHC historic inventory site | 14.8 |
| 304 | Gooseberry Neck Observation Towers | Westport | Bristol | MA | MHC historic inventory site | 14.8 |
| 540 | Spring Street | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 14.9 |
| 590 | Capt. Mark L. Potter House | New Shoreham | Washington | RI | RIHPHC historic resource | 14.9 |
| 276 | Tunipus Goosewing Farm | Little Compton | Newport | RI | NRHP-Eligible Resource (RIHPHC Determined) | 15 |
| 543 | WWII Lookout Tower – Spring Street | New Shoreham | Washington | RI | NRHP-Eligible Resource (RIHPHC Determined) | 15.1 |
| 251 | Westport Harbor | Westport | Bristol | MA | MHC historic inventory site | 15.2 |
| 290 | Bellevue Avenue Historic District NHL | Newport | Newport | RI | NHL | 15.2 |
| 548 | Block Island Southeast Lighthouse NHL | New Shoreham | Washington | RI | NHL | 15.2 |
| 595 | New Shoreham Historic District | New Shoreham | Washington | RI | Local Historic | 15.3 |
| 536 | Spring Cottage | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.3 |
| 531 | Old Harbor Historic District | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC-determined) | 15.3 |
| 538 | Captain Welcome Dodge Sr. | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.3 |
| 541 | Caleb W. Dodge Jr. House | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.3 |
| 535 | Spring House Hotel | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.4 |

| Survey ID | Visually Sensitive Resource | Municipality | County | State | Property Designation | Distance to nearest RWF WTG (miles) |
|---|---|---|---|---|---|---|
| 545 | Pilot Hill Road and Seaweed Lane | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.4 |
| 222 | Ocean Drive Historic District NHL | Newport | Newport | RI | NHL | 15.7 |
| 298 | Marble House NHL | Newport | Newport | RI | NHL | 15.7 |
| 597 | Ochre Point – Cliffs Historic District | Newport | Newport | RI | NRHP-listed resource | 15.8 |
| 546 | WWII Lookout Tower at Sands Pond | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.8 |
| 552 | Sea View Villa | Middletown | Newport | RI | RIHPHC historic resource | 15.9 |
| 295 | Rosecliff/Oelrichs (Hermann) House/ Mondroe (J. Edgar) House | Newport | Newport | RI | NRHP-listed resource | 15.9 |
| 293 | The Breakers NHL | Newport | Newport | RI | NHL | 15.9 |
| 516 | Corn Neck Road | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.9 |
| 302 | Clam Shack Restaurant | Westport | Bristol | MA | MHC historic inventory site | 15.9 |
| 301 | Horseneck Point Lifesaving Station | Westport | Bristol | MA | MHC historic inventory site | 15.9 |
| 553 | Whetstone | Middletown | Newport | RI | RIHPHC historic resource | 16 |
| 284 | The Bluff/John Bancroft Estate | Middletown | Newport | RI | RIHPHC historic resource | 16 |
| 288 | Clambake Club of Newport | Middletown | Newport | RI | NRHP-listed resource | 16 |
| 530 | Old Town and Center Roads | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16 |
| 526 | Beach Avenue | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.1 |
| 519 | Mitchell Farm | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.1 |
| 523 | Indian Head Neck Road | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.2 |
| 168 | Westport Pt. Revolutionary War Properties | Westport | Bristol | MA | MHC historic inventory site | 16.2 |
| 261 | Indian Avenue Historic District | Middletown | Newport | RI | NRHP-listed resource | 16.2 |
| 278 | St. Georges School | Middletown | Newport | RI | NRHP-listed resource | 16.3 |
| 528 | Hygeia House | New Shoreham | Washington | RI | NRHP-listed resource | 16.3 |
| 527 | U.S. Weather Bureau Station | New Shoreham | Washington | RI | NRHP-listed resource | 16.3 |
| 549 | Miss Abby E. Vaill/1 of 2 Vaill cottages | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.4 |
| 550 | Hon. Julius Deming Perkins / ”Bayberry Lodge” | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.4 |
| 542 | Lakeside Drive and Mitchell Lane | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.5 |
| 280 | Land Trust Cottages | Middletown | Newport | RI | NRHP-eligible resource (RIHPHC determined) | 16.6 |
| 482 | Russell Hancock House | Chilmark | Dukes | MA | MHC historic inventory site | 16.6 |
| 163 | Westport Point Historic District (1 of 2) | Westport | Bristol | MA | NRHP-eligible resource (MHC determined) | 16.7 |

| Survey ID | Visually Sensitive Resource | Municipality | County | State | Property Designation | Distance to nearest RWF WTG (miles) |
|---|---|---|---|---|---|---|
| 164 | Westport Point Historic District (2 of 2) | Westport | Bristol | MA | NRHP-listed resource | 16.7 |
| 551 | Mohegan Cottage/Everett D. Barlow House | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.7 |
| 266 | Paradise Rocks Historic District | Middletown | Newport | RI | RIHPHC historic resource | 16.8 |
| 547 | Lewis- Dickens Farm | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.8 |
| 525 | Island Cemetery/Old Burial Ground | New Shoreham | Washington | RI | RI Historical Cemetery | 16.8 |
| 279 | Kay St.-Catherine St.-Old Beach Rd. Historic District/The Hill | Newport | Newport | RI | NRHP-listed resource | 16.9 |
| 532 | Beacon Hill Road | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.9 |
| 533 | Nathan Mott Park | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.9 |
| 515 | Block Island North Lighthouse | New Shoreham | Washington | RI | NRHP-listed resource | 17.1 |
| 522 | Champlin Farm | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.1 |
| 517 | Hippocampus/Boy’s Camp/ Beane Family | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.2 |
| 520 | U.S. Lifesaving Station | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.4 |
| 518 | U.S. Coast Guard Brick House | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.4 |
| 521 | Peleg Champlin House | New Shoreham | Washington | RI | NRHP-listed resource | 17.5 |
| 469 | Hancock, Captain Samuel - Mitchell, Captain West House | Chilmark | Dukes | MA | NRHP-eligible resource (MHC determined) | 17.6 |
| 508 | Scrubby Neck Schoolhouse | West Tisbury | Dukes | MA | MHC historic inventory site | 18 |
| 345 | Point Judith Lighthouse | Narragansett | Washington | RI | NRHP-listed resource | 18.2 |
| 245 | Bailey Farm | Middletown | Newport | RI | NRHP-listed resource | 18.3 |
| 226 | Beavertail Light | Jamestown | Newport | RI | NRHP-listed resource | 18.4 |
| 582 | Horsehead/Marbella | Jamestown | Newport | RI | NRHP-listed resource | 18.6 |
| 333 | Ocean Road Historic District | Narragansett | Washington | RI | NRHP-listed resource | 18.9 |
| 335 | Dunmere | Narragansett | Washington | RI | NRHP-listed resource | 19.2 |
| 86 | Puncatest Neck Historic District | Tiverton | Newport | RI | RIHPHC historic resource | 19.4 |
| 576 | Fort Varnum/Camp Varnum | Narragansett | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 19.6 |
| 156 | Salters Point | Dartmouth | Bristol | MA | MHC historic inventory site | 19.7 |
| 578 | Dunes Club | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| 329 | Life Saving Station at Narragansett Pier | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| 330 | The Towers Historic District | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| 591 | Narragansett Pier MRA | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| 328 | The Towers/Tower Entrance of Narragansett Casino | Narragansett | Washington | RI | NRHP-listed resource | 19.9 |

| Survey ID | Visually Sensitive Resource | Municipality | County | State | Property Designation | Distance to nearest RWF WTG (miles) |
|---|---|---|---|---|---|---|
| TCP-1 | [redacted] | [redacted] | [redacted] | MA | NRHP-eligible resource (BOEM determined) | 20 |
| 343 | Brownings Beach Historic District | South Kingstown | Washington | RI | NRHP-listed resource | 21.8 |
| 444 | Tarpaulin Cove Light | Gosnold | Dukes | MA | NRHP-listed resource | 22.1 |
| 391 | Clark's Point Light | New Bedford | Bristol | MA | NRHP-listed resource | 24.6 |
| 390 | Fort Rodman Historic District | New Bedford | Bristol | MA | NRHP-eligible resource (MHC determined) | 24.6 |
| 392 | Fort Taber Historic District | New Bedford | Bristol | MA | NRHP-listed resource | 24.6 |
| 386 | Butler Flats Light Station | New Bedford | Bristol | MA | NRHP-listed resource | 25.6 |
| 389 | 744 Sconticut Neck Road | Fairhaven | Bristol | MA | MHC historic inventory site | 25.9 |
| 449 | Nobska Point Lighthouse | Falmouth | Barnstable | MA | NRHP-listed resource | 28 |

Source: EDR (2023:Attachment A)

Notes: MHC = Massachusetts Historical Commission, RIHCPC = Rhode Island Historical Preservation & Heritage Commission.

* This TCP extends for several miles offshore, including within 6 miles of the nearest potential Project WTG offshore [redacted].

# 2 Project Overview

On March 13, 2020, BOEM received the initial COP to develop a wind energy project within BOEM Renewable Energy Lease Area OCS-A 0486 (Lease Area) from Revolution Wind. In the revised version of the COP (submitted in December 2021), Revolution Wind proposes the construction, operations, and eventual decommissioning of the Project, with up to 100 WTGs, up to two OSSs, inter-array cables (IACs) buried under the seafloor linking the individual WTGs to the OSS, one OSS-link cable under the seafloor linking the OSSs to each other, up to two offshore sub-seafloor export cables, a 3.1-acre landfall work area for the export cables to come ashore at Quonset Point, a buried onshore transmission cable system, up to one OnSS and adjacent interconnection facility (ICF) with a buried connection line, and an overhead connection from the ICF to The Narragansett Electric Company's (TNEC) existing Davisville Substation (and the electrical grid in RI) (Figures A-1 and A-2 in Appendix A [vhb 2023:Figures ES-1 and ES-2]). Revolution Wind is utilizing a project design envelope (PDE) in its COP, which represents a range of design parameters that could be used for the Project. In reviewing the PDE, BOEM is analyzing the maximum impacting scenario (or maximum-case scenario) that could occur from any combination of the Project parameters. BOEM's analysis and review of the PDE could result in the approval of a project that is constructed within that range or a subset of design parameters within the proposed range.

For the RWF, as proposed in Revolution Wind's COP, each of the up to 100 WTGs would have a nameplate capacity of 8 to 12 megawatts (MW)[1]. The WTGs, OSSs, IACs, and OSS-link cable would be located in the Lease Area approximately 13 nautical miles (nm) (approximately 15 miles) east of Block Island, RI, and approximately 15 nm (approximately 17.25 miles) southeast of the coast of mainland RI. The RWEC would be buried in the seabed within federal OCS and RI state waters. The onshore transmission cabling, OnSS, ICF, and one grid connection would be located in Washington County, RI.

## 2.1 Background

The RWF is located within the RI/MA WEA where BOEM has conducted previous Section 106 reviews for issuance of the commercial lease and approval of site assessment activities. The Section 106 process was completed through a programmatic agreement (PA)[2] executed June 8, 2012 (BOEM 2012a), prepared concurrently with the BOEM's environmental assessment (EA) for commercial wind lease issuance and site assessment activities on the Atlantic OCS offshore RI and MA (BOEM 2012b, 2013). A commercial lease sale for the RI/MA was held in 2013 and Revolution Wind was the winner of Lease OCS-A 0486 (under its current number designation). Subsequent to award of the lease, Revolution Wind submitted a site assessment plan (SAP) describing the proposed construction and installation, operations and maintenance (O&M), and decommissioning of a stand-alone offshore meteorological data collection

[1] BOEM's EIS also analyzes an alternative that, if selected, would implement a higher nameplate capacity WTG (up to 14 MW assumed for the analysis) than what is in the COP project design envelope. This higher capacity WTG, however, must still fall within the physical design parameters of the PDE and thus within the maximum case design parameters used for evaluating impacts in the EIS and this Finding. It is important to note, however, that under this alternative less than 100 WTGs would be approved and installed, potentially reducing some of the impacts described in this Finding depending on which WTG positions were to be removed.

[2] *Programmatic Agreement among the U.S. Department of the Interior, Bureau of Ocean Energy Management; the State Historic Preservation Officers of Massachusetts and Rhode Island; the Mashpee Wampanoag Tribe; the Narragansett Indian Tribe; the Wampanoag Tribe of Gay Head (Aquinnah); and the Advisory Council on Historic Preservation Regarding the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities Offshore Massachusetts and Rhode Island*

system (Tetra Tech 2016), which BOEM reviewed and approved (BOEM 2017). Section 106 reviews for both the lease issuance and the approval of the SAP were conducted pursuant to the PA (BOEM 2012a). These reviews concluded with a BOEM determination of no historic properties affected for lease issuance, corresponding to the finding of no significant impact (FONSI), consequent to EA finalization on June 4, 2013. NEPA review of the SAP for categorical exclusion (CATEX) documented BOEM's finding of no historic properties affected under Stipulation 1 of the PA, on September 21, 2016 (and for consequent SAP approval on October 12, 2017).

## 2.2 Undertaking

BOEM has determined that the construction, operation, maintenance, and eventual decommissioning of the Project is the undertaking subject to Section 106 and that the activities proposed in the COP have the potential to affect historic properties. Detailed information about the Project, including the COP and its appendices, can be found on BOEM's website (see https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan-april-2021). BOEM sent those appendices to the COP that identify cultural resources and assess historic properties to all consulting parties on February 28, 2022.. On August 1, 2022, and simultaneous to the March 2023 release of this Finding, BOEM sent revised versions of these appendices. These documents contain material that meets the criteria for confidentiality under Section 304 of the NHPA. The contents of the COP, as well as its public and confidential appendices on cultural resources, should be referred to by readers, where cited, and are not repeated in detail by the Finding.

BOEM has elected to use NEPA substitution for the Section 106 review pursuant to 36 CFR 800.8(c) (see also Advisory Council on Historic Preservation [ACHP} 2020; Council on Environmental Quality and ACHP 2013). BOEM's Section 106 review for this undertaking includes the identification and evaluation of historic properties and the assessment of effects for all the action alternatives identified during the NEPA review, in the draft environmental impact statement (EIS) for the Project (BOEM 2022a). The EIS analyzes the impacts of the Project to the human environment and specifically to cultural resources, including historic properties. The final EIS and Section 106 review analyze a total of 17 alternatives (A through G and variants under four of these [C1–C2, D1–D3, E1–E2, and G1–G3]), as presented in Table 4. BOEM has identified a preferred alternative for the final EIS that would be a combination of the alternatives analyzed in the EIS; however, this alternative would result in no changes to BOEM's finding adverse effect for the Project. BOEM's final decision will be described in the record of decision (ROD).

**Table 4. Description of the Alternatives Reviewed in the Environmental Impact Statement**

| Alternative | Description |
|---|---|
| A:<br>No Action Alternative | Under the No Action Alternative, BOEM would not approve the COP. Project construction and installation, O&M, and decommissioning would not occur, and no additional permits or authorizations for the Project would be required. Any potential environmental and socioeconomic impacts, including benefits, associated with the Project as described under the Proposed Action or the Preferred Alternative, would not occur. However, all other past and ongoing impact-producing activities would continue… The current resource condition, trends, and impacts from ongoing |

| | |
|---|---|
| | activities under the No Action Alternative serve as the baseline against which the direct and indirect impacts of all action alternatives are evaluated.<br>Over the life of the Project, other reasonably foreseeable future impact-producing offshore wind and non–offshore wind activities would be implemented, which would cause changes to the affected environment even in the absence of the Proposed Action or the Preferred Alternative. The continuation of all other existing and reasonably foreseeable future activities described in Appendix E [of the EIS] without the Proposed Action serves as the baseline against which the cumulative impacts of all alternatives are evaluated. |
| B:<br>Proposed Action Alternative (Proposed Action) | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. The Proposed Action includes up to 100 WTGs ranging in nameplate capacity of 8 to 12 MW sufficient to fulfill at a minimum the existing power purchase agreements (PPAs, totaling 704 MW) and up to 880 MW, the maximum capacity identified in the PDE. The WTGs will be connected by a network of IACs; up to two OSSs[3] connected by one OSS-link cable; up to two submarine export cables co-located within a single corridor; up to two underground transmission circuits located onshore; one onshore ICF; and one OnSS inclusive of up to two interconnection circuits connecting to the existing Davisville Substation in North Kingstown, RI. The Proposed Action includes the burial of offshore export cables below the seabed in both the OCS and RI state waters and a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs[4]. |
| C:<br>Habitat Impact Minimization Alternative | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. To reduce impacts to complex fisheries habitats most vulnerable to permanent and long-term impacts from the Proposed Action, however, certain WTG positions would be eliminated while maintaining a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs. The placement of WTGs would be supported by location-specific benthic and habitat characterizations conducted in close coordination with National Marine Fisheries Service (NMFS). Under this alternative, fewer WTG locations (and potentially fewer miles of IACs) than Alternative B would be approved by BOEM. Under this alternative, there are 5 “spare” WTGs:<br>• Alternative C1: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations to maintain a uniform east–west/north–south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 35 WTGs and associated IACs would be removed from consideration, resulting in up to 65 WTGs and associated IACs being approved.<br>• Alternative C2: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations to maintain a uniform east west and north-south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 36 WTGs and associated IACs would be removed from consideration, resulting in up to 64 WTGs and associated IACs being approved.<br>Refer to EIS Appendix K for background information on the development of the Alternative C1 and C2 layouts. |

[3] Each OSS has a maximum nominal capacity of 440 MW; two OSSs are required to achieve the PPA obligations of 704 MW.

[4] In accordance with 30 CFR Part 585.634(C)(6), micrositing of WTG foundations may occur within a 500-ft radius around each proposed WTG location. Micrositing of WTGs will be performed on a case-by-case basis to avoid significant seabed hazards such as surface and subsurface boulders, as stated in the COP.

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| D:<br>No Surface Occupancy in One or More Outermost Portions of the Project Area Alternative | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. However, to reduce conflicts with other competing space-use vessels, WTGs adjacent to or overlapping transit lanes proposed by stakeholders or the Buzzard's Bay Traffic Separation Scheme Inbound Lane, would be eliminated while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs. Under this alternative, BOEM could select one, all, or a combination of the following three alternatives, while still allowing for the fulfillment of existing PPAs and up to the maximum capacity identified in the PDE (i.e., 880 MW). Under this alternative, fewer WTG locations (and potentially fewer miles of IACs) than Alternative B would be approved by BOEM. Under this alternative, there are up to 6 "spare" WTGs:<br>• Alternative D1: Removal of the southernmost row of WTGs that overlap the 4-nm east-west transit lane proposed by the Responsible Offshore Development Alliance (RODA), as well as portions of Cox Ledge. Under this alternative, up to 7 WTGs and associated IACs would be removed from consideration, resulting in up to 93 WTGs and associated IACs being approved.<br>• Alternative D2: Removal of the eight easternmost WTGs that overlap the 4-nm north-south transit lane proposed by RODA. Under this alternative, up to 8 WTGs and associated IACs would be removed from consideration, resulting in up to 92 WTGs and associated IACs being approved.<br>• Alternative D3: Removal of the northwest row of WTGs adjacent to the Inbound Buzzards Bay Traffic Lane. Under this alternative, up to 7 WTGs and associated IACs would be removed from consideration, resulting in up to 93 WTGs and associated IACs being approved.<br>The selection of all three alternatives (i.e., D1, D2, and D3) would eliminate up to 22 WTG locations and associated IACs, resulting in up to 78 WTGs and associated IACs being approved while maintaining the 1 × 1–nm grid spacing proposed in the COP and as described in Alternative B. Based on the design parameters outlined in the COP, allowing for the placement of 78 to 93 WTGs and two OSSs would still allow for the fulfillment of up to the maximum capacity identified in the PDE (e.g., 880 MW = 74 WTGs needed if 12 MW WTGs are used). |
| E:<br>Reduction of Surface Occupancy to Reduce Impacts to Culturally-Significant Resources Alternative | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. However, to reduce the visual impacts on culturally important resources on Martha's Vineyard and in RI, some WTG positions would be eliminated while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs. Under this alternative, fewer WTG locations (and potentially fewer miles of IACs) than Alternative B would be approved by BOEM. Under this alternative, there are up to 5 "spare" WTGs:<br>• Alternative E1: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 36 WTGs and associated IACs would be removed from consideration, resulting in up to 64 WTGs and associated IACs being approved.<br>• Alternative E2: Allows for a power output delivery identified in the PDE of up to 880 MW while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 19 WTGs and associated IACs would be removed from consideration, resulting in up to 81 WTGs and associated IACs being approved.<br>Refer to EIS Appendix K for background information on the development of the Alternative E1 and E2 layouts. |

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| F:<br>Selection of a Higher Capacity Wind Turbine Generator | The construction and installation, O&M, and eventual decommissioning of a wind energy facility implementing a higher nameplate capacity WTG (up to 14 MW) than what is proposed in the COP. This higher capacity WTG must fall within the physical design parameters of the PDE and be commercially available to the Project proponent within the time frame for the construction and installation schedule proposed in the COP. The number of WTG locations under this alternative would be sufficient to fulfill the minimum existing PPAs (total of 704 MW and 56 WTGs, including up to five “spare” WTG locations). Using a higher capacity WTG would potentially reduce the number of foundations constructed to meet the purpose and need and thereby potentially reduce impacts to marine habitats and culturally significant resources and potentially reduce navigation risks. |
| G:<br>Preferred Alternative | The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the range of the design parameters outlined in the COP, subject to applicable mitigation measures. The Preferred Alternative is designed to reduce impacts to visual resources and benthic habitat and includes up to 79 possible positions for the installation of 65 WTGs with a nameplate capacity of 8-12 MW necessary to fulfill the existing PPAs (total of 704 MW) while maintaining the uniform east–west and north–south 1 × 1–nm grid spacing between WTGs. There are up to 14 “spare” WTG positions available for use if unforeseen siting conditions occur necessitating relocation of any of the 65 WTGs from the planned position(s). Two of the 65 WTGs have the flexibility to be located in 3 different spots within the 79 WTG possible positions. As a result, this alternative includes the analysis of three layouts for installation of the 65 WTGs. This flexibility in design could allow for further refinement for visual resources impact reduction on Martha’s Vineyard and Rhode Island, or for habitat impact reduction in the NMFS Priority 1 area.<br>• Alternative layout G1: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while relocating 2 WTG locations from NMFS Priority 1 area to reduce fishery and essential fish habitat impacts. Under this alternative, 35 WTGs and associated IACs would be removed from consideration, resulting in 65 WTGs and associated IACs being installed in the positions identified in layout G1.<br>• Alternative layout G2: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while relocating 2 WTG locations to reduce visual impacts on the horizon from the Aquinnah Overlook, a culturally-important resource. Under this alternative, 35 WTGs and associated IACs would be removed from consideration, resulting in 65 WTGs and associated IACs being installed in the positions identified in layout G2.<br>• Alternative layout G3: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while relocating 2 WTG locations closest to the shore of Martha’s Vineyard to reduce visual impacts on culturally-important resources. Under this alternative, 35 WTGs and associated IACs would be removed from consideration, resulting in 65 WTGs and associated IACs being installed in the positions identified in layout G3.<br>All other components of Alternative G are the same as Alternative B and include: up to two offshore substations (OSSs) connected by an offshore substation-link cable; up to two submarine export cables co-located within a single corridor; up to two underground transmission circuits located onshore within a single corridor; and an onshore substation inclusive of up to two interconnection circuits within a single corridor connecting to the existing Davisville Substation in North Kingstown, Rhode Island.<br>Refer to Appendix K for background information on the development of the Alternative G and Alternative G1, G2 and G3 layouts. |

Source: BOEM final EIS Table 2.1-1

## 2.3 Area of Potential Effects

The geographic analysis area, as described for potential impacts to cultural resources (marine, terrestrial, and above ground) in the EIS under NEPA is equivalent to the Project's APE, as defined in the Section 106 regulations. In 36 CFR 800.16(d), the APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alteration in the character or use of historic properties, if any such properties exist." BOEM (2020) defines the Project APE as follows:

- the depth and breadth of the seafloor potentially affected by any bottom-disturbing activities, constituting the marine cultural resources portion of the APE;
- the depth and breadth of terrestrial areas potentially affected by any ground-disturbing activities, constituting the terrestrial cultural resources portion of the APE;
- the viewshed from which renewable energy structures, whether located offshore or onshore, would be visible, constituting the APE for visual impacts analysis; and
- any temporary or permanent construction or staging areas, both onshore and offshore.

This Finding assesses effects only to historic properties within the APE for the Project. These effects include reasonably foreseeable effects caused by the Project that could occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5(a)(1)).

### 2.3.1 Marine Area of Potential Effects

BOEM (2020) defines the APE for marine cultural resources (hereafter marine APE) as the depth and breadth of the seafloor potentially impacted by bottom-disturbing activities of the Project (Figure A-1 in Appendix A) (SEARCH 2023).

#### 2.3.1.1 Revolution Wind Farm Maximum Work Area

The marine APE encompasses all offshore areas where seafloor-disturbing activities from WTG and OSS foundation construction IAC trenching and installation, boulder relocation, and vessel anchoring could occur. The RWF COP PDE proposes up to 100 WTGs and two OSSs within the extent of the APE. Each potential WTG and OSS foundation location includes up to approximately 3-acres of seafloor disturbance under the maximum-case scenario, for a combined total of approximately 734 acres of horizontal construction disturbance for up to 102 offshore Project foundations, reaching up to a maximum vertical extent of 164 feet below seabed (bsb) for monopile foundations (BOEM 2022a). Under the maximum-case scenario up to 164 miles of IAC and OSS-link cable would be installed, resulting in up to 2,619 acres of seafloor disturbance and reaching cable emplacement depths of up to 10 feet below seafloor (BOEM 2022a). The target IAC and OSS-link cable burial depth requirement for the Project is 4 to 6 feet bsb.

#### 2.3.1.2 Revolution Wind Farm Export Cable Offshore Corridor

The RWEC would span approximately 42 miles through federal waters and RI state waters with landfall near Quonset Point, RI (BOEM 2022a). Combined, the two parallel cables' length would be approximately 84 miles. The RWEC would span 19 miles of the OCS and 23 miles through RI state waters before reaching landfall (BOEM 2022a). The entire RWEC would be located within a 1,640-foot-wide Project easement (8,349 acres) with the maximum depth of RWEC burial impact extending 13 feet

(4 m) below the seafloor (BOEM 2022a). The target RWEC burial depth requirement for the Project is 4 to 6 feet bsb. The maximum-case scenario for horizontal seafloor disturbance of the RWEC would be 1,390 acres of the 8,349 acre-corridor (BOEM 2022a). At the landfall work area, the marine APE also includes workspaces where potential seafloor-disturbing activities associated with horizontal directional drilling (HDD), potentially involving use of an offshore cofferdam, and vessel anchoring could occur. Details of the onshore transition for the RWEC is described with the landfall envelope in Section 2.3.2.1.

#### 2.3.1.3 Offshore Vessel Anchoring

Vessel anchoring for RWF and RWEC construction, operations, maintenance, and decommissioning would disturb up to 3,178 acres of seafloor under the maximum-case scenario (BOEM 2022a). Anchors for cable-laying vessels have a maximum penetration depth of 15 feet within the RWF and 18 feet for the RWEC (SEARCH 2023).Anchoring would be limited to the RWF maximum work area and the RWEC corridor (see Figure B-1).

### 2.3.2 Terrestrial Area of Potential Effects

BOEM (2020) defines the APE for terrestrial cultural resources (hereafter terrestrial APE) as the depth and breadth of terrestrial areas potentially impacted by any ground-disturbing activities of the Project. This includes the areas of the landfall envelope, onshore transmission cable easement, OnSS, and ICF depicted in Figure A-2.

#### 2.3.2.1 Landfall Envelope

Revolution Wind is considering a range of siting options for the RWEC landfall, all of which are encompassed by a 20-acre landfall work area. Within this area, 3.1 acres would be sited, within which ground disturbance associated with the onshore transmission cable construction would occur. The deepest disturbances within the landfall work area would be associated with the HDD construction method for cable emplacement, which could entail the installation of temporary sheet pile anchor walls driven to a depth of approximately 20 feet. The HDD drill itself could reach a depth of up to 66 feet below the seafloor and between the onshore transition joint bays and the offshore exit pits. HDD sediment displacement would be largely confined to the two 3-foot-diameter bore holes.

#### 2.3.2.2 Onshore Transmission Cabling

The width of potential ground disturbance for the onshore transmission cable is assumed to be at the extent of the Project easement, which is 25 feet wide centered along the cable route. The preferred onshore transmission cable route from the landfall location to the OnSS is an approximately 1-mile route that would predominantly follow along paved roads or previously disturbed areas such as parking lots. There are alternative onshore transmission cable routes under consideration within the onshore transmission cable PDE, as depicted on Figure A-2. The maximum-scenario for onshore cable disturbance is 16.7 acres. Although some of the alternative routes under consideration have segments that would be installed in undeveloped vegetated areas, these alternates would mostly be installed within paved roads and parking lots (as with the preferred onshore transmission cable route) and would be approximately the same length. Project-related ground disturbance could extend to a maximum depth of 13 feet below ground level anywhere within the width of this easement. Installation of the onshore transmission cable would impact approximately 3.1 acres; therefore, only a portion of the 16.7-acre onshore transmission cable envelope would actually be impacted by installation of the onshore transmission cable.

#### 2.3.2.3 Onshore Substation and Interconnection Facility

Construction of the OnSS and ICF would together require disturbance of approximately 11 acres within the terrestrial APE (BOEM 2022a). The maximum depth of disturbance within the OnSS and ICF work area limit is 60 feet below ground surface. The OnSS and ICF would have an underground cable connecting them, and the ICF would have an overhead cable connecting to the adjacent, existing TNEC Davisville substation.

### 2.3.3 Visual Area of Potential Effects

The APE for potential visual effects (hereafter visual APE) from the Project consists of onshore coastal areas of Connecticut (CT), New York (NY), RI, and MA. Maximum limits of theoretical visibility are represented by 1-mile, 3-mile, and 40-mile radii for each respective onshore or offshore Project component (WTG, OSS, OnSS, ICF, or O&M facility); however, these radii do not define the visual APE. Within these radii, the visual APE is defined only by those geographic areas with a potential visibility of Project components and, therefore, the visual APE excludes areas with obstructed views of Project components. Visibility and views of Project components were determined through a viewshed analysis (EDR 2021a, 2021b, 2021c, 2023). The viewshed analysis applied geographic information system (GIS) modeling to take into account the true visibility of the Project (e.g., visual barriers such as topography, vegetation, and intervening structures that obstruct the visibility of Project components).

Areas with potentially unobstructed views of offshore Project components comprise the APE for above ground historic properties (visual APE); see the shaded visual APE (Offshore Facility Viewshed) and visual APE (Onshore Facility Viewshed) areas in Figures A-3 and A-4. Figure A-4 also depicts reasonably foreseeable future project areas for consideration of cumulative effects within the visual APE.

#### 2.3.3.1 Onshore Project Components

Onshore Project facilities with above ground components include the OnSS and ICF, and these components have a viewshed radius of 3 miles. Onshore Project components where redevelopment of existing facilities could occur (O&M facilities) have a viewshed radius of 1 mile around and include potential O&M facilities at the Port of Davisville at Quonset Point and Port Robinson. The 1-mile radius at the Port of Davisville at Quonset Point O&M facility is completely subsumed within the 3-mile radius around the ICF and OnSS (Figure A-3).

The horizontal extent of the OnSS and ICF, as described under the terrestrial APE at Section 2.3.2.3, would be within an 11-acre area of disturbance. The maximum height of OnSS and ICF equipment would be up to 45 feet above ground, with OnSS shielding masts extending further, up to 65 feet, and the ICF overhead transmission circuit structures reaching up to 80 feet above ground (BOEM 2022a). Facility lighting was considered in the analysis of visual effects.

### 2.3.3.2 Offshore Project Components

Offshore Project components (e.g., WTGs) have a viewshed radius of 40 miles around the edge of the Lease Area (Figure A-4). The Project [redacted] extends to above ground historic properties in the following cities and towns (EDR 2023):

- RI—Bristol, Charlestown, Cranston, East Greenwich, Exeter, Jamestown, Little Compton, Middletown, Narragansett, New Shoreham, Newport, North Kingstown, Portsmouth, South Kingstown, Tiverton, Warwick, and Westerly;
- MA—Acushnet, Aquinnah, Barnstable, Bourne, Chilmark, Dartmouth, Edgartown, Fairhaven, Fall River, Falmouth, Gosnold, Marion, Mattapoisett, Nantucket, New Bedford, Swansea, Tisbury, Wareham, West Tisbury, and Westport;
- NY—East Hampton and Southold; and
- CT—Groton.

Above ground historic property distribution in the visual APE is mapped on Figure A-4. APE delineation and historic property identification assessed the potential visibility of a WTG from the water level to the tip of an upright rotor blade at a height of 873 feet and further considered how distance and curvature of the Earth affect visibility as space between the viewing point and WTGs increases (EDR 2021c, 2023). Potential WTG and OSS locations and spacing in the Project Lease Area also informed analyses, including when combined with the cumulative development of other reasonably foreseeable offshore wind developments (EDR 2021b). The analysis further considered the nighttime lighting of offshore structures and construction lighting.

# 3 Steps Taken to Identify Historic Properties

## 3.1 Technical Reports

To support the identification of historic properties within the APE, Revolution Wind has provided survey reports detailing the results of multiple investigations within the APE (marine, terrestrial, and visual). Table 5 provides a summary of these efforts to identify historic properties and the key findings/recommendations of each investigation. BOEM has reviewed and accepted all reports summarized in Table 5. BOEM found that the preliminary APEs identified by Revolution Wind are appropriate for the magnitude, extent, location, and nature of the undertaking; that the reports collectively represent a good faith effort to identify historic properties within the APE; and that the reports are sufficient to apply the Criteria of Adverse Effect (see Section 4) and to continue consultations with consulting parties for taking into account and resolving adverse effects to historic properties.

### 3.1.1 Report Summary – Marine

The Marine Archaeological Resources Assessment (MARA) provides the results of the archaeological survey of the seafloor and seabed within the marine APE for historic properties, largely represented by ASLFs and shipwrecks/possible historic shipwrecks. ASLFs represent submerged lands [redacted] that were inundated by approximately 8,000 years before present (B.P.), with submersion taking several thousand years at the beginning of the Holocene epoch, following the last ice age. Shipwrecks and similar submerged craft or structures of the type found to date sank within the past 400 years, after European colonization of New England. Historic properties (shipwrecks/possible historic shipwrecks and ASLFs) located in the marine APE in the RWF Lease Area and the RWEC corridor are depicted in Appendix B (Figure B-1) (SEARCH 2023:Figure 4-1). Appendix B contains sensitive historic property location information that meets the criteria for confidentiality under Section 304 of the NHPA and, for this reason, is detached from the publicly available copies of the Finding.

### 3.1.2 Report Summary – Terrestrial

The Terrestrial Archaeological Resources Assessment (TARA) provides the results of land-surface and subsurface-onshore archaeological survey (Phase I archaeological survey) of the terrestrial APE. The RWEC would transition from sea to shore at Quonset Point in RI. Quonset Point is in an area [redacted] extending to the west and southwest of the terrestrial APE (Forrest and Waller 2023). However, construction, operations, decommissioning, and large-scale redevelopment of former military facilities at Quonset Point following World War II has substantially altered the terrestrial APE. Intact pockets of natural soils represent a small percentage of all surficial earth. The proposed OnSS site was used as a general dump site during naval operations (1940s through 1960s); several hundred tons of debris and soil were removed from this dump site during remediation activities in the late 1990s. The pockets of relatively intact natural soils within the terrestrial APE are located within [redacted] work area limits and along the southern margins of the landfall area (Forrest and Waller 2023).

The Public Archaeology Laboratory, Inc. (PAL) contacted the RIHPHC and the Narragansett Indian Tribe, Wampanoag Tribe of Gay Head (Aquinnah), Mashpee Wampanoag Tribe, Mashantucket (Western) Pequot Tribal Nation, and Mohegan Tribe of Indians of Connecticut Tribal Nations to consider and address tribal concerns within its Phase I archaeological survey area. The archaeological survey [redacted] of the terrestrial APE identified four [redacted] archaeological resources (Forrest and Waller 2023). PAL did not conduct remote sensing (ground-penetrating radar, soil resistivity, magnetometry, or similar techniques). Dense surface vegetation made remote sensing impractical, and twentieth-century dumping, filling, and other ground disturbances and landscape modifications would have produced inconclusive results. The RIHPHC also has not favored remote sensing as a method sufficiently reliable for archaeological site identification in and of itself, preferring ground truthing instead to include the excavation of test pits or other excavation units.

### 3.1.3 Report Summary – Visual

The onshore and offshore Historic Resources Visual Effects Analyses (HRVEAs) and cumulative HRVEA (CHRVEA) identify the range of above ground historic properties identified in the visual APE for onshore and offshore project facilities, elements, or components (interchangeably). The CHRVEA builds from the results of the HRVEAs to assess where the effects of the Project may combine cumulatively with those of other reasonably foreseeable offshore wind projects (SWCA 2023).

For the onshore components' viewshed, the HRVEA identified a total of 80 above ground viewshed resources, within 3 miles of the proposed OnSS and ICF, that consist of 16 NRHP-listed properties, two properties that have been determined by the RIHPHC to be eligible for the NRHP, nine properties included in the RIHPHC inventory but without formal determinations of NRHP eligibility, and 53 RIHCC-identified Rhode Island Historical Cemeteries (EDR 2021a). Viewshed analyses determined that of these 80 viewshed resources, two are within the visual APE. These two resources are located within the viewshed of the OnSS and ICF. The viewshed analysis determined that neither are within the viewshed of any of the five potential O&M facility locations considered in the COP. At 1.1 miles away from the OnSS and ICF location is the NRHP-listed Wickford Historic District; at 0.25 mile away is the Quonset Point Naval Air Station, determined by the RIHCC to be NRHP eligible (EDR 2021a). The historic Quonset Point Naval Air Station is also addressed in the offshore HRVEA (EDR 2023).

In relation to the offshore Project components, the HRVEA identified a total of 451 above ground historic properties within the visual APE that consist of 98 NRHP-listed properties, 73 historic properties that have been determined eligible for the NRHP, 280 properties included in the RIHPHC, Massachusetts Historical Commission (MHC), or local historic inventories but without formal determinations of NRHP eligibility (EDR 2023). Those without formal determinations of NRHP eligibility are treated as historic properties in the HRVEA and in this Finding. Twelve of the NHRP-listed viewshed resources are also NHLs (EDR 2023). These are the Montauk Point Lighthouse, Block Island Southeast Lighthouse, Original U.S. Naval War College Historic District, Fort Adams Historic District, Battle of Rhode Island Historic District, Nantucket Historic District, New Bedford Historic District, Ocean Drive Historic District, Bellevue Avenue Historic District, The Breakers, Marble House, and William Watts Sherman House (Figure A-5). Three resources documented specifically due to their categorization as TCPs in MA, and where they may extend to the OCS, consist of the [redacted] TCP, the [redacted] TCP, and the [redacted] TCP. These TCPs are represented by broad, complex cultural landscapes and connected seascapes (EDR 2023). The [redacted] TCP is NRHP listed and the [redacted] TCP and the [redacted] TCP have previously been determined NRHP eligible by BOEM.

**Table 5. Cultural Resources Investigations Performed by Revolution Wind in the Area of Potential Effects (Marine, Terrestrial, and Visual)**

| Portion of APE | Report | Description | Key Findings/Recommendations |
|---|---|---|---|
| **Offshore** | *Marine Archaeological Resources Assessment* (SEARCH 2023) | Assessment of marine archaeological resources through remote sensing technologies of the marine APE | This MARA identified 19 shipwrecks/possible historic shipwrecks and 13 geomorphic features (ASLFs) of archaeological interest. SEARCH concluded avoidance is possible for 20 of the shipwrecks/possible historic shipwrecks through a 164-foot (50-meter) buffer in radius around the extent of the identified resource. Revolution Wind has determined that it would be able to fully avoid four ASLFs (Revolution Wind 2023). Full avoidance was determined not feasible at the remaining nine ASLFs and further action was recommended as necessary.* |
| **Onshore** | *Terrestrial Archaeological Resources Assessment Revolution Wind Farm Project Onshore Facilities* (Forrest and Waller 2023) | Phase I archaeological survey for the onshore components to identify terrestrial archaeological sites | This TARA identified four [redacted] archaeological sites. Two of the sites, [redacted] #1 and [redacted] #2, were recommended eligible for the NRHP under Criteria A and D. Full avoidance of the two historic properties was determined not feasible and further action was recommended as necessary (Forrest and Waller 2023).* |
| **Visual** | *Visual Impact Assessment and Historic Resources Visual Effects Analysis Revolution Wind Onshore Facilities* (EDR 2021a) | Report analyzing the viewsheds surrounding the O&M, OnSS, and ICF facilities proposed for Quonset Business Park/Quonset Point | This HRVEA identified 80 above ground historic properties within 3 miles of the proposed OnSS and ICF. Viewshed analyses determined that a total of two above ground historic properties are located within the viewshed of the OnSS and ICF but are not within the viewshed of any of the five potential O&M facility locations. One of these historic properties, the Quonset Point Naval Air Station, is additionally reviewed in the offshore HRVEA (EDR 2023). No adverse effects were found to above ground historic properties from proposed onshore project components (EDR 2021a). |

* Note: In confidential COP Appendix BB (EDR 2022b), Revolution Wind has proposed further measures to avoid, minimize, and mitigate adverse effects from the Project to historic properties. BOEM continues meeting with consulting parties to take into account the effects of the undertaking on historic properties and to reach resolution of adverse effects through preparation and implementation of a memorandum of agreement (MOA). BOEM has drafted avoidance, minimization, and mitigation measures for historic properties in both the MOA and the historic property treatment plans (HPTPs) attached to the MOA.

| Portion of APE | Report | Description | Key Findings/Recommendations |
|---|---|---|---|
| **Visual** | *Historic Resources Visual Effects Analysis Revolution Wind Farm* (EDR 2023) | Report analyzing the viewsheds from the WTGs and OSS through GIS modeling to determine the area of Project visibility and define the APE for historic properties sensitive to visual effects | This HRVEA identified 451 above ground historic properties within the APE, including 12 NHLs and three TCPs. These historic properties were analyzed with respect to the potential for visual effects. They were assessed according to the visibility of the offshore Project WTGs and OSS and potential Project effect on the characteristics of historic properties that make them eligible for NRHP listing. A total of 101 above ground historic properties would be adversely affected by the Project under maximum potential visibility (EDR 2023). BOEM's further analysis of these results in the CHRVEA finds that the combined visual effects of the Project with those of other reasonably foreseeable offshore wind projects would additionally result in cumulative adverse effects to these 101 historic properties (SWCA 2023). The 101 above ground historic properties that would be adversely affected include five NHLs and two TCPs. Full avoidance of visual effects to the 101 historic properties was determined not feasible and further action was recommended as necessary in the HRVEA and CHRVEA. See * note above. |
| | *Revolution Wind Project Updates to Historic Resources Visual Effects Analysis* (Revolution Wind 2022a) | Memorandum reviewing revisions in 2022 to the HRVEA, originally drafted in 2021 | This memo summarizes responses to consulting party comments resulting in the refinement—in the HRVEA (EDR 2023)—of the precision of historic property boundaries, the refinement of the identification and evaluation of historic properties, and the refinement of the assessment of Project visual effects to historic properties in the APE in relation to offshore project facilities. |
| | *Revolution Wind Farm National Historic Landmarks* (EDR 2022a) | Supplemental documentation with added summaries of NHLs in the APE and visualizations of offshore Project facilities from NHLs | This supplemental documentation further summarizes the historic significance of the 12 NHLs identified in the APE in relation to their aspects of integrity that are connected to sea views. Additional photographs and visualizations (i.e. simulated Project WTGs) for each NHL are included. These visualizations include representations of the visibility of simulated WTGs on the sea and wire-frame visualizations that indicate where WTGs would be positioned behind obstructions, such as treescapes. |
| | *Overview of Revisions to S106 Technical Reports and Document* (Revolution Wind 2023) | Memorandum on revisions in 2023 to the TARA, MARA, HRVEA, and historic property treatment plans (HPTPs) | This memo summarizes responses to consulting party comments resulting in the refinement—in the HRVEA (EDR 2023)—of the precision of historic property boundaries, the refinement of the identification and evaluation of historic properties, and the refinement of the assessment of Project visual effects to historic properties in the APE in relation to offshore project facilities. |

## 3.2 Consultation and Coordination with Consulting Parties and the Public

### 3.2.1 Early Coordination

Since 2009, BOEM has coordinated OCS renewable energy activities for the RI/MA and MA WEAs with its federal, state, local, and tribal government partners through its intergovernmental Renewable Energy Task Force. BOEM has met regularly with federally recognized Native American Tribal Nations (Tribal Nations) that could be affected by renewable energy activities in the area since 2011, specifically during planning for the issuance of offshore wind energy leases and review of site assessment activities proposed for those leases. BOEM also hosts public information meetings to update interested stakeholders on major renewable energy milestones. Information on BOEM's RI/MA and MA Renewable Energy Task Force meetings is available at https://www.boem.gov/Massachusetts-Renewable-Energy-Task-Force-Meetings, and information on BOEM's stakeholder engagement efforts is available at https://www.boem.gov/renewable-energy/state-activities/public-information-meetings.

### 3.2.2 National Environmental Policy Act Scoping and Public Hearings

On April 30, 2021, BOEM published the notice of intent (NOI) to prepare an EIS for the Revolution Wind COP and published a revised NOI on June 4, 2021 (BOEM 2021a; BOEM 2021b), extending the public scoping period to June 11, 2021. The purpose of the NOI was to announce BOEM's intent to prepare an EIS and to start the public scoping period for the NEPA effort wherein BOEM solicits public input on issues of concern and potential alternatives to be considered in the EIS. Through this notice, BOEM announced that it would use the NEPA substitution process for the Section 106 review for this undertaking, in accordance with Section 106 implementing regulations.

During the public scoping period, BOEM held three virtual scoping meetings for consulting parties and the public, which included specific opportunities for engaging on issues relative to Section 106 for the Project, on Thursday, May 13; Tuesday, May 18; and Thursday, May 20, 2021. Through the NEPA scoping process, BOEM received comments related to cultural, historic, archaeological, and tribal resources. BOEM's EIS scoping report includes these comments (BOEM 2022b).

BOEM published a notice of availability of the draft EIS for the COP on September 2, 2022. As part of this process, BOEM held a 45-day comment period and public meetings (through October 17, 2022), providing further opportunity for engagement on issues pertinent to Section 106 review. BOEM held public hearings on the draft EIS on September 29 and October 4–6 and 11, 2022.

### 3.2.3 Section 106 Consultation

BOEM sent Section 106 consultation invitations to 127 potential consulting parties pursuant to 36 CFR 800.3(f) of the Section 106 regulations, via mail and email between April 2 and 30, 2021. Additional consulting parties were invited throughout the consultation process, as they were identified. Throughout spring and early summer 2021, as third-party consultant to BOEM, SWCA Environmental Consultants (SWCA) followed up with parties to confirm preferred points of contact and interest in participating. Consequent to BOEM drafting the Finding, BOEM additionally invited entities who may own or administer adversely affected historic properties and requested Revolution Wind post public notices (in newspapers and at libraries and post offices) notifying the public and interested parties qualified to consult under NHPA Section 106 (36 CFR 800.2). Where appropriate, public notices were posted in both English and Spanish. The organizations BOEM invited to consult beginning in April 2021 and contacted directly in February 2023 are listed in Table 6.

**Table 6. Parties Invited to Participate in 106 Consultation**

| Participants in the Section 106 Process | Invited Consulting Parties |
| --- | --- |
| **SHPOs and state agencies** | Connecticut State Historic Preservation Office |
| | Connecticut Department of Economic and Community Development |
| | RIHPHC |
| | New York State Division for Historic Preservation |
| | MHC |
| | Massachusetts Board of Underwater Archaeological Resources |
| | Massachusetts Commissioner on Indian Affairs |
| | Rhode Island Department of Environmental Management |
| **Federal agencies** | National Park Service (NPS) |
| | National Oceanic and Atmospheric Administration – Habitat and Ecosystem Services Division |
| | U.S. Army Corps of Engineers, New England District |
| | U.S. Army Corps of Engineers, New York District |
| | Office of the Deputy Assistant Secretary of the Navy for Environment (DASN(E)) |
| | Chief of Naval Operations, Installations Division |
| | Naval Facilities Engineering Systems Command Headquarters–Cultural Resources |
| | Naval History and Heritage Command – Underwater Archaeology Branch |
| | Bureau of Safety and Environmental Enforcement |
| | U.S. Department of Defense - Office of the Deputy Assistant Secretary of Defense (Environment), Environmental Compliance and Planning |
| | U.S. Department of Defense - Office of the Assistant Secretary of Defense for Sustainment |
| | ACHP |
| | U.S. Coast Guard -Sector SE New England |
| | U.S. Coast Guard - Marine Transportation Systems (CG-5PW) |
| | U.S. Coast Guard – First Coast Guard District |

| Participants in the Section 106 Process | Invited Consulting Parties |
|---|---|
| | U.S. Fish and Wildlife Service |
| | Environmental Protection Agency |
| | Federal Aviation Administration |
| **Federally recognized Tribal Nations** | Mashpee Wampanoag Tribe |
| | Shinnecock Indian Nation |
| | Mashantucket (Western) Pequot Tribal Nation |
| | Wampanoag Tribe of Gay Head (Aquinnah) |
| | Mohegan Tribe of Indians of Connecticut |
| | Narragansett Indian Tribe |
| | Delaware Tribe of Indians |
| | The Delaware Nation |
| **Non-federally recognized Tribal Nations** | Chappaquiddick Tribe of Wampanoag Nation |
| | The Golden Hill Paugussett |
| | Eastern Pequot Tribal Nation |
| | Schaghticoke Tribal Nation |
| | Unkechaug Nation |
| **Local governments** | Cape Cod Commission |
| | City of Newport |
| | County of Dukes (MA) |
| | Town of Charlestown |
| | Town of East Hampton |
| | Town of Middletown |
| | Town of Nantucket |
| | Nantucket Planning and Economic Development Commission |
| | Town of Narragansett |
| | Town of North Kingstown |
| | City of Cranston |
| | City of East Providence |
| | City of Fall River |
| | City of New Bedford |
| | City New Bedford Historical Commission |
| | City of Providence |
| | City of Rehoboth |
| | City of Taunton |

| Participants in the Section 106 Process | Invited Consulting Parties |
|---|---|
| | County of Barnstable (MA) |
| | County of Bristol (MA) |
| | County of Plymouth (MA) |
| | County of Suffolk (NY) |
| | Town of Acushnet |
| | Town of Aquinnah |
| | Town of Barnstable |
| | Town of Barrington |
| | Town of Berkley |
| | Town of Bourne |
| | Town of Bristol |
| | Town of Chilmark |
| | Town of Coventry |
| | Town of Dartmouth |
| | Town of Dighton |
| | Town of East Greenwich |
| | Town of Edgartown |
| | Town of Exeter |
| | Town of Fairhaven |
| | Town of Falmouth |
| | Town of Freetown |
| | Town of Gosnold |
| | Town of Griswold |
| | Town of Groton |
| | Town of Hopkinton |
| | Town of Jamestown |
| | Town of Johnston |
| | Town of Lakeville |
| | Town of Ledyard |
| | Town of Little Compton |
| | Town of Marion |
| | Town of Mashpee |
| | Town of Mattapoisett |
| | Town of Middleborough |

| Participants in the Section 106 Process | Invited Consulting Parties |
|---|---|
| | Town of Nantucket |
| | Town of New Shoreham |
| | Town of North Stonington |
| | Town of Oak Bluffs |
| | Town of Portsmouth |
| | Town of Richmond |
| | Town of Rochester |
| | Town of Sandwich |
| | Town of Scituate |
| | Town of Seekonk |
| | Town of Somerset |
| | Town of South Kingstown |
| | Town of South Kingstown Historic District Commission |
| | Town of Southold |
| | Town of Stonington |
| | Town of Swansea |
| | Town of Tisbury |
| | Town of Tiverton |
| | Town of Tiverton Historic Preservation Advisory Board |
| | Town of Voluntown |
| | Town of Wareham |
| | Town of Warren |
| | Town of Warwick |
| | Town of West Greenwich |
| | Town of West Tisbury |
| | Town of West Tisbury Historic District Commission |
| | Town of West Warwick |
| | Town of Westerly |
| | Town of Westport |
| | Town of Westport Historical Commission |
| **Non-governmental organizations or groups** | Alliance to Protect Nantucket Sound |
| | Balfour Beatty Communities |
| | Beavertail Lighthouse Museum Association |
| | Block Island Historical Society |

| Participants in the Section 106 Process | Invited Consulting Parties |
|---|---|
| | Bristol Historical and Preservation Society |
| | Butler Flats Lighthouse (Mass Light Ltd) |
| | Clambake Club of Newport |
| | Cuttyhunk Historical Society |
| | East Greenwich Historic Preservation Society |
| | Friends of Sakonnet Light |
| | Gay Head Lighthouse Advisory Committee |
| | Martha's Vineyard Commission |
| | Montauk Historical Society |
| | Newport Historical Society |
| | Newport Restoration Foundation |
| | Norman Bird Sanctuary |
| | Preservation Massachusetts |
| | Rhode Island Historical Society |
| | Salve Regina University |
| | Southeast Lighthouse Foundation |
| | The Preservation Society of Newport County |
| | Revolution Wind (lessee) |

Entities that responded to BOEM's invitation to consult or were subsequently made known to BOEM and added as consulting parties are listed in Table 7.

**Table 7. Consulting Parties Participating in 106 Consultation**

| Participants in the Section 106 Process | Participating Consulting Parties |
|---|---|
| **SHPOs and state agencies** | Connecticut State Historic Preservation Office |
| | Connecticut Department of Economic and Community Development |
| | RIHPHC |
| | New York State Division for Historic Preservation |
| | MHC |
| | Rhode Island Department of Environmental Management |
| **Federal agencies** | NPS |
| | U.S. Army Corps of Engineers, New England District |
| | U.S. Army Corps of Engineers, New York District |
| | Office of the Deputy Assistant Secretary of the Navy for Environment (DASN(E)) |

| Participants in the Section 106 Process | Participating Consulting Parties |
|---|---|
| | Chief of Naval Operations, Installations Division |
| | Naval Facilities Engineering Systems Command Headquarters–Cultural Resources |
| | Naval History and Heritage Command – Underwater Archaeology Branch |
| | U.S. Department of Defense - Office of the Deputy Assistant Secretary of Defense (Environment), Environmental Compliance and Planning |
| | U.S. Department of Defense - Office of the Assistant Secretary of Defense for Sustainment |
| | ACHP |
| | Bureau of Safety and Environmental Enforcement |
| | U.S. Coast Guard -Sector SE New England |
| | U.S. Coast Guard - Marine Transportation Systems (CG-5PW) |
| | Environmental Protection Agency |
| | Federal Aviation Administration |
| **Federally recognized Tribal Nations** | Mashpee Wampanoag Tribe |
| | Shinnecock Indian Nation |
| | Mashantucket (Western) Pequot Tribal Nation |
| | Wampanoag Tribe of Gay Head (Aquinnah) |
| | Mohegan Tribe of Indians of Connecticut |
| | Narragansett Indian Tribe |
| | Delaware Tribe of Indians |
| | The Delaware Nation |
| **Non-federally recognized Tribal Nations** | Chappaquiddick Tribe of Wampanoag Nation |
| | Unkechaug Nation |
| **Local governments** | City of Newport |
| | County of Dukes (MA) |
| | Town of Charlestown |
| | Town of East Hampton |
| | Town of Little Compton |
| | Town of Middletown |
| | Town of Nantucket |
| | Nantucket Planning and Economic Development Commission |
| | Town of Narragansett |

| Participants in the Section 106 Process | Participating Consulting Parties |
|---|---|
| | Town of North Kingstown |
| | Town of New Shoreham |
| **Nongovernmental organizations or groups** | Block Island Historical Society |
| | Clambake Club of Newport |
| | Friends of Sakonnet Light |
| | Gay Head Lighthouse Advisory Committee |
| | Newport Restoration Foundation |
| | Norman Bird Sanctuary |
| | The Preservation Society of Newport County |
| | Rhode Island Historical Society |
| | Salve Regina University |
| | Southeast Lighthouse Foundation |
| | Revolution Wind (lessee) |

On January 15–17, July 21 and 27, and August 20, 2020; on March 12 and April 9 and August 2 and 13, 2021; February 3, May 2, June 1 and 2, 2022; and January 24 and February 3, 2023, BOEM met with federally recognized Tribal Nations to simultaneously discuss multiple BOEM actions, including BOEM's action on Revolution Wind. Officials with the Mashpee Wampanoag Tribe, Mashantucket (Western) Pequot Tribal Nation, and Wampanoag Tribe of Gay Head (Aquinnah) have attended Project cooperating agency meetings to date. BOEM received comments from the Tribal Nations during June 2021 cooperating agency meetings in the scoping of Project alternatives and weighed these in the identification of alternatives to consider in detailed EIS analyses (BOEM 2022a). See EIS Appendix A at *Government-to-Government Consultation with Federally Recognized Indian Tribes* (BOEM 2022a). The Mohegan Tribe of Indians of Connecticut, the Mashantucket (Western) Pequot Tribal Nation, the Narragansett Indian Tribe, the Wampanoag Tribe of Gay Head (Aquinnah), the Mashpee Wampanoag Tribe, the Shinnecock Indian Nation, the Delaware Nation, and the Delaware Tribe of Indians participated in various meetings. BOEM continues to consult with these and other Tribal Nations on developments in offshore wind and the Project. BOEM is planning additional government-to-government consultations for the future.

In correspondence and subsequent consultation meetings, BOEM requested information from consulting parties on defining the APE and identifying historic properties potentially affected by the proposed undertaking. BOEM held an initial Section 106 virtual consultation meeting with consulting parties on December 17, 2021, reviewing the Project background; NEPA substitution in the Section 106 process, consultation schedule, and timing; and Section 110(f) consultation requirements and BOEM's compliance with these requirements. On February 28, 2022, the historic properties assessment/analysis reports were distributed to consulting parties (MARA, TARA, HRVEAs, and CHRVEA). BOEM held a second Section 106 virtual consultation meeting with consulting parties on April 8, 2022, reviewing technical report information and the agency's preliminary assessment of historic properties. BOEM provided a revised MARA, offshore HRVEA, CHRVEA and accompanying documents (i.e., a memos on technical report revisions, documentation of response to comments on historic properties assessment and analysis reports, and an updated consultation schedule), and redistributed the previously provided TARA and the onshore HRVEA, on August 1, 2022, and simultaneous to the release of this revised Finding in March 2023. BOEM held the third Section 106 virtual consultation meeting with consulting parties September 27, 2022, reviewing the August 2022 changes to the historic properties assessment/analysis reports and the Finding and draft MOA. On December 5, 2022, BOEM held a consultation meeting with the Town of Aquinnah, focusing on mitigation proposals the Town provided for their historic properties. BOEM held a consultation meeting on NHLs with consulting parties associated with the NHL review on the Project on December 14, 2022, reviewing the 12 NHLs and the supplemental NHL documentation. Meeting summaries and access to recordings of the meetings were made available to consulting parties following each meeting.

In spring and fall 2022, consulting parties provided comments on the distributed historic properties assessment and analysis reports on the identification of historic properties and preliminary considerations of effect on these properties as presented in the MARA, TARA, HRVEAs, and CHRVEA. The fall comments in 2022 included further address of the Finding, draft MOA, and draft EIS. BOEM's responses to all comments were provided in response-to-comment document releases with, and are reflected in, the revised versions of the historic properties assessment/analysis reports, which were distributed to consulting parties in August 2022 and March 2023.

BOEM will continue meeting with consulting parties to take into account the effects of the undertaking on historic properties and to reach resolution of adverse effects through preparation and implementation of a MOA. A draft MOA was provided by BOEM to consulting parties with the release of this Finding. BOEM has scheduled a meeting with consulting parties on April 7, 2023, to further review the results of the Finding and consult upon resolution of adverse effects and refine the MOA. BOEM plans to hold other future consulting party meetings to finalize the MOA and complete the NHPA Section 106 process.

# 4 Application of the Criteria of Adverse Effect

The Criteria of Adverse Effect under Section 106 (36 CFR 800.5(a)(1)) states that an undertaking has an adverse effect on a historic property when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative. According to the regulations (36 CFR 800.5(a)(2)), adverse effects on historic properties include, but are not limited to:

i. physical destruction of or damage to all or part of the property;

ii. alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR 68) and applicable guidelines;

iii. removal of the property from its historic location;

iv. change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;

v. introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;

vi. neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian Tribe [Tribal Nations] or Native Hawaiian organization; and

vii. transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

## 4.1 Adversely Affected Historic Properties

### 4.1.1 Assessment of Effects to Historic Properties in the Marine Area of Potential Effects

As noted in the Introduction (Section 1) to this Finding, BOEM has determined that the undertaking would have an adverse effect on nine historic properties (NRHP-eligible marine cultural resources) within the marine APE (see Table 1). Each of these are ASLF features.

Archaeological surveys within the marine APE identified 32 historic properties within the RWF maximum work area (SEARCH 2023). Of these, 19 are shipwrecks/possible historic shipwrecks and 13 are geomorphic features (ASLFs) of archaeological interest. [redacted]

### 4.1.1.1 Shipwrecks and Possible Historic Shipwrecks

All 19 shipwrecks/possible historic shipwrecks would be avoided with sufficient buffers by all proposed Project activities that are part of the undertaking, and as a result, there would be no effects to these potential historic properties (SEARCH 2023). Revolution Wind has established a protective buffer extending 50 m (164 feet) from the maximum discernable extent of the shipwreck or unidentified sonar and/or magnetic anomalies delineated in the high-resolution remote sensing survey data sets and would avoid seafloor-disturbing activities within this buffer during construction, operations, and decommissioning activities (SEARCH 2023). BOEM has determined the protective buffer to be sufficient and would require its implementation as a condition of approval if the COP is approved. Because the Project would avoid adverse effects to these shipwrecks/possible historic shipwrecks, which would be eligible for the NRHP based upon their ability to contribute further important historic and archaeological research information under NRHP Criterion D and/or their role in important events in history under NRHP Criteria A, this Finding does not go into detail on their significance and integrity; for greater detail, see the MARA (SEARCH 2023).

### 4.1.1.2 Ancient Submerged Landforms

As part of the MARA, SEARCH conducted for the COP an inclusive search of pre-contact period archaeological sites (i.e., archaeological sites that were once part of the terrestrial landscape and have since been inundated by global sea level rise during the late Pleistocene and early Holocene) (see BOEM 2020). Revolution Wind followed BOEM (2020), *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR 585*, in identifying and delineating ASLFs and ASLF features with archaeological potential in the marine APE, as described in the MARA (SEARCH 2023). These features may derive their significance from reasons other than their archaeological potential, such as their potential contribution to a broader culturally significant landscape. The MARA applied high-resolution geophysical survey utilizing magnetometer/gradiometer and side-scan sonar, sub-bottom profiler, and seismic data sets to identify ASLF targets or features, then developed a geotechnical testing strategy for collection of vibracore samples to a maximum depth of 20 feet to further refine targets that could be an ancient submerged landscape (SEARCH 2023:Section 3.6).

The vibracore samples recovered were subjected to macrobotanical, pollen, faunal, and radiocarbon sample analyses to further support the identification of marine archaeological sites and to inform the broader paleolandscape reconstruction (SEARCH 2023). Please see the MARA for details on the methods and results of these investigations. Although 13 ASLFs and features were identified that exhibit high archaeological potential, no evidence of human occupation associated with the ASLFs or ASLF features was identified in core samples taken during the submerged cultural resources investigation (SEARCH 2023:Section 5).

The offshore RWF area was once exposed as dry land at the end of the last ice age. Glacial retreat exposed the area beginning approximately 24,000 years before present (B.P.), and it remained exposed until between 11,000 and 8,000 B.P. when sea levels rose to submerge the area (SEARCH 2023). ASLFs are the formerly terrestrial landscapes exposed between the time of glacial retreat and submersion by the sea. Features identified as discrete surviving remnants of these landscapes, albeit submerged, are persisting areas [redacted]. ASLFs are a finite resource that [redacted]

[redacted] serve as an archaeological and scientific source of information for understanding the past climatic regimes, landscapes, and resources present [redacted] during ancient times. [redacted] (Joy 2018; SEARCH 2023). Additionally, low-lying areas only require low-energy sea level rise to reach inundation. With the onset of rapid sea level rise however, these same low-lying environments could have been submerged deeply and quickly, leading to potentially deeply buried, intact former terrestrial soils with higher preservation potential than high-elevation areas (SEARCH 2023). As such, using seismic data sets, sub-bottom profiler data, and preliminary ground model and geologic interpretation SEARCH employed a paleoreconstruction model within the RWF and RWEC areas to identify the ASLFs with the highest potential for preservation. The MARA identified 13 total ASLF features (Target-21 through Target-33). Of these 13, eight are located within the RWEC corridors (Target-21, Target-22, and Target-29 through Target-33 within the RWEC in RI and Target-23 within RWEC on the OCS) and five are located within the RWF area (Target-24 through Target-28) (see Table 1). Horizontal and vertical extents of the 13 ASLFs are presented in Section 5 of the MARA, in detail. Of these 13targets, the MARA states explicitly:

> [redacted] The extent of the intact geomorphic features of archaeological interest within the APE is minimal due to the relatively shallow impacts of the cable installation process, wind turbine layout, post-glacial processes, and marine transgression. (SEARCH 2023:202).

The MARA concluded that nine of the 13 ASLFs (all except Target-27) could be impacted by proposed Project activities, with the recommendation for further consultation to evaluate these nine features. The MARA identified that the RWF and RWEC areas have been subject to heavy erosion and redistribution of sediments through glacial and marine processes, thereby diminishing the chance of identifying preserved, intact ASLFs except for the 13 identified here (SEARCH 2023:Section 6). The majority of the Project's seafloor disturbance—in areas where ASLFs occur—is limited to 3 to 4 m (10 to 13 feet) bsb. [redacted] (SEARCH 2023).

Although geomorphic features (the ASLFs) exhibit high archaeological potential; as the MARA notes, no evidence of human occupation associated with the ASLFs was identified in core samples taken during the submerged cultural resources investigation (SEARCH 2023).

The 13 identified ASLFs are NRHP eligible at minimum for their connection to broad events within [redacted] history under NRHP Criterion A and for their ability to contribute further information to the understanding of that history under NRHP Criterion D, pursuant to 36 CFR 800.16(l) (SWCA 2021a). All ASLF and ASLF features identified in the APE are categorized as sites [redacted] in accordance with the NRHP evaluation criteria (see SWCA 2021a). The 13 ASLF and ASLF features are individually eligible under Criterion A for their associations [redacted] They are individually eligible under Criterion D for the potential to yield important cultural, historical, and scientific information [redacted] prior to 8,000 B.P. Consistent with NRHP Bulletin 15, natural features or sites "unmarked by cultural materials" can be eligible under Criterion D where "the study of the feature, or its location, setting, etc… will yield important information about the event or period with which it is associated" under Criterion A, and "usually in the context of data gained from other sources" (NPS 1997:22).

The ASLF and ASLF features identified within the APE each retain integrity of location, setting, association, and feeling. [redacted] ASLFs occupy a unique location within a relict terrestrial landscape, and the information that their paleosols and positions on the landscape may provide is important in understanding the earliest history of the region (SWCA 2021a). All ASLF and ASLF features were identified in the APE through confirmation of evidence of relict terrestrial surfaces or sediments.

Integrity of setting is important to ASLFs and ASLF features. [redacted] The 13 ASLF features in the marine APE for the Project retain their integrity of setting.

Integrity of association is important for connection of ASLFs and ASLF features [redacted] (SWCA 2021a). The 13ASLF features in the marine APE for the Project continue to convey these associations [redacted].

Integrity of feeling is key to the significance of these properties [redacted]. Though now submerged, the ASLFs document the paleoclimate [redacted] through palynological, geochemical, and other analysis points of the prehistoric natural environment. These ASLFs and ASLF features provide well-preserved evidence of the landscape [redacted] (SWCA 2021a). [redacted]

[redacted] (SWCA 2021a). The 13 ASLF features in the marine APE for the Project retain their integrity of feeling. Under NRHP Criteria B and C, insufficient information is available to determine eligibility for the 13 ASLF in the marine APE for the Project.

ASLFs and ASLF features are preserved under limited conditions, making persisting sites rare examples of the property type. However, they retain [redacted] their historic character and significance (SWCA 2021a), in accordance with NRHP Bulletin 15 (NPS 1997). No cultural materials, patterns of design, or elements of workmanship have yet been identified at these ASLFs or ASLF features. The 13ASLF features in the marine APE for the Project are not known to retain integrity of material, workmanship, and design.

BOEM has found that the Project would potentially result in adverse effects to nine of the 13 ASLFs within the RWF and RWEC areas; however, Revolution Wind would use micrositing of project cabling and WTGs to the extent able to avoid these adverse effects (e.g., by placing cabling in younger sediments [redacted]). In terms of the Criteria of Adverse Effect, where the ASLFs are not avoidable, the undertaking would result in the permanent, irreversible physical destruction at or damage to nine of the ASLF features (excluding ASLF Target-27). [redacted].

At Target-22, Target-23, Target-24, Target-26, Target-27, and Target-28, final design scenarios could result in full avoidance of physical Project disturbance (Revolution Wind 2022b). At Target-21, Target-29, and Target-30, adverse effects would be limited and minimized by micrositing (SEARCH 2023). Target-25 may not be avoidable by WTG placement under the maximum case scenario, however, it could be avoidable by alternatives where fewer than 100 WTGs would be constructed.

At Target-22, Target-23, and Target-24, complete avoidance is feasible for the RWEC, and Target 26 can be avoided vertically if cable burial depth of 4-6 ft is maintained across the feature, as Revolution Wind intends (Revolution Wind 2022b). At each of these four ASLFs, [redacted] the maximum-case scenario for the RWEC, so impacts would be limited and could be minimized by micrositing (SEARCH 23). At Target-27, project siting would avoid its known extent by excluding all physical Project disturbance from the ASLF feature boundary. At Target-28, WTG placement and workspaces could be microsited to avoid [redacted] the maximum-case scenario for the IAC (SEARCH 23).

At Target-21, Target-29, and Target-30 along the RWEC and at Target-25 along the IAC, [redacted] the maximum-case scenario for the RWEC. As a result, mpacts would be limited and could be minimized by micrositing (SEARCH 2023).

Target-31 is located [redacted] where anchor penetration could impact the feature; therefore, Revolution Wind has committed to avoidance of Target-31 by establishing a no anchor zone to avoid impacts to this feature (Revolution Wind 2023). Target-32 and Target-33 [redacted] would be physically avoided by project impacts (Revolution Wind 2023). Although potential anchoring depths of up to 18 feet bsb also increase the consideration of the horizontal extent of ASLFs on portions of the RWEC, where deeper anchor depths could occur, the potential for adverse effects to ASLFs are previously accounted for and would not increase given Revolution Wind's commitment to exclusion of anchoring from these ASLF areas (Revolution Wind 2023).

### 4.1.2 Assessment of Effects to Historic Properties in the Terrestrial Area of Potential Effects

BOEM has determined that the undertaking would have an adverse effect on two historic properties ([redacted] archaeological sites) within the terrestrial APE (see Table 2). Overall, the TARA identified four [redacted] archaeological resources. [redacted] (Forrest and Waller 2023). [redacted] #1 archaeological site and the [redacted] #2 archaeological site are eligible for NRHP listing under Criteria A and D and are archaeologically significant (see Table 2).

> [redacted] #1 . . . likely contains significant new information [redacted] #1 is eligible for listing in the National Register under Criteria A and D. (Forrest and Waller 2023:4-24)

> [redacted] 2 Site may contain significant new information [redacted] #2 Site is eligible for listing in the National Register under Criteria A and D. (Forrest and Waller 2023:4-25)

Revolution Wind is committed to avoiding or minimizing impacts to these sites to the best extent feasible. However, [redacted] plans are unlikely to be able to fully avoid impacts to these two historic properties, and adverse effects would result. Therefore, BOEM will continue to consult with the Tribal Nations, Revolution Wind, other federal and state agencies, and consulting parties to develop and implement an archaeological mitigation/treatment plan to resolve adverse effects that Project construction would have on the [redacted] #1 and [redacted] #2 sites. These mitigation measures would be made a requirement of the MOA for the project. [redacted]

[redacted]

### 4.1.3 Assessment of Effects to Historic Properties in the Visual Area of Potential Effects

BOEM has determined that the undertaking would have an adverse effect on 101 historic properties within the visual APE for offshore development (see Table 3). Of the 101 above ground historic sites and districts in the visual APE that could be susceptible to visual adverse impacts from the offshore components of the Project, 37 are listed on the NRHP (five of which are also NHLs). The remaining 64 are properties that have been determined to be eligible for the NRHP (a total of 33) or are included in the inventories of the RIHPHC, MHC, or local entities with final determinations of NRHP eligibility pending (a total of 31). The 101 adversely affected above ground historic properties are coastal properties with open ocean viewsheds toward the RWF. They include five NHLs in RI: Southeast Lighthouse on Block Island and Ocean Drive Historic District, Bellevue Avenue Historic District, The Breakers, and Marble House at Newport. They also include two TCPs in MA: [redacted]

Although the visual APE for onshore development also contains two historic properties in the viewshed of the OnSS and ICF, BOEM has determined that no adverse effects would result at these two historic properties. The historic Quonset Point Naval Air Station and Wickford Historic District are within the visual APE of the OnSS and ICF; however, these onshore Project facilities would be in scale and character with the current use of the Quonset Point Naval Air Station and would not introduce contrasting visual elements inconsistent with either that naval air station or with the existing setting of the Wickford Historic District (BOEM 2021a). Although the historic Quonset Point Naval Air Station is also in the range of potential physical effects due to the potential construction of the Project's RWEC landfall and onshore cable siting on Quonset Point, BOEM has determined that physical Project disturbance would not dimmish the integrity of the Quonset Point Naval Air Station and no adverse effects would result.

The HRVEA identified the 101 adversely affected historic properties from 451 above ground historic properties in the viewshed of offshore project components and therefore in the visual APE; 246 of these are in MA, 197 in RI, 6 in NY, and 2 in CT (EDR 2023:Table 3.1.1-1 and Attachment A). To determine visual APE intersections with these 451 historic properties, the HRVEA used the Spatial Join extension in the ESRI ArcGIS® software and refined historic property parcel boundaries to determine which historic properties, identified in files searches and previous historic properties surveys, overlaid with the modeled Project viewshed (EDR 2023; Revolution Wind 2022a). The results of this exercise were then manually reviewed to confirm the location of each resource in areas of potential visibility (EDR 2021). This process was then repeated to determine which resources had visibility of RWF aircraft warning lights and the OSS. Finally, redundant resource points were eliminated, along with contributing resources (e.g., those not individually recorded as historic properties) which were located within historic districts (EDR 2023).

In this Finding, consistent with the HRVEA, "historic districts within the [APE] were counted as a single property regardless of the number of contributing properties located within the [APE] in each district, as it was considered a conservative approach to address potential impacts to the entirety of the district rather than just select properties. Available documentation for NHL and NRHP-listed districts did not always indicate the total number of contributing properties, or which properties are considered to be contributing to the significance of a given district" (EDR 2023:20). This means that effects to historic districts and the contributing properties within them were considered as a whole, inclusive of those portions of the district that may extend beyond the APE.

> Potential impacts to above-ground historic properties within the [visual ]APE which have individual designations apart from the historic districts in which they are located were evaluated on an individual basis. Potential impacts to historic districts within the [visual ] APE were considered to the entirety of the district as one property, rather than to each of the contributing properties, as not all contributing properties within historic districts are located in the [visual ]APE. This approach is considered to be conservative as far as addressing potential impacts to historic districts as a whole. (EDR 2023:19)

As the HRVEA notes, the primary "potential effect resulting from the introduction of WTGs into the visual setting for any historic or architecturally significant property is dependent on a number of factors, including distance, visual dominance, orientation of views, viewer context and activity, and the types and density of modern features in the existing view (such as buildings/residences, overhead electrical transmission lines, cellular towers, billboards, highways, and silos)" (EDR 2023:101).

> Potential visual effects were assessed by considering a number of factors for each above-ground historic property, including:
>
> - Maritime setting
> - Contribution of views of the sea to the above-ground historic property's significance
> - The location and orientation of the above-ground historic property relative to the shoreline/sea
>
> EDR reviewed the characteristics contributing to historic significance for each of the identified above-ground historic properties that have been determined as part of NRHP resource documentation, or state-level NRHP eligibility determinations (where such documentation was available) to determine whether or not the property had a significant maritime setting. . . . For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. . . .
>
> Significant views to the sea were assessed by desktop review of online mapping systems as well as field observation to determine whether the above-ground historic property has clear, unobstructed views of the sea and whether or not this view contributes to the historic significance of a given property. The distance and direction of view related to the intended historic purpose of above-ground historic properties with maritime setting was also given consideration in this assessment. . . .
>
> Eight distinct and empirical points of measurement were also considered in the assessment of the Project's potential visual effect on above-ground historic properties within the [visual ]APE. These points of measurement were determined using the

viewshed analysis generated through ArcGIS as described [above], and are further defined in the [visual impact assessment] VIA (EDR [2021c]). They include the following:

- Distance from the nearest visible WTG
- Blade tip visibility
- WTG Aviation light visibility
- Mid-tower aviation light visibility
- Coast Guard light visibility
- Total acreage of above-ground historic property
- Total acreage of visibility within the above-ground historic property
- The portion of the above-ground historic property (percent of acreage) from which the Project would be potentially visible

. . . While all the resources within the [visual ]APE have theoretical views of the wind WTGs, due to the effect of distance, intervening vegetation and buildings/structures, as well as the Earth's curvature on visibility, not all of the resources would have views of full WTGs (i.e., in which the entire WTG structure was visible). In order to provide the most conservative level of analysis of potential Project visibility, the number of WTGs for which WTG blade tips were visible was used in determining the number of WTGs visible from a given above-ground historic property.

Upon a manual review of the viewshed results, it was found that in some cases the amount of potential visibility which was found to intersect . . . above-ground historic property boundaries was relatively small, in some cases single "cells" or "pixels" and would not represent any noticeable amount of actual visibility. Single cells of visibility produced in the viewshed analysis represent 0.00222-acre, or approximately 96 square feet (8.9 sq. m) of space and may be considered erroneous or otherwise not representative of actual visibility. Therefore, although the viewshed analysis indicated that these small portions of the [APE] occur within the boundaries of an above-ground historic property, these above-ground historic properties with only one "cell" of visibility were not considered to have actual views of the Project.

In addition, [many] above-ground historic properties within the [visual ]APE have large boundaries (i.e., over 10 acres), so that even a small percentage of the viewshed within such a property's acreage could be relatively large. For example, the Kay St.-Catherine St.-Old Beach Road Historic District (73000052) occupies 303 acres in the City of Newport. The viewshed analysis indicated that four percent of this property had potential views of the RWF. In this case, four percent of the property is approximately 13 acres, which is still a relatively large area of visibility.

> Therefore, this quantitative assessment was intended to provide a baseline level of effects which was then supplemented with a qualitative assessment of the contribution of a property's maritime setting to its historic significance, the level of Project visibility, relationship of specific views towards the Project to the location, design, and historic use of an above-ground historic properties, and the overall sensitivity of each above-ground historic properties to visual effects. (EDR 2023:101–105)

Because relevant "maritime settings vary considerably among the different types of above-ground historic properties" in the visual APE, the HRVEA grouped the historic properties where Project effects would result by resource type and discussed them thematically (EDR 2023:101). The HRVEA found the identified historic properties to be broadly categorizable as follows:

- Native American Sites, Historic Districts, and TCPs;
- Historic Buildings and Structures;
- Lighthouses and Navigational Aids;
- Recreational Properties;
- Historic Cemeteries and Burial Grounds;
- Maritime Safety and Defense Facilities;
- Agricultural Properties;
- Estates/Estate Complexes; and
- Historic Battlefields.

Above ground historic properties within each of these categories tend to be eligible for NRHP listing because of their contributions to important events in history under Criterion A and/or their embodiment of a significant architectural or engineering design, style, or masterful work under Criterion C. TCPs may additionally be eligible under NRHP Criteria B and D for their connections to important people in the heritage of [redacted] and the important information they can provide regarding [redacted] history, respectively. Some of the historic properties also were found to meet several of the NRHP Criteria Considerations before being found eligible for NRHP listing under Criteria A, C, or D (EDR 2023). Additionally, NHLs identified under any category are recognized to "possess exceptional value as commemorating or illustrating the history of the United States" that requires "a higher standard of care when considering undertakings that may directly and adversely affect NHLs" (NPS 2021).

#### 4.1.3.1 Native American Sites, Buildings, Districts, and Traditional Cultural Properties

Six Native American Sites, Buildings, Districts, and TCPs are identified in the visual APE by the HRVEA (Appendix B). These include three recorded as historic resources (non-TCPs) in RI: [redacted]. Three TCPs in MA and extending to the OCS were originally documented specifically due to their identification [redacted] as TCPs: [redacted], all of which are represented by broad, complex cultural landscapes and connected seascapes (EDR 2023).

Of the six Native American historic properties in the visual APE, BOEM has determined that the Project would result in visual adverse effects to the [redacted] TCP and the [redacted] TCP due to the proximity of the RWF and due to the importance of the TCPs' views toward the water, where the visual character of the adjoining landscape and seascape contribute to TCP significance.

The common attributes of the TCP historic property type with respect to visual setting are described by EDR (2023:51–52) as follows:

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

#### 4.1.3.2 Historic Buildings and Structures

There are 251 historic buildings and structures identified in the offshore visual APE (Appendix B). Historic properties of this type "consist mostly of vernacular residences or groupings of residences, with some limited variety of building types within the districts, in addition to historic markers and public parks" (EDR 2023:109). The variety of buildings and structures associated with this type extends to neighborhood commercial districts and buildings (including industrial sites) and includes supporting infrastructure, such as area bridges, that—in composite—made up these settlement areas and supported the livelihoods of the local residents. In other cases, the use of the historic residence has changed to commercial, municipal, institutional, educational, religious, transportation or to other non-residential repurposing (EDR 2023).

Of the 251 historic properties of this type in the visual APE, RI contains 87, MA 162, and CT two (EDR 2023). Of these historic buildings and structures, 48 in RI and MA possess important settings and critical views of the Project (see EDR 2023:Attachment A) and have been determined by BOEM to be subject to adverse effects from the offshore elements of the Project:

Aquinnah, MA
Vanderhoop, Edwin DeVries Homestead
Tom Cooper House
Theodore Haskins House
Gay Head – Aquinnah Town Center HD
3 Windy Hill Drive
71 Moshup Trail
Leonard Vanderhoop House
Gay Head-Aquinnah Coast Guard Station Barracks

Dartmouth, MA
Salters Point

Fairhaven, MA
744 Sconticut Neck Road

Chilmark, MA
Hancock, Capt. Samuel-Mitchell, Capt. West House
Russell Hancock House
Simon Mayhew House
Flaghole
Flanders, Ernest House, Shop and Barn

West Tisbury, MA
Scrubby Neck Schoolhouse

Westport, MA
Westport Point Historic Districts (1of 2)
Westport Point Historic Districts (2 of 2)
Westport Harbor
Gooseneck Causeway

Little Compton, RI
Warren Point Historic District

City of Newport, RI
Kay St.-Catherine St.-Old Beach Rd. HD/The Hill

Middletown, RI
Indian Avenue Historic District
Paradise Rocks Historic District
St. Georges School
Land Trust Cottages
Sea View Villa
Whetstone

South Kingstown, RI
Brownings Beach Historic District

Tiverton, RI
Puncatest Neck Historic District

New Shoreham, RI
Spring Street
Corn Neck Road
Hippocampus/Boy's Camp/Beane Family
Mitchell Farm
Beach Avenue
Peleg Champlin House
Indian Head Neck Road
U.S. Weather Bureau Station
Old Town and Center Roads
Old Harbor Historic District
New Shoreham Historic District
Beacon Hill Road
Capt. Welcome Dodge Sr.
Caleb W. Dodge Jr. House
Lakeside Drive and Mitchell Lane
Pilot Hill Road and Seaweed Lane
Mohegan Cottage/Everett D. Barlow House
Capt. Mark L. Potter House

The HRVEA describes the common attributes of this historic property categorization with respect to the visual setting of the historic properties as follows:

> These above-ground historic property types often are adjacent to and offer clear views of the ocean or are significant due to their development as residential communities. For many above-ground historic properties of this type, a relationship with the Atlantic Ocean is essential to their historic integrity. . . . Historic Buildings and Structures are important elements of cultural heritage within the [APE], within the majority of examples found

along or near the shoreline . . . . While no official documentation relative to the maritime significance of this specific above-ground historic property type is known, several common features are mentioned across the breadth of the individual nomination forms that may be considered as the common attributes with respect to their visual setting:

- Historic maritime (fishing and shipping) economy;
- Location along or near the water;
- Views and vistas of the Atlantic Ocean;
- Vernacular design and locally sourced materials;
- Landscape design derived from the natural environment; and
- Local historic associations. (EDR 2023:53)

Historic buildings and structures . . . occur throughout the study area and in a variety of local contexts. Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic houses were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and historic homes frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting. . . . Historic seaside villages, ports and other districts in the study area are commonly characterized by dense development and narrow roadways. The maritime setting for such districts is often obvious and may be expressed through the design and orientation of homes, commercial properties and other buildings, parks, docks, piers, and breakwaters. Depending on the specific characteristics of each district, open ocean views may or may not be available from the majority of historic buildings and other areas within a village. Further, marine viewsheds may encompass limited areas due to the complexity of the shoreline and presence of points, necks, or islands that screen views towards the open ocean. Where ocean versus bay views are available but are tangential to the dominant aspects of maritime viewsheds, changes to those distant ocean views may not diminish the integrity of a seaside village or other historic district. Where ocean views are a dominant aspect of the maritime setting, changes to such viewsheds may diminish the integrity of a historic district, even where views are limited to immediate shoreline sections. (EDR 2023:103–104)

#### 4.1.3.3 Lighthouses and Navigational Aids

There are 20 lighthouses and navigational aids identified in the visual APE (Appendix B). This historic property type, lighthouses in particular, "may be broadly defined as water-related navigation aids to transportation and defense consisting of a light tower, featuring prominent views of the sea, and dominance of the surrounding landscape generally shared among all the individual properties" (EDR 2023:54).

Of the 20 historic properties of this type in the visual APE, MA contains 10, RI eight, and NY two (EDR 2023). Of these lighthouses and navigational aids, 10 in RI and MA possess important settings and critical views of the Project (see EDR 2023:Attachment A) and have been determined by BOEM to be subject to adverse effects from the offshore elements of the Project:

Aquinnah, MA
Gay Head Light

Falmouth, MA
Nobska Point Lighthouse

Gosnold, MA
Tarpaulin Cove Light

New Bedford, MA
Butler Flats Light Station
Clark's Point Light

Jamestown, RI
Beavertail Light

Little Compton, RI
Sakonnet Light Station

Narragansett, RI
Point Judith Lighthouse

New Shoreham, RI
Block Island North Lighthouse
Block Island Southeast Lighthouse NHL

The common attributes of this historic property type with respect to visual setting are described by EDR (2023:56) as follows:

- Direct physical location and/or historic functional relationship with the sea;
- Elevated and prominent views of the sea;
- Visual prominence of the surrounding landscape;
- Isolation or at least spatial dominance of the surrounding landscape; and
- Proximal relationship to shipping lanes.

> Lighthouses and other historic navigation aids in the study area include properties that were intended to serve mariners plying large areas of open water and other properties that served specific navigation routes through the complex and treacherous waters of the region's bays. All of these properties have an obvious association with maritime settings, but the scale of those settings will vary due to the conformation of the local landscape and seas and the design and purpose of each navigation aid. (EDR 2023:102)

#### 4.1.3.3.1 Block Island Southeast Lighthouse National Historic Landmark

Among the identified lighthouses and navigational aids, the Block Island Southeast Lighthouse (Figure 1) has been recognized for its importance to U.S. history as an NHL. The HRVEA describes the property as follows.


**Figure 1. Block Island Southeast Lighthouse before it was offset from the bluff edge (Stupich 1988).**

> This property is located approximately 12 miles (19.3 km) south of the coast of mainland Rhode Island, on Mohegan Bluff, on the southeast shore of Block Island, approximately 14 miles (22.5 km) from the nearest [Project] WTG. . . . Built in 1874 and fully operational by 1875, [Southeast] Lighthouse consists of a five-story brick tower and a two-and-a-half-story, brick duplex keeper's residence. The duplex residence is connected to a one-and-a half-story kitchen by a hyphen of the same height. It is a rare surviving example of a lighthouse built during a brief period of Victorian Gothic design influence at the U.S. Lighthouse Board and the sole surviving lighthouse of its high-style design. In 1993, the lighthouse structure and dwelling were moved approximately 250 feet (76.2 m) back from the edge of the bluffs to prevent the loss of the above-ground historic property to erosion. The light tower and dwelling were moved as a single mass, including the above-ground elements of the foundations, to retain the historic fabric. The new location preserves the historic relationship of the lighthouse with seacoast … Block Island Southeast Lighthouse was designated an NHL in 1995. (EDR 2023:55)

Block Island Southeast Lighthouse NHL is listed in the NRHP under Criterion A for its national importance in the history of maritime transportation, and under Criterion C for the national significance of its architecture and technology (SWCA 2021b). The maritime setting of the NHL is a key aspect of historic integrity cited in the NHL nomination. The HRVEA found Block Island Southeast Lighthouse NHL in particular to have high visual sensitivity within the visual APE, due to its historic location, setting, and feeling being primarily associated with clear views of the sea and for which public use enhances appreciation of the property's historic use and association with the sea (EDR 2023). Approximately 48% (6 acres) of this approximately 134-acre historic property are within the visual APE and would have visibility of Project WTGs and OSS (EDR 2023:Attachement A). The visual simulations for this NHL are at KOP BI-04 (day and night) in Appendix C (see also EDR 2022a).

Prudent and feasible alternatives to avoid adverse effects from the Project on the Block Island Southeast Lighthouse NHL and other NHLs, and planning to the maximum extent possible necessary to minimize harm to NHLs, are presented in Section 5 of this Finding.

#### 4.1.3.4 Historic Cemeteries and Burial Grounds

There are 36 historic cemeteries and burial grounds included in the visual APE (Appendix B), consisting of "cemeteries identified by federal, state, or local governmental agencies as having historic significance" (EDR 2023:56). Of the 36 historic properties of this type in the visual APE, RI contains 23 and MA 13 (EDR 2023). RI has specific mandates for documenting historic cemeteries.

Of these, one in RI possesses important settings and critical views of the Project (see EDR 2023:Attachment A) and has been determined by BOEM to be subject to adverse effects from the offshore elements of the Project: Island Cemetery/Old Burial Ground in New Shoreham on Block Island. The Island Cemetery/Old Burial Ground would be adversely affected by the Project because of the characteristically elevated ocean views that are maintained for this memorial resting place and the historically maritime populous that it serves. Otherwise, the secluded nature of properties of this type and their rare occurrence near the shoreline greatly limits visibility, and therefore effects, of the Project.

The common attributes of this historic property type with respect to visual setting are described as follows:

> These above-ground historic properties may be municipally owned cemeteries on public land, small family plots on private land, or abandoned burial grounds. Historic cemeteries are lasting memorials to the past, provide a guide to the changing values and composition of communities in the course of their historic development. . . . Typically, cemeteries and burial grounds are not eligible for listing in the NRHP except when they satisfy NPS Criteria Consideration D: 'd. A cemetery which derives its primary importance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events'. . . . [Attributes include:]
>
> - Secluded or private setting;
> - Designed landscape features;
> - Graves of persons of local, state, or national significance; and
> - Examples of funerary art and/or architecture (i.e., a mausoleum or above-ground crypt). (EDR 2023:56–57)
>
> Where such burial grounds are located near the water they may be associated with ocean or other maritime viewsheds, however, ocean vistas are less likely to have been a significant consideration in the siting of such cemeteries than their larger, more formal counterparts in the region. Where cemeteries are located within districts or other historic settlements strongly associated with maritime settings, such burial grounds may be sited

> to maintain a visual connection to the waters in order to maintain a sense of continuity linking the departeds' final resting places with the environment in which they lived. . . . Maritime views from hillside cemeteries that were intentionally incorporated or framed by landscape designs may be more sensitive to discordant modern elements than those associated with less formal burial grounds that may not have been specifically located to provide ocean views. (EDR 2023:103)

#### 4.1.3.5 Maritime Safety and Defense Facilities

There are 31 maritime safety and defense facilities included in the offshore visual APE (Appendix B), plus one within the onshore visual APE (EDR 2021a). This property type consists of "facilities erected by bureaus of the U.S. Department of Defense or their predecessors and share historic associations with coastal defense" (EDR 2023:57). Although, "These structures vary in their design and construction materials," they "are unified by their historic functions of rescuing and protecting maritime transportation in the area, or for coastal defense" (EDR 2023:57).

Of the 31 historic properties of this type in the visual APE, RI contains 20, MA nine, and NY two (EDR 2023). Of these, 10 in RI and MA possess important settings and critical views of the Project (see EDR 2023:Attachment A) and have been determined by BOEM to be subject to adverse effects from the offshore elements of the Project:

<u>New Bedford, MA</u>
Fort Rodman Historic District
Fort Taber Historic District

<u>Westport, MA</u>
Horseneck Point Lifesaving Station
Gooseberry Neck Observation Towers

<u>Narragansett, RI</u>
Life Saving Station at Narragansett Pier
Fort Varnum/Camp Varnum

<u>New Shoreham, RI</u>
U.S. Coast Guard Brick House
U.S. Lifesaving Station
WWII Lookout Tower – Spring Street
WWII Lookout Tower at Sands Pond

The common attributes of this historic property type with respect to their visual setting are described in the HRVEA as follows:

> The Maritime Safety and Defense Facilities within the [APE] have served to protect and act as rescue stations for the coastal waters of Rhode Island and Massachusetts. These above-ground historic properties were constructed as government buildings that needed open views and access to the ocean to fulfill their functional roles and are therefore located immediately adjacent to the coastline to facilitate direct interaction with the water. For all above-ground historic properties of this type, a physical relationship to the Atlantic Ocean is essential to historic integrity. . . . [Attributes include:]
>
> - Construction commissioned by the federal government for use by a bureau of the Department of Defense;
> - Built for interaction between the structure and ocean-going vessels;
> - Location along or near the water;

- Clear views of the ocean, and/or direct access to the water; and
- Design includes living quarters and functional space. (EDR 2023:58)

Historic military and maritime safety properties along the shoreline will likely be associated with maritime settings. Aesthetic considerations in the siting of such facilities may or may not be expressed in the design of buildings, structures, and landscapes depending on the age and specific functions of the property. Proximity to navigation channels, defensibility, and the presence of existing shipbuilding or repair infrastructure in a broader maritime context may have been significant considerations in the siting of naval facilities. Such factors may not demonstrate a significant association with open ocean viewsheds. The study area includes several significant examples of World War II-era defense structures, including fire control or observation towers designed to monitor specific parts of the maritime environment. Early lifesaving stations were likewise intended to provide for observation of marine waters in the vicinity of known hazards or where storms posed specific risks to sea-going or coastal vessels. Lifesaving stations were also frequently located where rescue boats or other vessels might be safely launched under treacherous conditions. These locations may have included inlets, harbors or coves adjacent to open waters where rescue and recovery efforts would likely be made. (EDR 2023:103)

#### 4.1.3.6 Agricultural Properties

There are 48 agricultural properties included in the visual APE (Appendix B). This property type consists of "historic farm buildings and landscapes which have retained a high degree of integrity and are generally no longer used for their original purpose" (EDR 2023:58).

Of the 48 historic properties of this type in the visual APE, MA contains 33 and RI 15 (EDR 2023). Of these agricultural properties, four in RI possess important settings and critical views of the Project (see EDR 2023:Attachment A) and have been determined by BOEM to be subject to adverse effects from the offshore elements of the Project:

Little Compton, RI
Tunipus Goosewing Farm

Middletown, RI
Bailey Farm

New Shoreham, RI
Champlin Farm
Lewis-Dickens Farm

Although, "Generally, these above-ground historic properties do not derive their significance in any direct way from the ocean or maritime activities" (EDR 2023:58), the HRVEA addresses the four cases where adverse effects would result based on the open or maritime island settings of these particular historic properties. The common attributes of this historic property type with respect to their visual setting are described in the HRVEA (EDR 2023:59) as follows:

- Farmhouses;
- Barns and associated ancillary buildings;

- Large, open fields;
- Fieldstone walls dividing property or grazing space; and
- Locally sourced building materials.

> Historic agricultural properties, including farms, farmhouses, barns and related buildings and structures are relatively common in the study area. Many of these properties were built between 1700 and 1850, after which agricultural economies in New England and New York declined sharply. The historic settings for such properties typically include open, agrarian landscapes which once may have afforded open views of the seas when sited along the shoreline or at higher elevations within the coastal interior. Few of the once expansive agrarian landscapes associated with the historic use of the region's farms survive. Some have been altered by later residential and commercial development and many have been transformed by reforestation. Despite these changes, historic agricultural properties remain an important part of the region's heritage and tangible expression of several centuries of intensive farming that transformed the landscapes throughout southern New England and eastern Long Island. (EDR 2023:102)

#### 4.1.3.7 Recreational Properties

There are 27 recreational properties included in the visual APE (Appendix B). This property type is "defined by the role these properties served in their original functions as places for the resort tourism economy of the late-nineteenth century to flourish" (EDR 2023:59).

Of the 27 historic properties of this type in the visual APE, RI contains 19, MA six, and NY two (EDR 2023). Of these recreational properties, 14 in RI and MA possess important settings and critical views of the Project (see EDR 2023:Attachment A) and have been determined by BOEM to be subject to adverse effects from the offshore elements of the Project:

<u>Aquinnah, MA</u>
Gay Head - Aquinnah Shops Area

<u>Westport, MA</u>
Clam Shack Restaurant

<u>Narragansett, RI</u>
The Towers Historic District
The Towers/Tower Entrance-Narragansett Casino
Ocean Road Historic District
Dunes Club
Narragansett Pier MRA

<u>Middletown, RI</u>
Clambake Club of Newport

<u>New Shoreham, RI</u>
Hygeia House
Nathan Mott Park
Spring House Hotel
Spring Cottage
Miss Abby E. Vaill/1 of 2 Vaill cottages
Hon. Julius Deming Perkins/"Bayberry Lodge"

The common attributes of this historic property type with respect to their visual setting are described in the HRVEA as follows:

> These above-ground historic properties feature beaches, casinos, restaurants, and other buildings and structures built to entertain seasonal vacationers. They are typically located

near the shoreline or immediately adjacent to the sea, and in some cases, are the beaches themselves. The enjoyment of, and interaction with, the sea are integral features of the significance of these above-ground historic properties. In many cases, the beachfront, shoreline, and adjacent ocean waters are prominent features of the historic setting due to their close association with historic recreational activities. . . . [Attributes include:]

- Functionality designed for human interaction;
- Location along or near the water;
- Views and vistas of the Atlantic Ocean;
- Landscaped lawns and gardens; and
- Ancillary buildings, such as garages, caretaker cottages, or sheds. (EDR 2023:59–60)

Seaside resorts, like many other shoreline recreational, commercial, and residential properties, were often sited to take advantage of aesthetically pleasing ocean or maritime views. Depending on location and the conformation of the local shoreline, such properties may be associated with specific bay or cove viewsheds that include limited areas of the open ocean waters. Recreational activities at resorts frequently included swimming and designated beaches where residents and visitors may have spent considerable time during the summer months. Where these features are still present and express a tangible association with the historic resort property, views from beaches may be as important as views from more formal elements of the designed landscape. Likewise, historic hotels and inns became more common elements of the region's shoreline communities in the late 19th century. Such properties were often sited near harbors, ferry landings, rail stations, and public or private beaches and may be associated with similar historic maritime settings. Views to ocean waters or the more intimate bays and coves of the region may have been an integral part of the visitor's motivation for staying in such establishments. Such considerations can be expressed through the inclusion of building and landscape features clearly intended to afford views of ocean. Older taverns and inns in the study area may be found along the working harbors and ports and were intended to serve the fishing, whaling, and related participants in maritime commerce. The design and location of these properties may not show the same influence of aesthetic considerations but will likely also retain a strong association with the waterfront and maritime environment. (EDER 2023:102)

#### 4.1.3.8 Estates and Estate Complexes

There are 28 estates and estate complexes included in the visual APE (Appendix B). This property type "consists of high-style residences, or groupings of residences, typically designed by prominent architects of the nineteenth and early twentieth centuries" (EDR 2023:60).

Of the 28 historic properties of this type in the visual APE, RI contains 21 and MA seven (EDR 2023). Of these, 11 in RI possess important settings and critical views of the Project (see EDR 2023:Attachment A) and have been determined by BOEM to be subject to adverse effects from offshore Project elements:

<u>Jamestown, RI</u>
Horsehead/Marbella

<u>Little Compton, RI</u>
Stone House Inn
Abbott Phillips House

<u>Middletown, RI</u>
The Bluff/John Bancroft Estate

<u>Narragansett, RI</u>
Dunmere

<u>City of Newport, RI</u>
Ocean Drive Historic District NHL
Bellevue Avenue Historic District NHL
The Breakers NHL
Marble House NHL
Ochre Point – Cliffs Historic District
Rosecliff/Oelrichs (Hermann) House/Monroe (J. Edgar) House

The common attributes of this historic property type with respect to their visual setting are described by the HRVEA as follows:

> Estates and Estate Complexes within the [visual ]APE transcend the traditional residential above-ground historic property type in their grandeur and scale. These above-ground historic property types often are set upon open tracts of naturalistic or stylized designed landscapes and are often accompanied by a variety of ancillary buildings. For many above-ground historic properties of this type, views of the Atlantic Ocean are essential to their historic integrity. . . . Estates and Estate Complexes are well-known as one of the symbols of cultural heritage in Rhode Island, and the City of Newport in particular. . . . [Attributes include:]
>
> - Location along or near the water;
> - Views and vistas of the Atlantic Ocean;
> - Long driveways meant to offer views of the main house on approach;
> - Landscaped lawns and gardens; and
> - Ancillary buildings, such as garages, caretaker cottages, or sheds. (EDR 2023:61)
>
> Estates built by or for wealthy families have been part of the region's landscapes for centuries and many such properties are located along the shorelines. High style, architect-designed mansions and associated landscapes are characteristic of several areas within the study area and many such properties were sited to take advantage of ocean views. The importance of maritime settings to these properties may be apparent in the design of building features such as veranda, porches, and large windows facing the water or through landscape elements and overall designs that were intended to frame specific views towards the seas. As with many other above-ground historic property types, the conformation of local shorelines and the specific orientation of each property may be important in assessing the association with specific aspects or elements of each associated viewshed. (EDR 2023:102–103)

### 4.1.3.8.1 Ocean Drive Historic District National Historic Landmark

The Ocean Drive Historic District (Figure 2) is one of four identified estates and estate complexes recognized for its importance to U.S. history as an NHL. The HRVEA describes this NHL as follows.

> The summer homes in the Ocean Drive Historic District feature great variety in style and opulence, ranging from Neoclassical-style mansions to early nineteenth-century farms. In contrast to the adjacent Bellevue Avenue Historic District, however, Ocean Drive (aka Ocean Avenue) is decidedly more bucolic and rural, with greater expanses between structures accentuated by natural and designed landscapes. The national significance of the Ocean Drive Historic District is derived from its architecture, which includes works from McKim, Mead and White, John Russell Pope, and landscape architecture by Frederick Law Olmstead [*sic*] . . . In 2012 an updated statement of significance was appended to the NHL nomination which elaborated and expanded upon the initial areas of Criterion C significance such as architecture and landscape design. The update also addressed additional Criterion A areas of significance such as planning, and engineering related to maritime views and design features purposefully built to interact with the shoreline and the ocean. The updated nomination materials also included a detailed account of the evolution of Ocean Drive as a "pleasure drive" to accompany the development of the inland areas as an upper-income resort suburb. (EDR 2023:145)

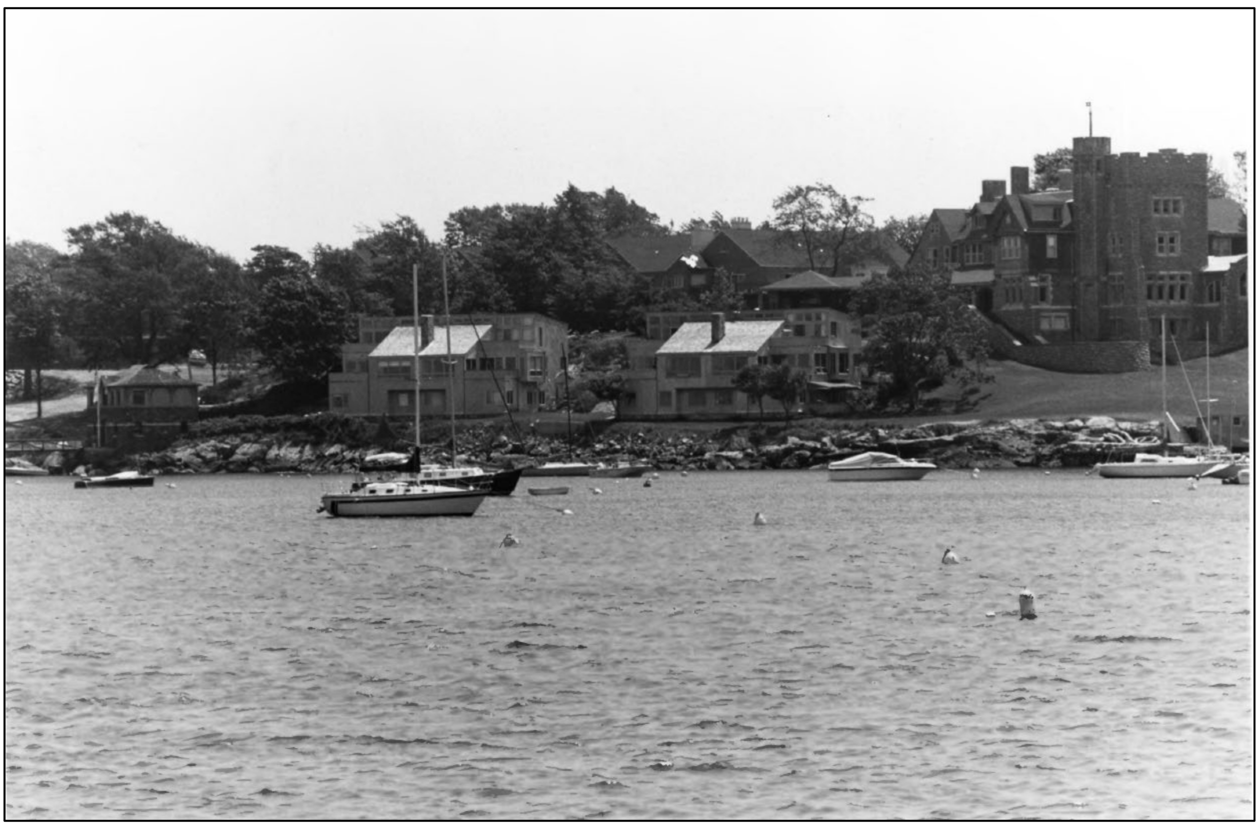

**Figure 2. Ocean Drive Historic District photographed from the sea (NRHP 1976).**

> [Olmsted's] landscape architecture firm . . . was involved in at least two subdivisions and 15 private contract designs within the district. These designs include properties situated on dramatic overlooks, and along Ocean Drive. Clearly this roadway was specifically constructed to take advantage of ocean views. (EDR 2023:145)

The Ocean Drive Historic District NHL was made up of 45 contributing properties located in an over-1,500-acre district in a suburban/rural setting encompassing most of the peninsula southwest of the City of Newport (SWCA 2021b). The NRHP nomination finds the district eligible under Criteria A and C in the areas of architecture, landscape architecture, community planning, conservation, and environmental preservation (SWCA 2021b). The NHL program focuses on the district architecture and landscape, providing the following statement of national significance, "This large historic district… has a rugged, informal character, as compared with the formal aspect of the Bellevue Historic District. It includes early farms and elaborate summer homes, as well as landscapes designed by Olmsteds' firm to accord with the natural contours of rocky cliffs, green hills and pastures. The area was favored by 19th-century industrial magnates and the social elite" (NPS 2012). The Ocean Drive Historic District NHL and its contributing buildings tend to retain integrity of location, design, materials, workmanship, association, feeling, and setting (SWCA 2021b). An estimated 15% (261 acres) of this approximately 1,756-acre historic property are within the visual APE and would have visibility of Project WTGs and OSS (EDR 2023:Attachement A). The visual simulations from Newport Cliff Walk at KOP AI-03 in Appendix C represents the key views from the shorelines and NHLs at Newport, RI. See EDR (2022a) for supplemental visualizations that are specific to the Ocean Drive Historic District NHL.

Prudent and feasible alternatives to avoid adverse effects from the Project on this and other NHLs, and planning to the maximum extent possible necessary to minimize harm to NHLs, are presented in Section 5 of this Finding.

#### 4.1.3.8.2 Bellevue Avenue Historic District National Historic Landmark

The Bellevue Avenue Historic District (Figure 3) is one of four of the identified estates and estate complexes recognized for its importance to U.S. history as an NHL. The HRVEA describes this historic property as follows.


**Figure 3. Chateau-sur-mer in the Bellevue Avenue Historic District (Boucher 1969; NRHP 1972).**

Newport is one of the most spectacular assemblages of American architecture from its beginning to our own time. There are structures in this district that could never be built again in such close proximity, nor possessing such variety, nor by a group of such distinguished architectural firms. This district begins with several commercial blocks including the Casino, continues with the Gothic Revival villas, and includes the "Stick Style" and Shingle Style and culminates in the great 19th century summer palaces of Bellevue Avenue and Ochre Point. The list of architects embraces almost every major designer of that time and what emerges at Newport is also a study of the development of the taste and skill of men like Richard Upjohn, Richard Morris Hunt and McKim, Mead and White over their professional careers.

The Bellevue Avenue Historic District National Historic Landmark is approximately two miles long and consists of 87 contributing properties . . . occupying several blocks along Bellevue Avenue, from Memorial Boulevard in the north, to Block Island Sound in the south, in the City of Newport. Spring Street and Cogshell Avenue form the western boundary of the district, while Narragansett Bay forms the eastern boundary. From north to south, this district features two miles of commercial blocks and villas, notably ending in the south with the grand and palatial nineteenth-century estates of wealthy summer residents. (EDR 2023:A-25)

The district possesses many distinctive examples of high-style architecture. While the significance statement in the NRHP-nomination of the district does not explicitly reference the ocean, the views of the ocean were essential to the planning and construction of the contributing buildings (SWCA 2021b). The district contains contributing buildings that are also individually recognized as NHLs, specifically The Breakers NHL and Marble House NHL. The NRHP nomination finds the district significant in the areas of architecture, landscape architecture, and commerce (SWCA 2021b). The significance focuses on aspects of the district that make it NRHP-eligible under Criterion C, for the embodiment of distinctive characteristics of a type, period, or method of construction, that represent the work of a master, and possess high artistic values. Significance in the area of commerce further provides for the NRHP-eligibility of the district under Criterion A for its relation to important events in the historic development of Newport (SWCA 2021b). The NHL program more fully focuses on the district architecture, providing the following statement of national significance, “An assemblage of American architecture distinguished by the variety of styles and famous architectural firms represented, the district includes Gothic Revival villas, Stick- and Shingle-style buildings, and great summer palaces of the late 19th century” (NPS 2015a). The Bellevue Avenue Historic District NHL and its contributing buildings tend to retain integrity of location, design, materials, workmanship, association, feeling, and setting (SWCA 2021b). About 13% (over 70 acres) of this approximately 600-acre historic property are within the visual APE and would have visibility of Project WTGs and OSS (EDR 2023:Attachement A). The visual simulations from Newport Cliff Walk at KOP AI-03 in Appendix C best represent the views from the NHLs on Newport shores. See EDR (2022a) for more visualizations that are specific to the Bellevue Avenue Historic District NHL.

#### 4.1.3.8.3 The Breakers National Historic Landmark

The Breakers (Figure 4) is an estate/estate complex recognized for its importance to U.S. history as an NHL and located in the Bellevue Avenue Historic District NHL. The HRVEA describes this NHL:

> The Breakers . . . is located on at Ochre Point Avenue in Newport, Rhode Island, approximately 16 miles (25.7 km) from the nearest [Project] WTG. . . . The estate was designed by Richard Morris Hunt and built between 1893 and 1895 for Cornelius Vanderbilt II. It emulates a sixteenth-century, northern Italian palazzo. Elaborate façade work and imposing mass are featured in the architecture and speak to the substantial power and wealth of the original residents. The estate is significant for its historic associations with America’s first architect trained at the Ecole Des Beaux-Arts, Richard Morris Hunt, and for being the largest and perhaps most famous Newport estate built by wealthy patrons at the turn of the twentieth century. . . . The Breakers was individually listed in the NRHP in 1971. . . . and designated an NHL in 1994. (EDR 2023:61)

**Figure 4. The Breakers in the Bellevue Avenue Historic District (NRHP 1971a).**

The NRHP nomination finds The Breakers significant in the areas of architecture, social history, and transportation (SWCA 2021b). The significance focuses on aspects of the historic property that make it NRHP-eligible under Criterion C, for the embodiment of distinctive characteristics of a type, period, or method of construction, that represent the work of a master, and possess high artistic values. Significance in the area of social history and transportation further provides for the NRHP-eligibility of the historic property under Criterion A for its relation to important events associated with high society in the historic development of Newport and the social position and wealth of the Vanderbilts arriving from the railroad industry. The NHL nomination further indicates eligibility of The Breakers under NRHP Criterion B for significant association with Cornelius Vanderbilt II and Richard Morris Hunt (SWCA 2021b). The NHL program focuses on architecture, providing the following statement of national significance, “The Breakers is the architectural and social archetype of the Gilded Age, a period when members of the Vanderbilt family were the merchant princes of American life through their prominence in the world of finance, as patrons of the arts, and as vanguards of international society. In 1895, the year of its completion, The Breakers was the largest, most opulent house in a summer resort considered the social capital of America. It was built for Cornelius Vanderbilt II (1843-1899), a key figure in American railroads, philanthropy, and fashionable society, and designed by Richard Morris Hunt (1827-1895), one of the founding fathers of architecture in America” (NPS 2006). The Breakers NHL retains integrity of location, design, materials, workmanship, association, feeling, and setting (SWCA 2021b). About 29% (5 acres) of this approximately 16-acre historic property are within the visual APE and would have visibility of Project WTGs and OSS (EDR 2023:Attachement A). The visual simulations from Newport Cliff Walk at KOP AI-03 in Appendix C best represent the views from the NHLs on Newport shores. See EDR (2022a) for more visualizations that are specific to The Breakers NHL.

#### 4.1.3.8.4 Marble House National Historic Landmark

Marble House (Figure 5) is an estate/estate complex recognized for its importance to U.S. history as an NHL and is also located in the Bellevue Avenue Historic District NHL. Marble House is described as follows.

**Figure 5. Marble House in the Bellevue Avenue Historic District (NRHP 1971b).**

> Marble House (71000025) is a three-story Neoclassical mansion located on Bellevue Avenue in Newport. It was commissioned by William Vanderbilt, designed by famed architect Richard Morris Hunt and constructed 1892. Built with an imposing architectural scale and clad in Tuckahoe white marble, it is one of the stateliest mansions contributing to the NHL-listed Bellevue Avenue Historic District. The property was individually listed on the NRHP before the district was nominated. (SWCA 2021b:30)

The NRHP nomination finds the Marble House significant in the areas of architecture and social history (SWCA 2021b). The significance focuses on aspects of the historic property that make it NRHP-eligible under Criterion C, for the embodiment of distinctive characteristics of a type, period, or method of construction, that represent the work of a master, and possess high artistic values. Significance in the area of social history further provides for the NRHP-eligibility of the historic property under Criterion A for its relation to important events in the historic development of Newport. The NHL nomination additionally finds Marble House eligible under NRHP Criterion B for its significant associations with Alva Belmont and William K. Vanderbilt (SWCA 2021b). The NHL program focuses on architecture, providing the following statement of national significance, “Inspired by the Petit Trianon (1760-1764) a garden retreat on the grounds of Versailles, the house’s French inspired interiors were designed by Jules Allard and

Sons, of Paris. A virtual showcase of various French styles and built with seemingly endless financial resources, the house was unparalleled in design and opulence in its day. The economic influence of the Vanderbilts and their financial and cultural power in America were expressed in the family houses and their patronage of American architecture. As one of the earliest of the Beaux Arts houses to appear in America, it would influence the design of architecture thereafter. Today, Marble House is a testament to the architectural genius of Richard Morris Hunt and the spirit of America's 'Gilded Age.'" (NPS 2015b). The Marble House NHL retains integrity of location, design, materials, workmanship, association, feeling, and setting (SWCA 2021b). About 5% (one-third acre) of this approximately 6-acre historic property are within the visual APE and would have visibility of Project WTGs and OSS (EDR 2023:Attachement A). The visual simulations from Newport Cliff Walk at KOP AI-03 in Appendix C best represent the views from the NHLs on Newport shores. See EDR (2022a) for more visualizations that are specific to the Marble House NHL.

#### 4.1.3.9 Historic Battlefields

There are four historic battlefields included in the visual APE, which "consist of typically large landscapes across which the events of historic military actions took place" and, within these, "any number of more focused and specific points of significance may exist, while the collective significance of the events of the battle is broader" (EDR 2023:61).

Of the four historic properties of this type in the visual APE, MA contains three and RI one (EDR 2023). Of these, one historic battlefield in MA, the Westport Point Revolutionary War Properties, would be subject to adverse effects from the Project.

The common attributes of this historic property type with respect to their visual setting are described by the HRVEA as follows:

> These types of above-ground historic properties are typically spread out over large areas, sometimes encompassing entire town centers or portions of townships. They may include landscapes, buildings, or water features which were integral to the outcome of the struggles which took place in their midst. In some cases, these features have been significantly altered from the time of the battles. . . .
>
> [R]egarding the visual setting of battlefields with regard to their significance, as in most cases the significance of an historic battlefield lay in their historic context and the physical struggles that took place on them. However, there are some characteristics which may be generally common to Historic Battlefields:
>
> - Natural features which influenced military operations;
> - Military engineering works (trenches, forts);
> - Sites of engagement; and
> - Corridors of movement. (EDR 2023:62)
>
> Properties of this type are mostly inland and will only have visibility in isolated areas within their boundaries, or in the small areas where their boundaries touch the shoreline.

> The potential effects of the Project are further mitigated because the significance and setting of these properties are characterized by terrestrial conflict, and not from pristine views of the seascape or relationship to the ocean. (EDR 2023:115)

#### 4.1.3.10 Summary of the Assessment of Adverse Effects and Cumulative Effects to Historic Properties in the Visual Area of Potential Effects

The 101 adversely affected historic properties within the visual APE for onshore and offshore development retain their maritime setting, and that maritime setting contributes to the property's NRHP eligibility and continues to offer significant seaward views. These seaward views support the integrity of the maritime setting and include vantage points with the potential for an open view from each property toward RWF WTGs (EDR 2021b, 2023). For historic properties where BOEM has determined the Project would cause adverse effects, BOEM then assessed whether those effects would be additive to the potential adverse effects of other reasonably foreseeable actions at the 101 historic properties, thereby resulting in cumulative effects (see SWCA 2023).

BOEM reviewed the HRVEA's list of historic properties assessed as likely to be adversely affected by the Project and all information and comments provided by consulting parties in correspondence and at meetings to date to inform determinations of adverse effects including visual and cumulative effects.

BOEM (2022a) has determined that options to reduce the number of RWF WTGs under any action alternative for the Project (see Table 1) would effectively minimize visual effects because there would be fewer WTGs constructed and visible from the affected historic properties (see also Section 5). However, none of the alternatives would completely avoid visual adverse effects for the 101 above ground historic properties.

The cumulative effects analysis quantified the total number of WTGs from all planned future developments theoretically visible (daytime or nighttime) within the APE (EDR 2021b). This analysis projected that the development of additional wind farms in the RI/MA WEA would result in the construction of nearly 1,000 WTGs (EDR 2021b, 2023; SWCA 2023). The project would contribute proportionally from nearly 10% to nearly 90% of the cumulative adverse effect, owing to the location and intensity of the foreseeable build-out attributed to other offshore wind energy development activities. This is based on full buildout of the Project (up to 100 WTGs and two offshore substations [OSS]) and all other reasonably foreseeable offshore wind projects currently planned in the APE (modeled at 955 WTGs and three OSSs [EDR 2021b]). The proportion of visible WTG elements added by the project ranges from 9.6 percent at [redacted] TCP, where all modeled WTGs and OSS would potentially be visible, to 87.2 percent at the historic U.S. Weather Bureau Station at Block Island, where the Project WTGs would potentially be visible in greater numbers than the combination of all other future wind farms planned in adjacent OCS lease areas (41 Project WTGs would potentially be visible there versus six WTGs from other planned projects) (SWCA 2023). Intensity of visual impacts from WTG and OSS development would reduce with distance from historic properties and lighting and design actions that would be taken by Revolution Wind to minimize impacts; however, cumulative effects would not be fully eliminated at the 101 adversely affected historic properties.

BOEM has found that the Project would have adverse visual effects on the 101 historic properties listed in Table 3. Per the Criteria of Adverse Effect, the undertaking would introduce visual Project elements that diminish the integrity of these historic properties' significant historic features. BOEM did, however, determine that due to the distance and open viewshed, the integrity of the properties would not be so diminished as to disqualify any of them from NRHP eligibility.

Although the HRVEA identified 350 other above ground historic properties on mainland RI and MA within the visual APE of offshore Project components, BOEM has determined that either no effects or no adverse effects would result at these historic properties, based on the justifications provided in the HRVEA (see EDR 2023:Attachment A). While their size and siting may afford many of these historic properties some view toward the Lease Area, for some these views will not be critical to their integrity and for others existing buildings, vegetation, and elements of the built environment result in limited, screened views. Existing buildings and infrastructure are also often accompanied by preexisting nighttime lighting that would reduce the visibility of farther off Project lighting. Visibility would be further minimized based on distance between onshore historic properties and offshore Project components. With increasing distances between historic properties and the RWF, atmospheric, environmental, and other obscuring factors, such as fog, haze, sea spray, wave height, and normal viewer acuity, serve to further minimize the visual intrusion posed by offshore WTGs. The ability of these 350 historic properties to convey the significance of their architectural and social history would be unaltered by the Project.

BOEM reviewed the assessment in the HRVEAs and CHRVEA and has determined that the Project would result in no adverse effects to any above ground historic properties identified in the visual APE beyond the 101 historic properties identified as adversely affected in Table 3.

# 5 Actions to Avoid, Minimize, or Mitigate Adverse Effects

As a requirement of COP approval, BOEM would stipulate the avoidance of historic properties identified in the APE and not currently found to be subject to adverse effects from the Project. This includes considering all prudent and feasible alternatives to avoid adverse effects on the NHLs, as discussed below.

For unavoidable adverse effects to historic properties, additional minimization and mitigation measures would be developed in consultation with the appropriate parties. This includes, to the maximum extent possible, taking such planning and actions as may be necessary to minimize harm to any NHL that may be directly and adversely affected by an undertaking.

Avoidance, minimization, and mitigation measures would be implemented through execution of an MOA by BOEM and the required signatories to resolve adverse effects under Section 106. Simultaneous to the release of this Finding, BOEM is releasing its *Draft Memorandum of Agreement Among the Bureau of Ocean Energy Management, the State Historic Preservation Officers of Connecticut, Massachusetts, New York, and Rhode Island, and the Advisory Council on Historic Preservation Regarding the Revolution Wind Farm and Revolution Wind Export Cable Project* for consulting party review. The MOA would be finalized and its requirements set by BOEM under NHPA Section 106 as a condition of BOEM's signing the ROD, completing the NEPA review. Avoidance, minimization, and mitigation measures for historic properties are drafted in both the MOA and the HPTPs attached to the MOA. Under the MOA, adverse effects from the Project to historic properties, including NHLs, would be avoided, minimized, or mitigated in accordance with the NHPA Section 106 regulations (36 CFR 800) and in compliance with Section 110(f). The MOA also includes post-review discovery plans for onshore and offshore cultural resources, should previously undiscovered or unimpacted historic properties be identified. The post-review discovery plans would be implemented to assess and resolve any inadvertent adverse effects to these historic properties. Any historic properties that are discovered post-review, if adversely affected, would be resolved through the Section 106 consultation process detailed in these post-review discovery plans and the MOA.

## 5.1 Alternatives Considered

BOEM used the NEPA review process to consider a range of feasible alternatives to the maximum-case scenario of the Project's Proposed Action. That maximum-scenario would result in construction, operation, maintenance, and conceptual decommissioning of up to 100 WTGs and two OSS at the RWF. Alternatives considered would reduce the number of proposed WTGs. Analyses have found that reductions in WTG numbers will help minimize the adverse effects on above ground historic properties in the visual APE and ASFLs in the marine APE. However, no alternative meeting the purpose and need of Project development in the Lease Area would fully avoid adverse effects to historic properties, including from visual impacts to NHLs.

### 5.1.1 National Historic Landmarks

As the NPS (2021) conveys, "Section 110(f) of the NHPA requires that Federal agencies exercise a higher standard of care when considering undertakings that may directly and adversely affect NHLs. The law requires that agencies, ‘to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to such landmark.’ In those cases when an agency’s undertaking directly and adversely affects an NHL… the agency should consider all prudent and feasible alternatives to avoid an adverse effect on the NHL.” The implementing regulations for Section 106 of the NHPA at 36 CFR 800.10 provide special requirements for protecting NHLs and complying with the NHPA Section 110(f).

In considering the other factors suggested by NPS, BOEM recognizes there is generally substantial and highly supportive public interest in using the OCS to develop clean energy sources. For instance, Executive Order 14008 in 2021 declared it the policy of the United  “to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy… and spurs well-paying union jobs and economic growth, especially through innovation, commercialization, and deployment of clean energy technologies and infrastructure.” This undertaking contributes to these goals.

BOEM has planned and is taking action to avoid adverse effects on NHLs in accordance with NHPA 110(f) and pursuant to The Secretary of the Interior’s Standards and Guidelines for Federal Agency Historic Preservation Programs Pursuant to the National Historic Preservation Act (NPS 2021). Under all Project alternatives (BOEM 2021c), BOEM would avoid adverse effects to seven of the 12 NHLs in the visual APE: the Montauk Point Lighthouse, Original U.S. Naval War College Historic District, Fort Adams Historic District, Battle of Rhode Island Historic District, Nantucket Historic District, New Bedford Historic District, and William Watts Sherman House. This avoidance of adverse effects would be accomplished by taking advantage of existing obscuration, consisting of intervening factors such as curvature of the Earth, and atmospheric and environmental factors like fog, haze, sea spray, and intervening buildings, vegetation, and topography, which are enhanced with increasing distances between WTGs and historic properties. In addition, BOEM reviewed other NHLs in the vicinity, including the steamship *Sabino* in CT and the Newport Historic District in RI and determined these to not be in the APE. The *Sabino* only travels within 35 miles of the Project on tours and the Newport Historic District NHL, once distinguished from other adjoining historic district boundaries in the City of Newport, was found to be across Newport Neck from the Project without open ocean views of the RWF (EDR 2023; Revolution Wind 2022a).

BOEM has determined that five NHLs in RI would be adversely affected by the Project: Southeast Lighthouse on Block Island and Ocean Drive Historic District, Bellevue Avenue Historic District, The Breakers, and Marble House at Newport. BOEM has notified the NPS (as delegate of the Secretary of the Interior) and the ACHP of this determination with distribution of this Finding. The ACPH and NPS have been active consulting parties on the Project since BOEM invited them to consult at the initiation of the NHPA Section 106 process on the Project on April 6 and April 29, 2021, respectively. BOEM is fulfilling its responsibilities to give a higher level of consideration to minimizing harm to NHLs, as required by NHPA Section 110(f), through implementation of the special requirements outlined at 36 CFR 800.10 (BOEM 2021a).

Given the location of the lease and number of WTGs proposed, constraints on the necessary generation capacity for the project to be feasible, and the distance of the Lease Area to the shorelines of Block Island and Newport (see Figure A-5), BOEM determined that all feasible alternatives, including all feasible WTG layouts, would result in adverse visual effects on these five NHLs. Because of all these factors, the only alternative that BOEM was able to identify that avoids any Project effects on these NHLs was the no-action alternative. In the EIS, BOEM (2022a) has identified alternatives that reduce the number of WTGs by from the maximum-case scenario of the Proposed Action. While the differences between alternatives may be variable, alternatives for reduction in WTG numbers would all reduce visual effects on the NHLs and other adversely affected historic properties due to the fact that fewer WTGs would be constructed and therefore visible from above ground historic properties. Additionally, fewer WTGs could lessen the potential for physical disturbance of ASLFs on the seafloor, such as through providing greater flexibility for avoidance by cables and seafloor work areas.

When prudent and feasible alternatives "appear to require undue cost or to compromise the undertaking's goals and objectives, the agency must balance those goals and objectives with the intent of section 110(f)" (NPS 2021). In this balancing, the NPS suggests that agencies should consider "(1) the magnitude of the undertaking's harm to the historical, archaeological and cultural qualities of the NHL; (2) the public interest in the NHL and in the undertaking as proposed, and (3) the effect a mitigation action would have on meeting the goals and objectives of the undertaking" (NPS 2021). For the Project, the magnitude of the visual effects on the five NHLs is minimized by the distance between proposed offshore WTGs and the onshore NHLs and other factors (such as obscuring factors) limiting views between Project WTGs and the five NHLs. Moreover, while the undertaking would affect the historic setting of the NHLs, it would not affect other character-defining features or aspects of the NHL's historic integrity. The five NHLs, should the undertaking proceed, would still illustrate their regional and national significance, and continue to exemplify their national importance.

Through consultation, BOEM would refine minimization measures to the maximum extent feasible and further develop mitigation measures of adverse effects that remain at the five NHLs after the application of minimization efforts. BOEM would identify and finalize mitigation measures specific to each NHL with the consulting parties through development of the MOA. Mitigation measures for adverse effects to NHLs must be reasonable in cost and not be determined using inflexible criteria, as described by the NPS (2021). Mitigation of adverse effects to the five NHLs would meet the following requirements:

- reflect the heightened, national importance of the property and be appropriate in magnitude, extent, nature, and location of the adverse effect;
- focus on replacing lost historic resource values with outcomes that are in the public interest, such as through development of products that convey the important history of the property;
- comply with The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings (NPS 2017).

### 5.1.2 Action Alternatives that Would Minimize the Adverse Effect of the Project

The Proposed Action (Alternative B) would construct, operate, maintain, and perceivably decommission up to 100 WTGs of 8 to 12 MW each and up to two OSS; whereas, Alternative C (Habitat Alternative) would include 64–65 WTGs, Alternative D (Transit Alternative) would include 78–93 WTGs, Alternative E (Viewshed Alternative) would include 64–81 WTGs, and Alternative G (Preferred Alternative) would include 65 WTGs. Alternative F (Higher Capacity Turbine Alternative) would combine with action alternatives C or E1 to use 14 MW WTGs within the PDE of the 12 MW WTGs and thereby use fewer

WTGs, reducing overall numbers  to as few as 56 WTGs (see Table 4). BOEM has identified a preferred alternative for the final EIS that would be a combination of the alternatives analyzed in the EIS; however, it would result in no changes to BOEM's finding of adverse effect for the Project. BOEM's final decision will be described in the record of decision (ROD).

#### 5.1.2.1 Minimization of Visual Adverse Effect

Reduction in WTG numbers was analyzed in the EIS to have the following opportunities to reduce visual impacts to above ground historic properties, which would additionally minimize harm to NHLs. Compared to the maximum-case scenario under the Proposed Action, Alternatives C through F could decrease impacts to historic properties from visibility of offshore wind structures and from the construction and installation lighting on these structures because the number of constructed WTGs and their viewshed would be reduced in the following manners (see BOEM 2022a:Table 3.10-7).

WTG structure and lighting visibility would be reduced from up to 100 WTGs under the Proposed Action to:

- 64 or 65 WTGs (up to 35% to 36% less, respectively) under Alternative C.
- 78 to 93 WTGs (up to 7% to 22% less) under Alternative D. These visual impacts under Alternative D would remain greater than those of Alternative C. Alternative D3 would specifically remove the closest seven WTG locations to Block Island and have an increased advantage for reducing visual impacts on above ground historic properties on the shores of that island over other action alternatives, except Alternative E2, which would remove even more WTGs on the Block Island side of the RWF.
- 64 to 81 WTGs (up to 36% to 19% less) under Alternative E. The Alternative E1 configuration, in particular, would reduce the proximity of WTGs to Martha's Vineyard and toward mainland RI. Alternative E2 would remove the closest WTGs to Martha's Vineyard and be most advantageous for reducing WTG proximity to Block Island; however, it would not be as effective overall as Alternative E1 for reducing WTG proximity to onshore areas. Although the distance of WTGs from Martha's Vineyard would increase under Alternative E specifically compared to other alternatives, the total number of WTG impacts would remain greater than those of Alternative C and would reach the potential lower WTG numbers and impacts of Alternative D. Alternative E is primarily focused on setbacks of WTGs from Martha's Vineyard and would effectively increase distances of Project WTGs to historic properties there, especially under Alternative E1. This especially includes increased setbacks from historic properties [redacted] inclusive of the Edwin DeVries Vanderhoop Homestead, Gay Head Light, and Gay Head - Aquinnah Shops. Alternative E also further increases setbacks from Newport and Block Island, including the Breakers, Marble House, and the Ocean Drive Historic District, Bellevue Avenue Historic District, and Southeast Lighthouse NHLs. The Alternative E setbacks for RWF WTGs would increase the distances to historic properties at Aquinnah by between approximately 0.25 and 1 mile, at Newport and mainland RI by approximately 4 miles, and at Block Island variably beginning at less than 1 mile and extending to over 4 miles. Therefore, Alternative E would be more effective in reducing visual impacts from the nearest potential WTGs to historic properties at Martha's Vineyard, MA, and along RI shores compared to other action alternatives but would not eliminate visual impacts to all historic properties and would not result in fewer visible WTGs and offshore RWF lighting sources than Alternatives C or F.

- as few as 56 WTGs (up to 44% less than the maximum of 100 WTG under the Proposed Action) under Alternative F when combined with any of the action alternatives (C1, C2, or E1) intended to allow for the fulfillment of the existing three PPAs' generation requirement of at least 704 MW. These WTG impacts under Alternative F could potentially be reduced from those of the other action alternatives, where WTG numbers are comparatively less.
- 65 WTGs (35% to 17% less than under the Proposed Action [Alternative B], Alternative D, and Alternative E2). Alternative G could decrease impacts to viewshed resources when compared to the Proposed Action, Alternative D, and Alternative E2 because the number of constructed WTGs and their viewshed would be reduced by 35% for Alternative G as compared to the maximum-case scenario under the Proposed Action and by at least 17% for the minimum case for these alternatives. The 35% reduction under Alternative G is comparable to the amount of reduction as would occur under Alternative C and Alternative E1, based on their WTG numbers; however, WTGs under Alternative G would be differently configured than under other alternatives. Finally, Alternative F would have 13% fewer WTGs than Alternative G, and the potential for an equivalent proportion of reduced visual impact on viewshed resources. However, WTG setback distances changes cannot be quantified until the additional WTGs to be removed are identified under Alternative F.

WTG configurations for Alternative G, BOEM's Preferred Action, would effectively reduce the proximity of WTGs to NHLs at Block Island and Newport, RI. With the combination of reduced WTG numbers and farther setbacks from shorelands, Alternative G would be equally or more effective in reducing visual impacts from the nearest potential WTGs to viewshed resources at Martha's Vineyard, on Block Island, and along Rhode Island shores, as at Newport, compared to other action alternatives, except potentially Alternative E1 and Alternative F. Similar to Alternative E1, Alternative G is generally more effective at increasing setbacks from NHLs at Newport and Block Island than other alternatives, even though Alternative G would not eliminate visual impacts to all viewshed resources and would not result in fewer visible WTGs and offshore RWF lighting sources than Alternative C, E1, or F.

In relation to the five adversely affected NHLs, at Block Island and Newport, Rhode Island, Alternative G would reduce the field of view in which WTGs would be seen in a line across the horizon. Under Alternative G, Southeast Lighthouse NHL would have comparatively the narrowest visible extent of WTGs across the horizon, within a 24 to 26 degree field of view, as compared to a 29 degree field of view of WTGs under Alternative E, a 33 to 38 degree field of view of WTGs under Alternative D, and the broadest 38 degree field of view for the project under Alternative C and under the Proposed Action (EDR 2023). NHLs in the Newport area would have proportionately the fewest WTGs (a maximum of 65) in combination with a narrowed field of view (37 to 41 degrees) for WTGs visible across the horizon; although, the reduction is not as much as for the field of view from Block Island (EDR 2023). Only Alternative D2 would have a narrower line of turbines visible from those NHLs at Newport, within a 35 to 37 degree field of view (EDR 2023); however, Alternative D would have a cluster of up to 92 WTGs on the horizon, proportionately 42% more than Alternative G.

Compared to the Proposed Action, Alternative G setbacks for RWF WTGs would increase the distances to viewshed resources at Aquinnah by a minimum of approximately 1.25 miles and at Newport and mainland Rhode Island by 1.15 mile and up to 3.5 miles, dependent on the WTG configuration used. In relation to Block Island, Alternative G would reduce the number of closest WTGs and remove the line of

WTGs visible on the horizon from Block Island, thereby removing the massing of RWF WTGs southeast and northeast of Block Island in comparison to the Proposed Action. Compared to Alternative C, Alternative G would continue to have WTGs in approximately the same proximity to Martha's Vineyard, although Alternative G would have fewer WTGs than Alternative C. Alternative G would have approximately the same changes as Alternative C in relation to Block Island, Newport, and mainland Rhode Island (in comparison to the Proposed Action). Alternative G, in comparison to Alternative D, would have increased setbacks from Martha's Vineyard, Newport, and mainland Rhode Island. However, in comparison to Alternative D3, Alternative G would have approximately the same increased setback distances from Block Island, albeit with a different WTG configuration under Alternative G and Alternative D3. Alternative E1 would begin placing WTGs farther from Martha's Vineyard and from Newport than Alternative G, with Alternative G WTG placement beginning approximately 2 miles nearer from Martha's Vineyard and approximately 1.15 to 3.5 miles from Newport than the nearest Alternative E1 WTG. Alternative G would not reduce WTG proximity to Block Island as much as Alternative E2 WTG (where WTGs would begin at the same distance as Alternative G, but then begin receding more greatly to the northwest, to distances of 1.15 to approximately 5.5 miles farther away). The distances by which Alternative F would increase WTG setbacks from shore in relation to the other action alternatives cannot be quantified until the additional WTGs to be removed are identified. As described, those action alternatives with the fewest WTGs and the greatest distances of setback would have the least degree of potential visual impacts on viewshed resources. Although the level of impact would be reduced, the layout modification and construction activities proposed under Alternatives C through F would still include the same historic properties adversely affected under the Proposed Action and the same potential for impacts to these historic properties. Portions of all RWF WTGs would potentially be visible from nearly all the 101 historic properties adversely affected under the action alternatives. All action alternatives, regardless of planned WTG numbers, would have the WTG visibility reduced somewhat due to intervening land areas and with setback distance from the coastline. As described, those action alternatives with the fewest WTGs and the greatest distances of setback would have the least degree of potential visual adverse effects on historic properties. Under Alternatives C through F, the construction and installation of offshore Project components with lighting would have adverse effects to historic properties, similar to those of the Proposed Action. O&M and decommissioning of offshore Project components with lighting would have effects to historic properties under Alternatives C through F, similar to those of the Proposed Action. Visual effects from offshore Project components' lighting would be removed upon completion of decommissioning.

To the potential 955 WTGs modeled in a maximum-case scenario for other future offshore wind activities (EDR 2021b), Alternatives C through F would add visual effects from offshore WTG structure visibility and lighting, including from navigational and aviation hazard lighting systems. The same 101 historic properties would continue to be adversely affected by offshore structure lighting visibility in the visual APE under Alternatives C through F as under the Proposed Action. The cumulative visual effects of offshore structures and lighting on historic properties in the visual APE associated with Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be long term and adverse, until decommissioning of the Project. However, for Alternatives E1 and G in particular, the visual proximity for effects from offshore Project elements would specifically have increased setbacks from historic properties at Martha's Vineyard, MA, and the nearest shores of RI (including NHLs at Newport and Block Island).

#### 5.1.2.2 Minimization of Physical Effects to ASLF from Seafloor Disturbance

Alternatives C through F would involve the same types or numbers of submerged historic properties on the seafloor at the RWF and RWEC offshore development areas as under the Proposed Action. However, these alternatives could decrease the risk of disturbance and impacts to historic properties because the number of constructed WTGs could be reduced and associated cable trenching could also decrease, resulting in greater Project flexibility for avoiding these historic properties. Therefore, RWEC and RWF WTG and IAC construction, operation, maintenance, decommissioning, and associated vessel anchoring would result in less seafloor disturbance than is anticipated for the Proposed Action (see BOEM 2022a:Table 3.10-7).

Potential construction disturbance for WTG and OSS locations is expected to reduce from the maximum scenario of 734.4 acres of Alternative B to 475.2-482.4 acres under Alternative C, 576-684 acres under Alternative D, 475.2-597.6 acres under Alternative D, 482.4 acres under Alternative G, and as little as 417.6 acres under Alternative F (BOEM 2022a:Table E4-1). The IAC length and acreage of disturbance between WTG would reduce comparatively. Potential anchorage disturbance is expected to reduce from the 3,178 acres of Alternative B to 2,062-2,093 acres under Alternative C, 2,496-2,961 acres under Alternative D, 2,062 or 2,589 acres under Alternative D, and as little as 1,814 acres under Alternative F (BOEM 2022a:Table E4-1).

Compared to the Prosed Action, Alternative C would place WTG locations farther from seven of the 29 historic properties in the marine APE, specifically 2.8 to 3.0 miles farther from ASLF Target-28 and Target-27, respectively, and 0.25 mile to 2.5 miles farther from shipwrecks/possible historic shipwreck Target-02, Target-08, Target-17, Target-18, and Target-19, in order of increasing distance. Distances to other submerged historic properties in the marine APE would not change under Alternative C.

Alternative D would decrease the risk of disturbance and impacts at one potential shipwreck (Target 04) because the nearest WTG would be sited approximately 3.5 miles more distant from that shipwreck. Impacts would remain the same as the Proposed Action, however, if Alternative D retains WTG proximity to that shipwreck. As a result, Alternative D would not have the potential to reduce potential for adverse effects at submerged historic properties as much as Alternative C. Alternative D would also maintain similar configurations to the Proposed Action at the other 28 ASLFs and shipwrecks/possible historic shipwrecks in the marine APE.

Compared to the Proposed Action, the 64 WTG configuration of Alternative E1 would place WTG locations farther from seven of the 32 ASLFs and shipwrecks/possible historic shipwrecks in the marine APE. These seven consist of two ASLFs (Target-24 and Target-26), three known shipwrecks (Target-01, Target-06, and Target-09), and two possible historic shipwrecks (Target-07 and Target-16). Compared to the Proposed Action, the 81 WTG configuration of Alternative E2 would place WTG locations farther from one ASLF (Target-24) and one possible historic shipwreck (Target-09). Either configuration of Alterative E would have more potential for adverse effects at submerged historic properties than Alternative C but less potential for adverse effects than either Alternative D or the Proposed Action. Although of closer proximity to some submerged cultural properties than these other alternatives, Alternative E would increase the distance of Project WTGs to a range of other submerged historic properties than either Alternative C or Alternative D. Nevertheless, Alternative E would result in similar effects to the Proposed Action at the 22 to 27 historic properties in the marine APE where its configurations do not provide farther avoidance distances.

Seafloor disturbance associated with Alternative F, which combines alternative WTG reduction options, would result in less seafloor disturbance than is anticipated for the Proposed Action or, potentially, the other action alternatives.

Alternative G would place the WTGs and their connecting IAC farther from two ASLFs and three to eight shipwreck sites than the Proposed Action by placing WTGs 1.9 to 3.7 miles farther away. However, the shift in WTG locations would result in a shift of IAC cabling, which would potentially increase impacts to one possible historic shipwreck (Target 10) and one ASLF (Target 28) by moving or increasing IAC cabling within these two targets (three IAC cables in parallel under Alternative G instead of one under the Proposed Action). Alternative G would also move IAC cabling 0.28 mile closer to an ASLF (Target 25).

Alternatives C through F would use the same RWEC as that of the Proposed Action. These alternatives would result in irreversible adverse effects to historic properties where seafloor disturbance would not be avoidable during construction of the RWEC.

Due to the similarity in Project activities and locations, the impacts of seafloor disturbance on identified ASLFs and shipwrecks/possible historic shipwrecks from Project operations, maintenance, and decommissioning activities associated with Alternatives C through F would be similar to the Proposed Action. Seafloor disturbance, including shipwrecks and ASLF, would be negligible (not adverse) during operations and maintenance, because these activities would be restricted to areas that have been surveyed and found to contain no marine cultural resources or that have previously experienced disturbance during construction. Decommissioning activities would be expected to take place in previously disturbed areas and therefore not adverse to historic properties. Overall, the reduced scale of Alternatives C through F would result in fewer potential effects from seafloor disturbance activities than the Proposed Action.

## 5.2 Avoidance, Minimization, and Mitigation Measures

The Section 106 process requires BOEM to seek ways to avoid, minimize, or mitigate the adverse effects of the Project that would result from the undertaking. BOEM is approaching this process sequentially, beginning with avoidance. Avoidance of adverse effects is preferred and prioritized. BOEM would then implement minimization to reduce the adverse effect to the extent able. All adverse effects remaining after avoidance and minimization measures would be mitigated. Mitigation measures for historic properties, including NHLs, would be stipulated in the MOA and detailed in the HPTPs attached to the MOA. This includes consideration of monitoring and of emergency situations, such as storms affecting or damaging wind facilities in proximity to ASLFs. These same measures, committed to by Revolution Wind in the MOA and identified in COP Appendix BB – Cultural Resources Avoidance, Minimization, and Mitigation Measures (EDR 2022d), would also be incorporated by BOEM into COP approval.

BOEM remains in consultation with all consulting parties under Section 106 of the NHPA, including Tribal Nations [redacted] State Historic Preservation Offices/Division for Historic Preservation; ACHP; NPS; and other cooperating federal agencies, local governments, historical interest groups, and involved property owners.

BOEM will continue to consult with these parties on this Finding and the resolution of all adverse effects. Consistent with the provisions for NEPA substitution, pursuant to 36 CFR 800.8(c)(4)(i)(A), BOEM will codify the resolution of adverse effects through the MOA for the Project.

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# APPENDIX A

## Area of Potential Effects Map Figures

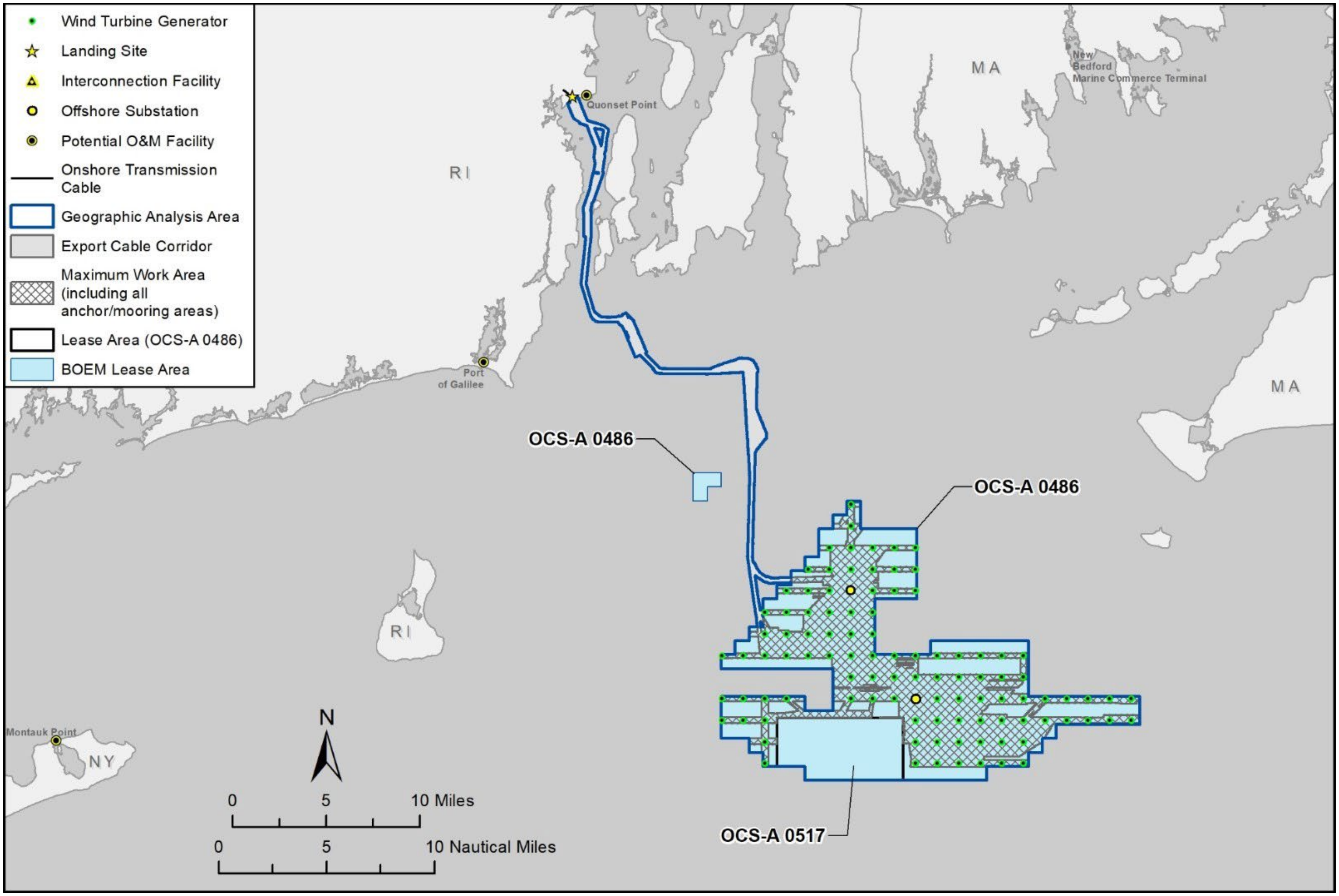



**Figure A-1. Revolution Wind construction and operations plan proposed offshore Project elements.**

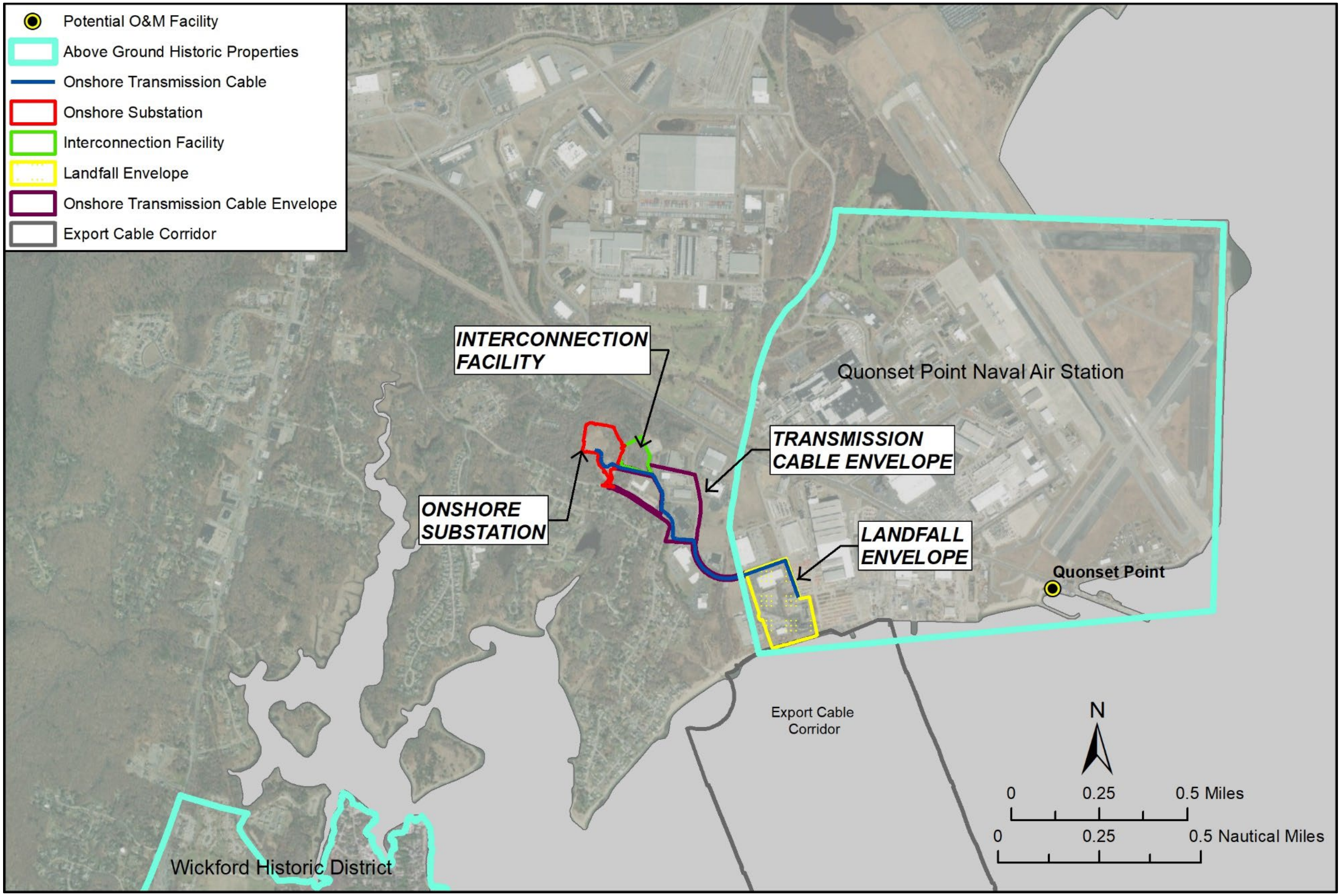



**Figure A-2. Revolution Wind construction and operations plan proposed onshore Project elements.**

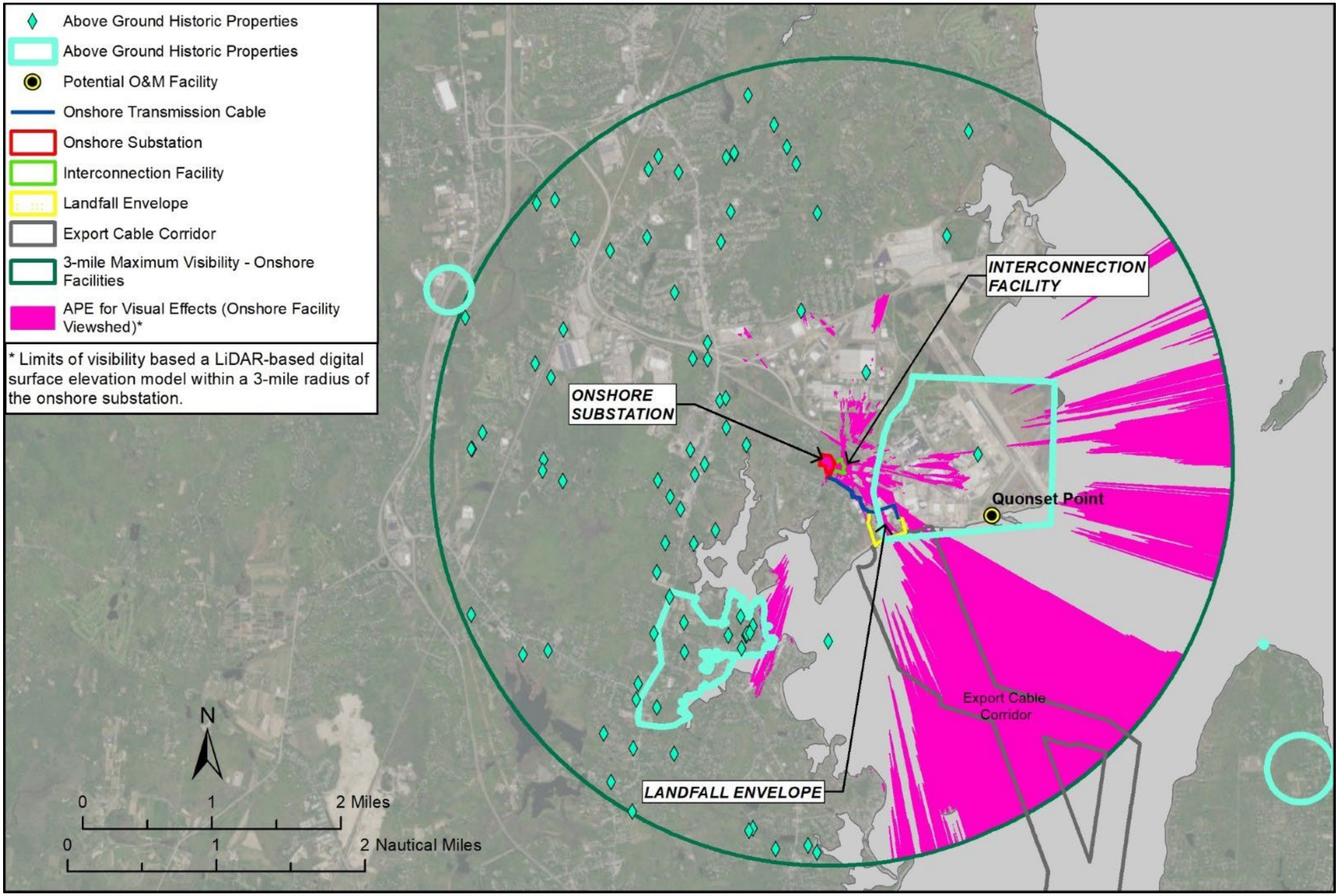



**Figure A-3. Visual area of potential effects and visual effects assessment geographic analysis area – onshore.**

[redacted]

**Figure A-4. Visual area of potential effects and visual effects assessment geographic analysis area – offshore.**

[redacted]

**Figure A-5. National historic landmarks in the visual area of potential effects – offshore.**

# APPENDIX B

# Map Figures of Historic Properties in Relation to the Area of Potential Effects

[redacted]


MARA Figure 4-1. Potential Submerged Cultural Resources in RWF and RWEC. (SEARCH 2023:111) [Focusing on potential shipwrecks; see next page for all ASLF]

[redacted]

Lease Area OCS-A 0486
Revolution Wind Farm Indicative Export Cable Routing
RWF APE
RWEC-OCS APE
RWEC-RI State Waters APE
Indicative Interarray Cable Routing
OSS Location
WTG Location
Micro-siting Buffer
Geomorphic Feature of Archaeological Interest Area
State/Federal Boundary

Service Layer Credits: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

**Revolution Wind**
**Geomorphic Feature of Archaeological Interest Area**

Reference system: NAD83 (2011)
Projection: UTM Zone 19N
0 4 8 Kilometers
0 2.5 5 Miles
Date: 2/23/2023
Created by: S. NELSON
Checked by: B. BLEICHNER
Approved by: B. BLEICHNER

Revolution Wind | Powered by Ørsted & Eversource

MARA Figure 6-1. Geomorphic Features of Archaeological Interest Areas. (SEARCH 2023:203)

[redacted]

**Revolution Wind**
**Figure 4-17**
**Identified Archaeological Resources**

**Legend**

- Identified Archaeological Resource
- QDC and TNEC Parcels

Service Layer Credits: Source: Historical Topographic Map Collection courtesy of the U.S. Geological Survey Esri

[redacted]

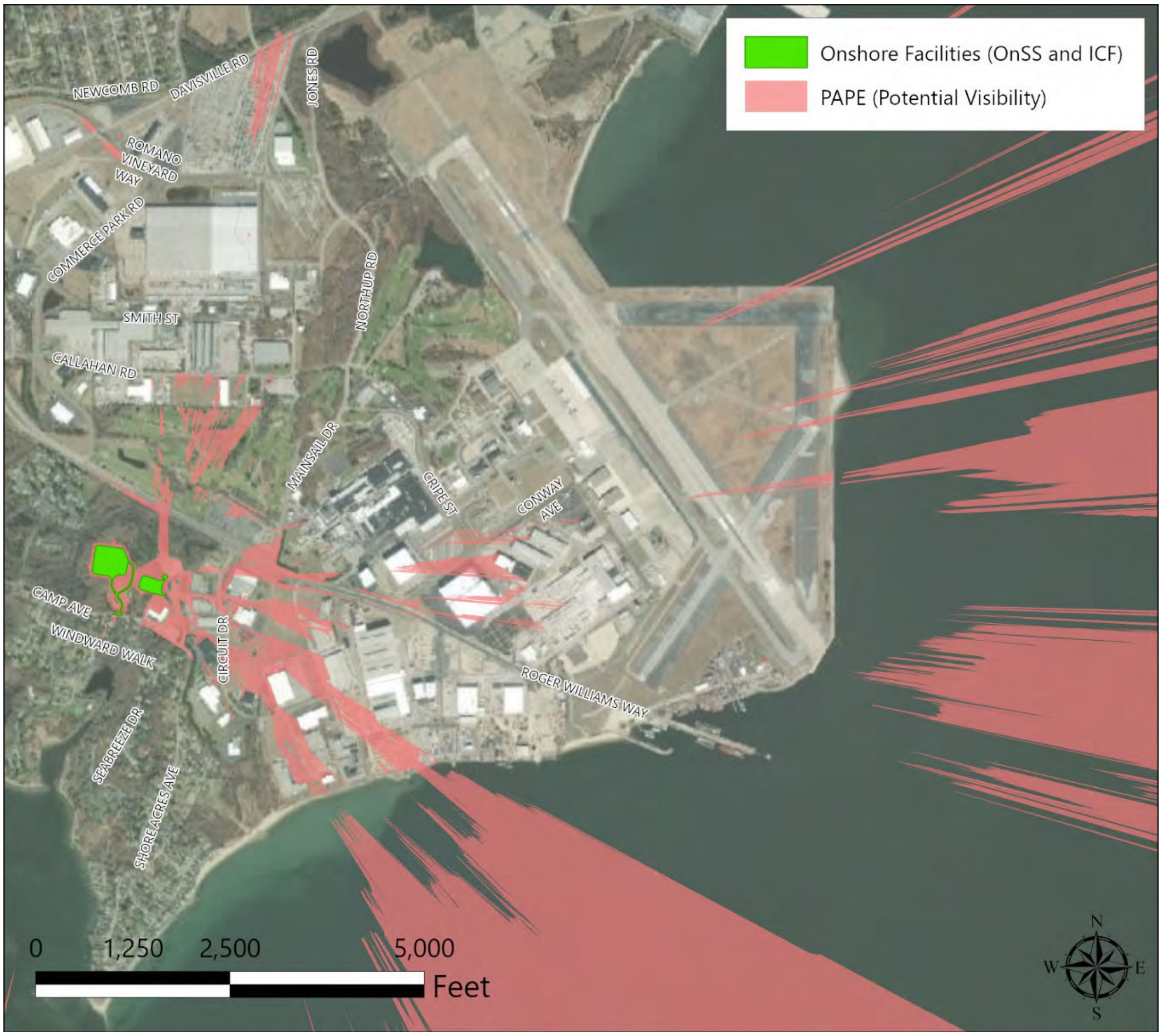
Reference system: NAD83 (2011)
Projection: UTM Zone 19N

0 100 Meters
0 300 Feet

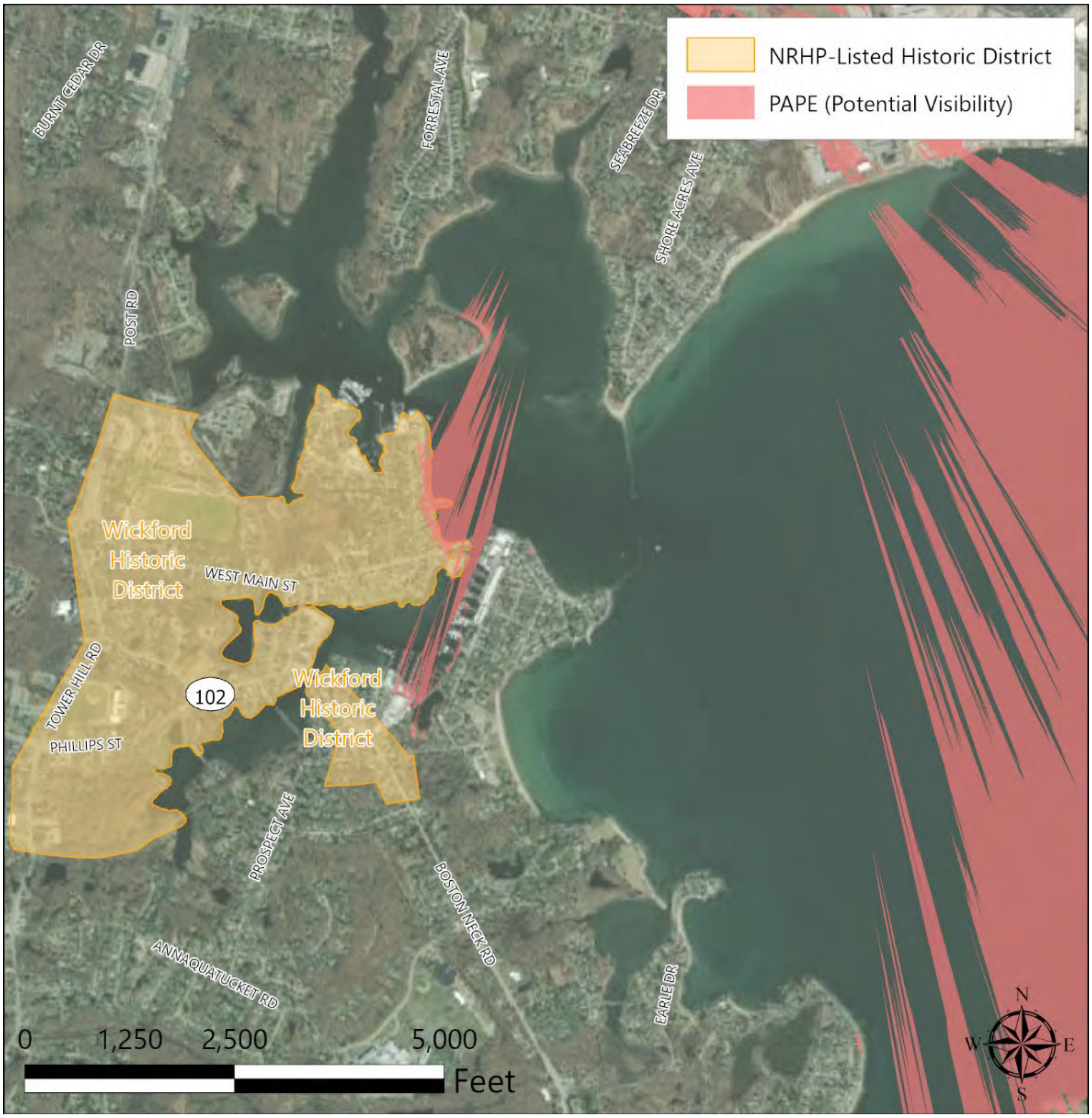
Date: 8/12/2021
Created by: PAL

Revolution Wind | Powered by Ørsted & Eversource

**TARA Figure 4-17: Revolution Wind Onshore Facilities identified archaeological resources on the Wickford, RI USGS topographic quadrangle. (Forrest and Waller 2023:4-18)**




**Onshore HRVEA Figure 2.2-2. Detail of Potential Project Visibility at the Quonset Point Naval Air Station (EDR 2021a:23)**




**Onshore HRVEA Figure 2.2-3 - Detail of Potential OnSS and ICF Visibility Within the Wickford Historic District (EDR 2021a:24)**


# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023) Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects**

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above-Ground Historic Property

National Historic Landmark

NRHP-Listed Property

NRHP-Eligible Property

Municipal Boundary

State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

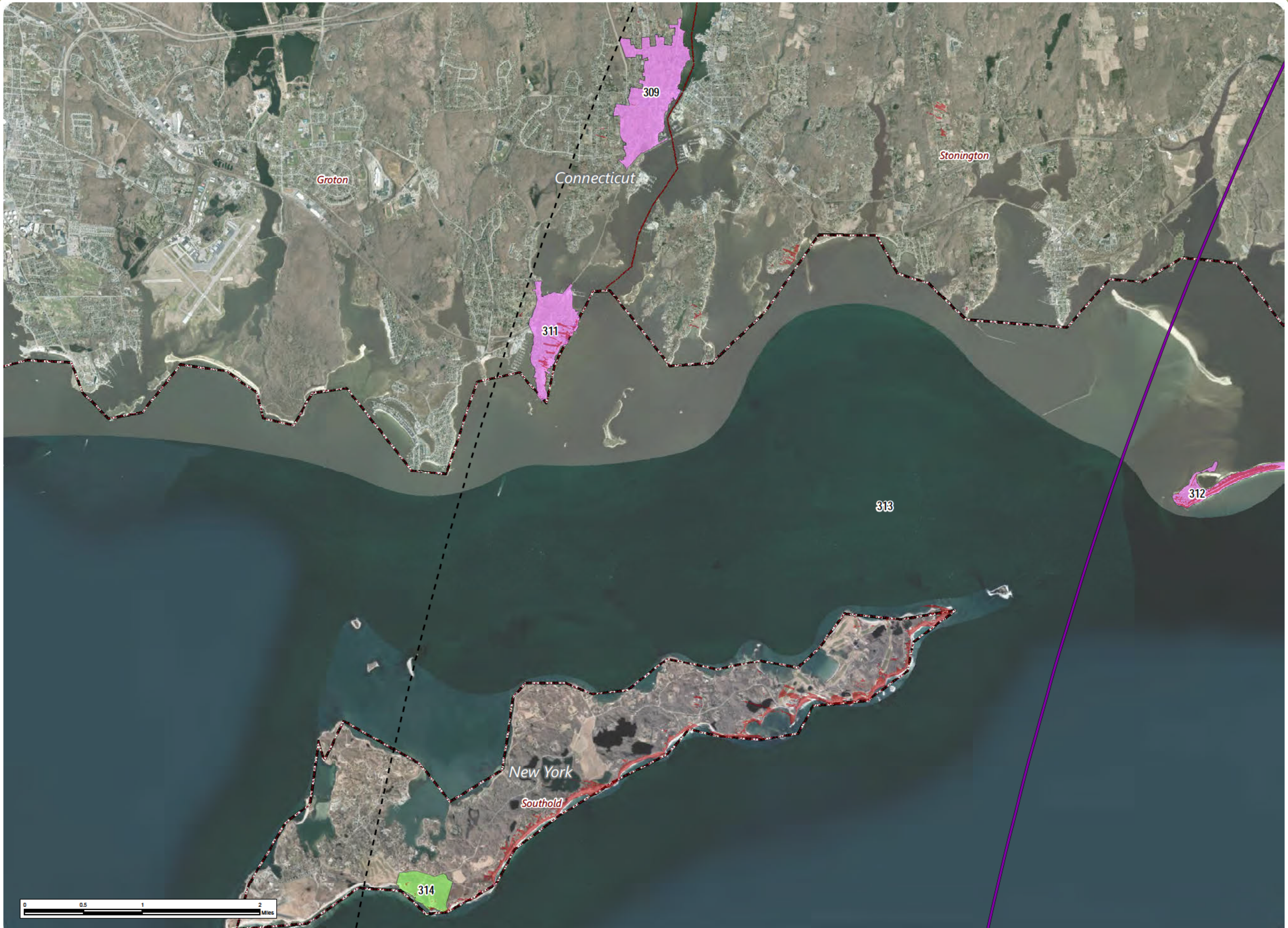
No Adverse Effect

Potential Adverse Effect

Sheet 1 of 28

**Notes: 1.** Basemap: ESRI ArcGIS Online "World Imagery" map service. **2.** This map was generated in ArcMap on July 28, 2022. **3.** This is a color graphic. Reproduction in grayscale may misrepresent the data.

www.edrdpc.com




# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)
40-Mile Visual Study Area

Above-Ground Historic Property
NRHP-Listed Property
NRHP-Eligible Property
Municipal Boundary
State Boundary
Turbine Distance Intervals

Label Key for Historic Properties
No Adverse Effect
Potential Adverse Effect

Sheet 2 of 28

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on July 28, 2022. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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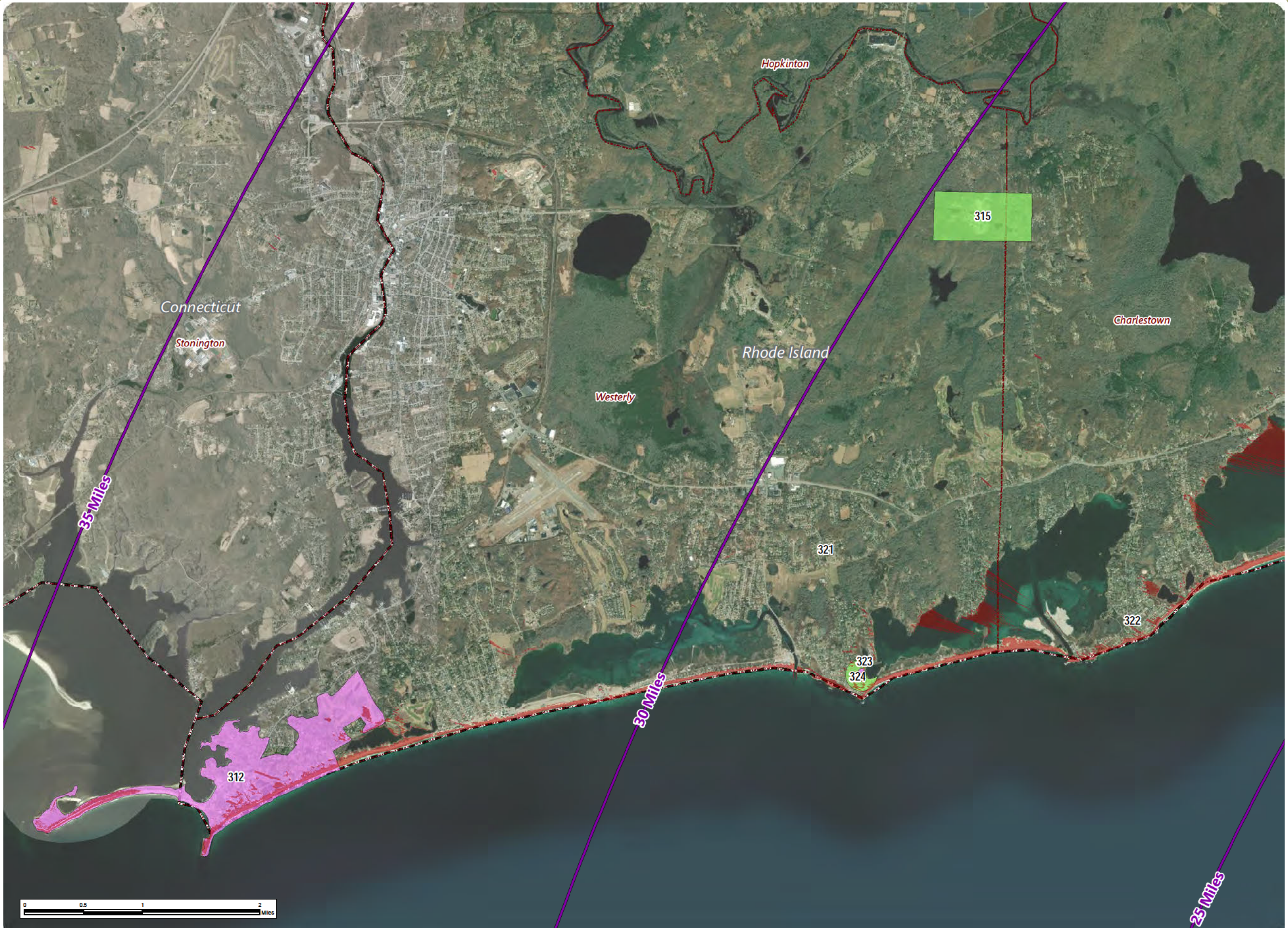


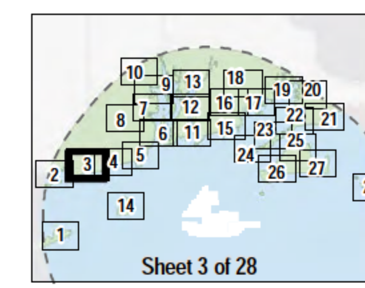

# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)
40-Mile Visual Study Area
Above-Ground Historic Property
NRHP-Listed Property
NRHP-Eligible Property
Other Potential Historic Property
Municipal Boundary
State Boundary
Turbine Distance Intervals

Label Key for Historic Properties
No Adverse Effect
Potential Adverse Effect

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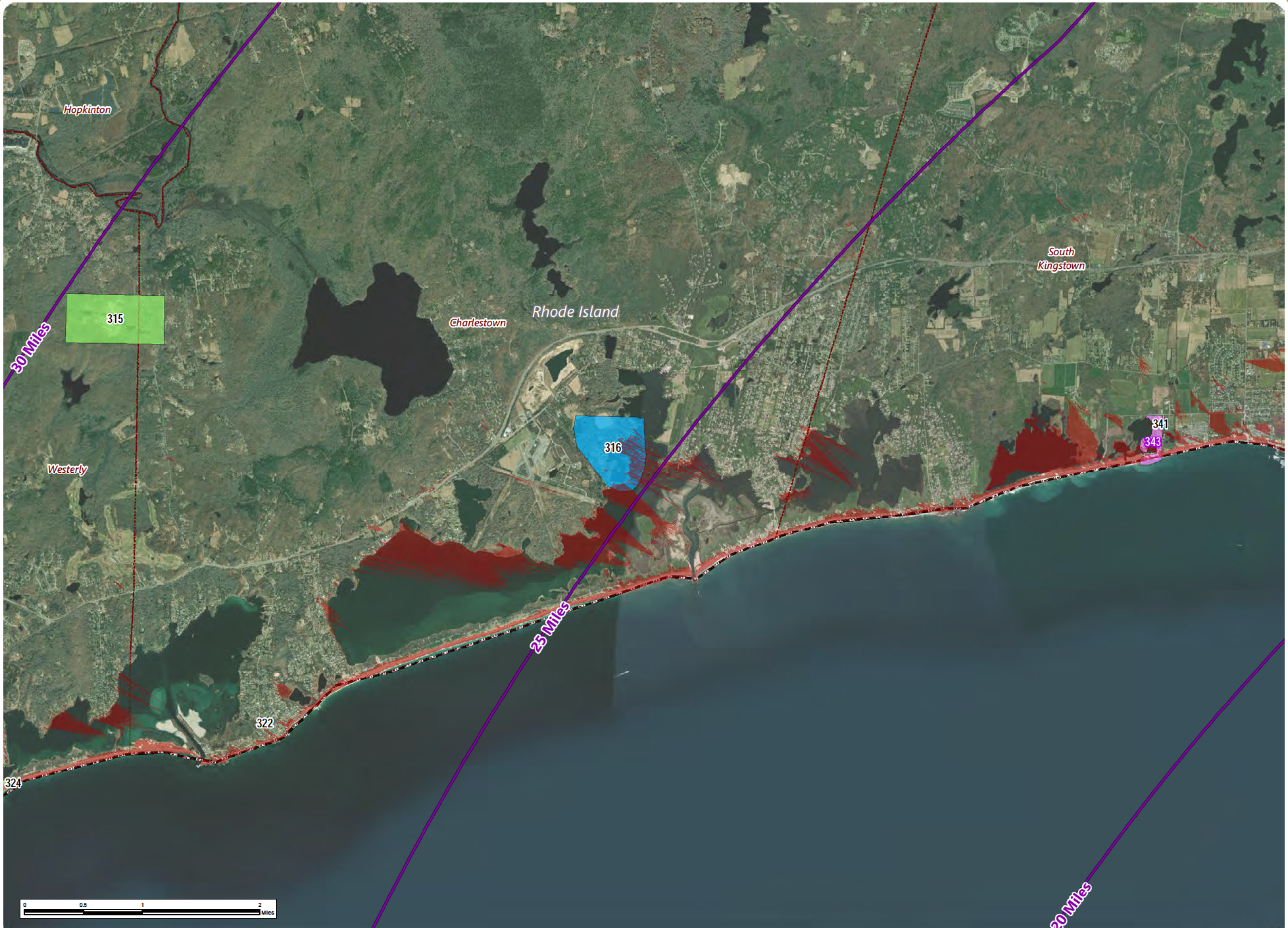


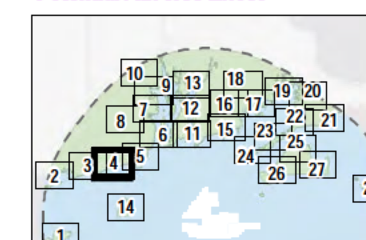

# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)
40-Mile Visual Study Area
Above-Ground Historic Property
NRHP-Listed Property
NRHP-Eligible Property
Other Potential Historic Property
Municipal Boundary
State Boundary
Turbine Distance Intervals

Label Key for Historic Properties
No Adverse Effect
Potential Adverse Effect



Sheet 4 of 28

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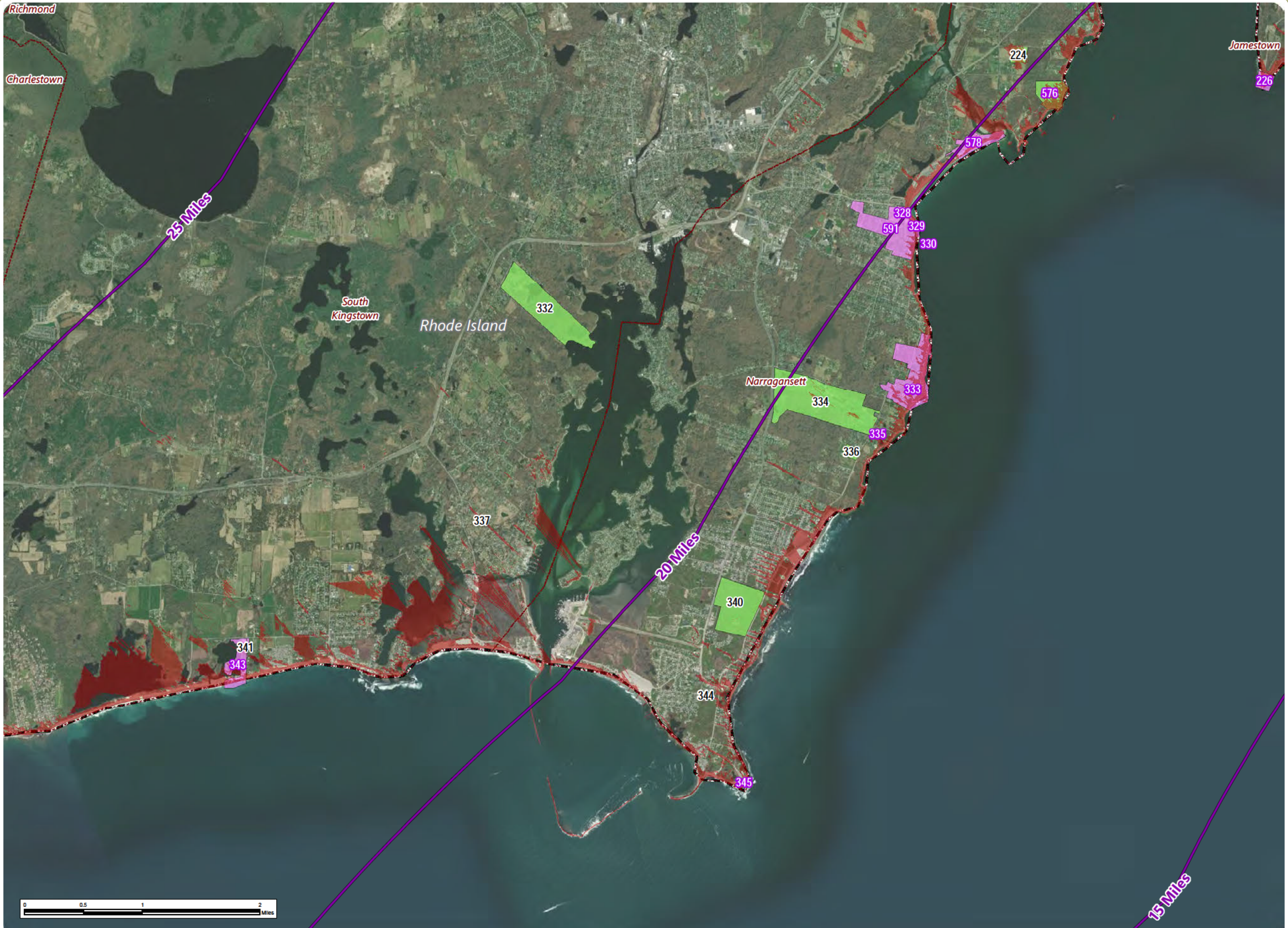


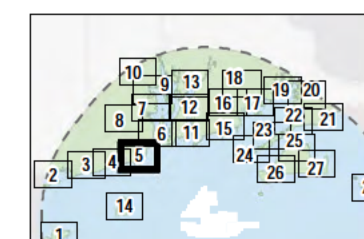

# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)
40-Mile Visual Study Area
Above-Ground Historic Property
NRHP-Listed Property
NRHP-Eligible Property
Other Potential Historic Property
Municipal Boundary
State Boundary
Turbine Distance Intervals

Label Key for Historic Properties
No Adverse Effect
Potential Adverse Effect

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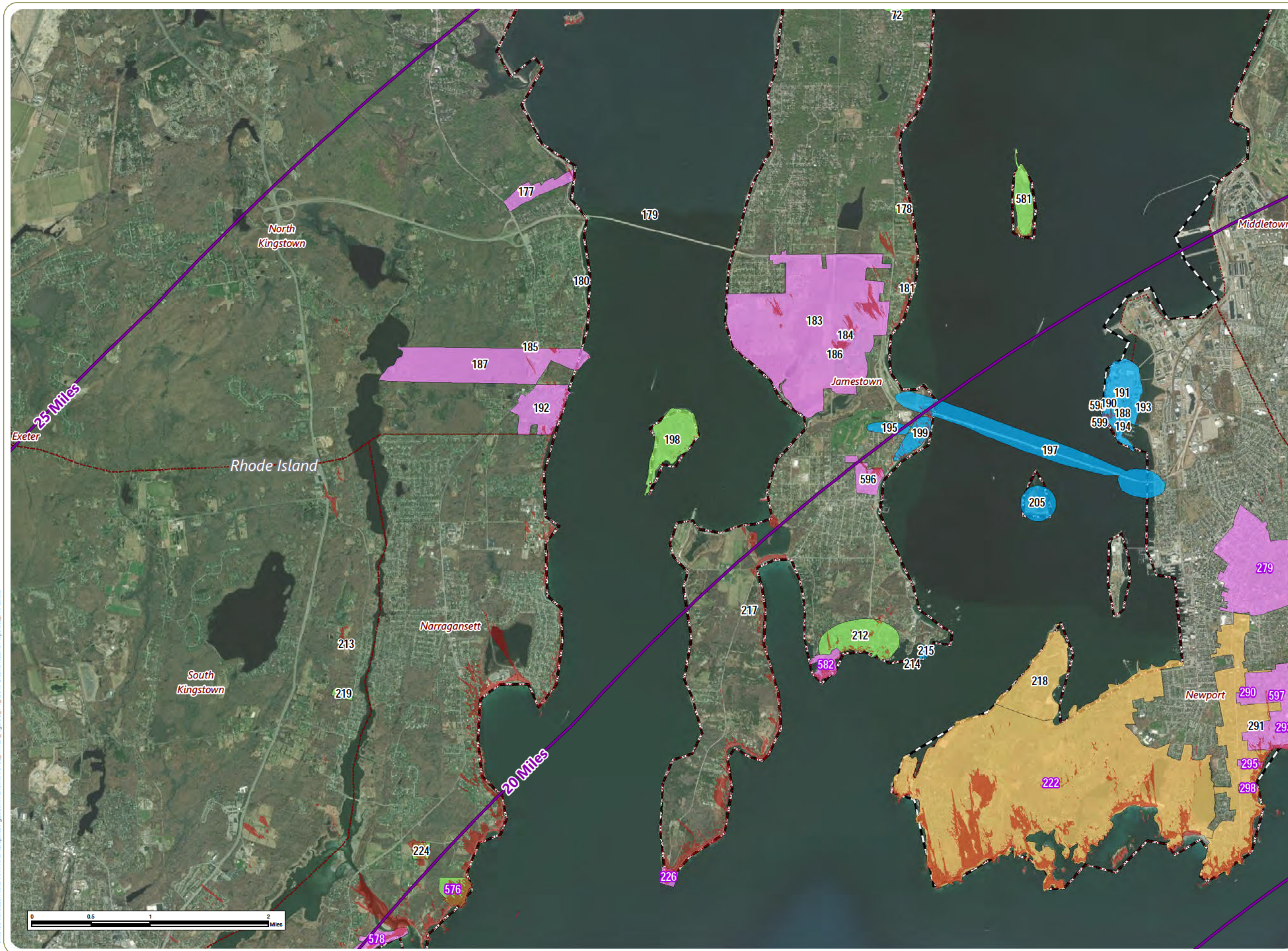


# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

## HRVEA (EDR 2023)

Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

- Preliminary Area of Potential Effects (PAPE)
- 40-Mile Visual Study Area

Above-Ground Historic Property

- National Historic Landmark
- NRHP-Listed Property
- NRHP-Eligible Property
- Other Potential Historic Property
- Municipal Boundary
- State Boundary
- Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

Sheet 6 of 28

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on July 28, 2022. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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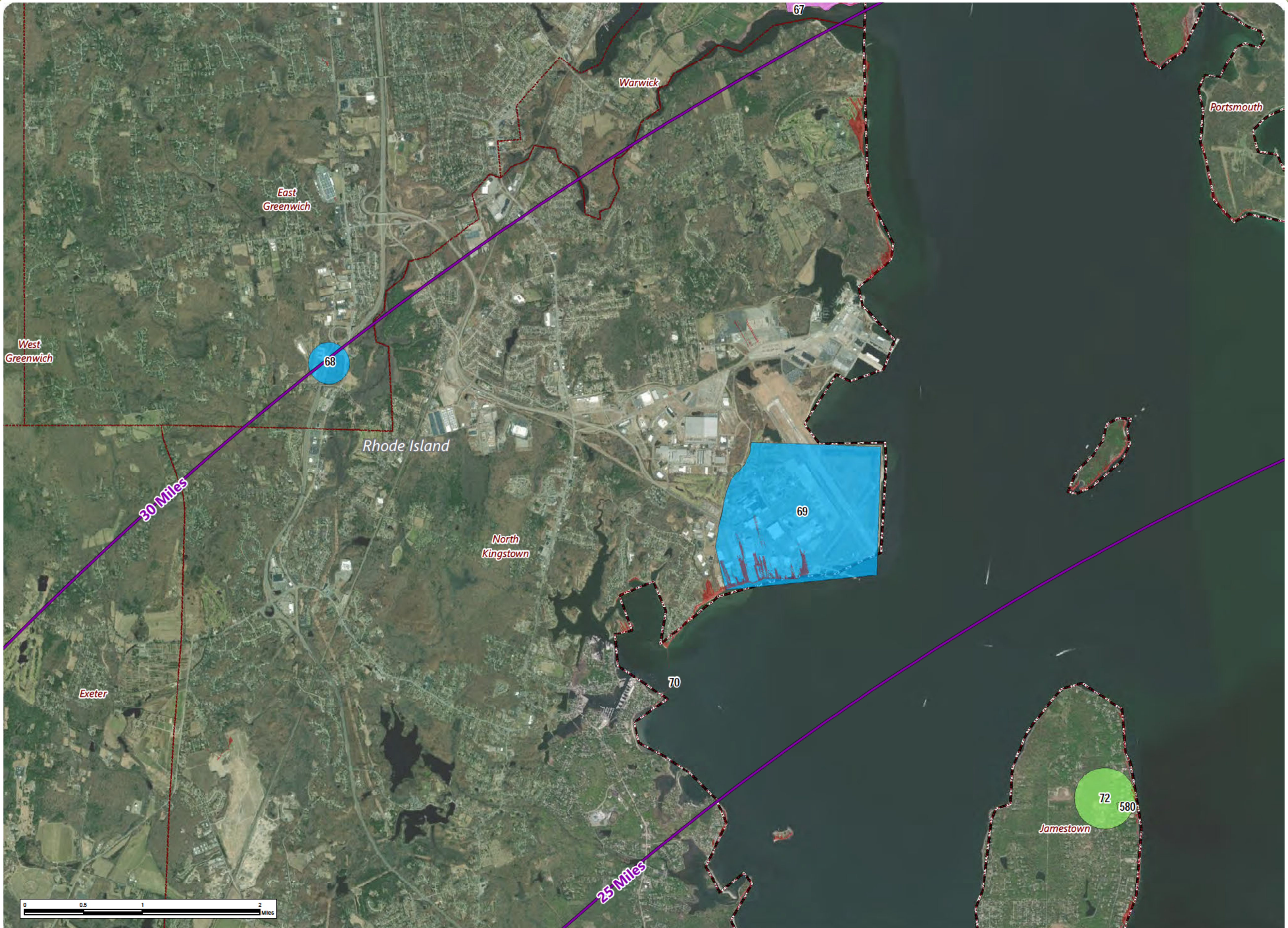


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# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

## HRVEA (EDR 2023)
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

- Preliminary Area of Potential Effects (PAPE)
- 40-Mile Visual Study Area

Above-Ground Historic Property
- NRHP-Listed Property
- NRHP-Eligible Property
- Other Potential Historic Property
- Municipal Boundary
- State Boundary
- Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

Sheet 7 of 28

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on July 28, 2022. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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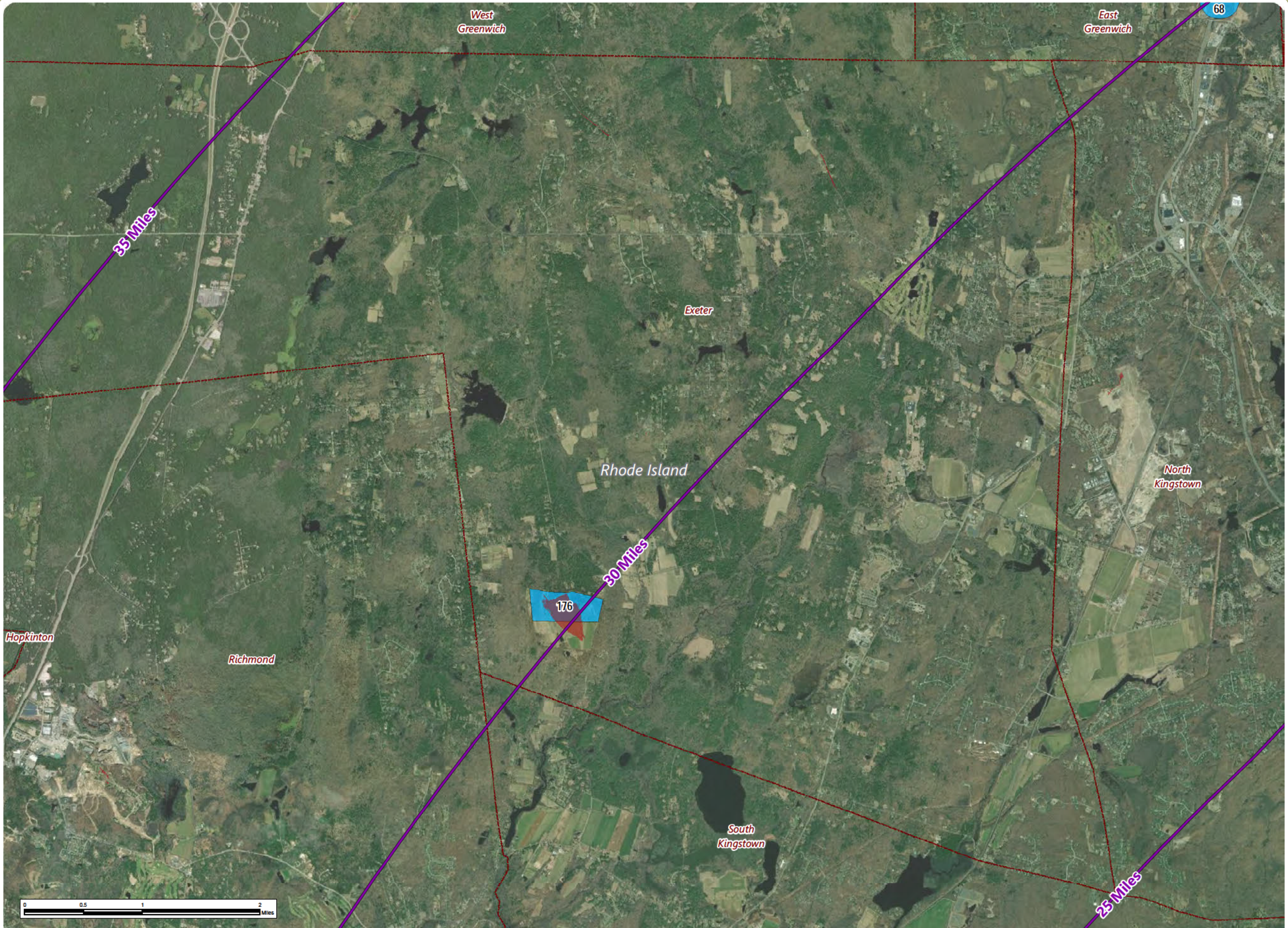


# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)
40-Mile Visual Study Area
Above-Ground Historic Property
Other Potential Historic Property
Municipal Boundary
State Boundary
Turbine Distance Intervals

Label Key for Historic Properties
No Adverse Effect
Potential Adverse Effect

Sheet 8 of 28

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on July 28, 2022. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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## Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**

Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above-Ground Historic Property

NRHP-Listed Property

Other Potential Historic Property

Municipal Boundary

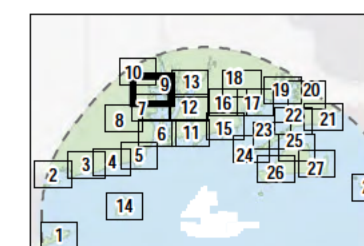
State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect



Sheet 9 of 28

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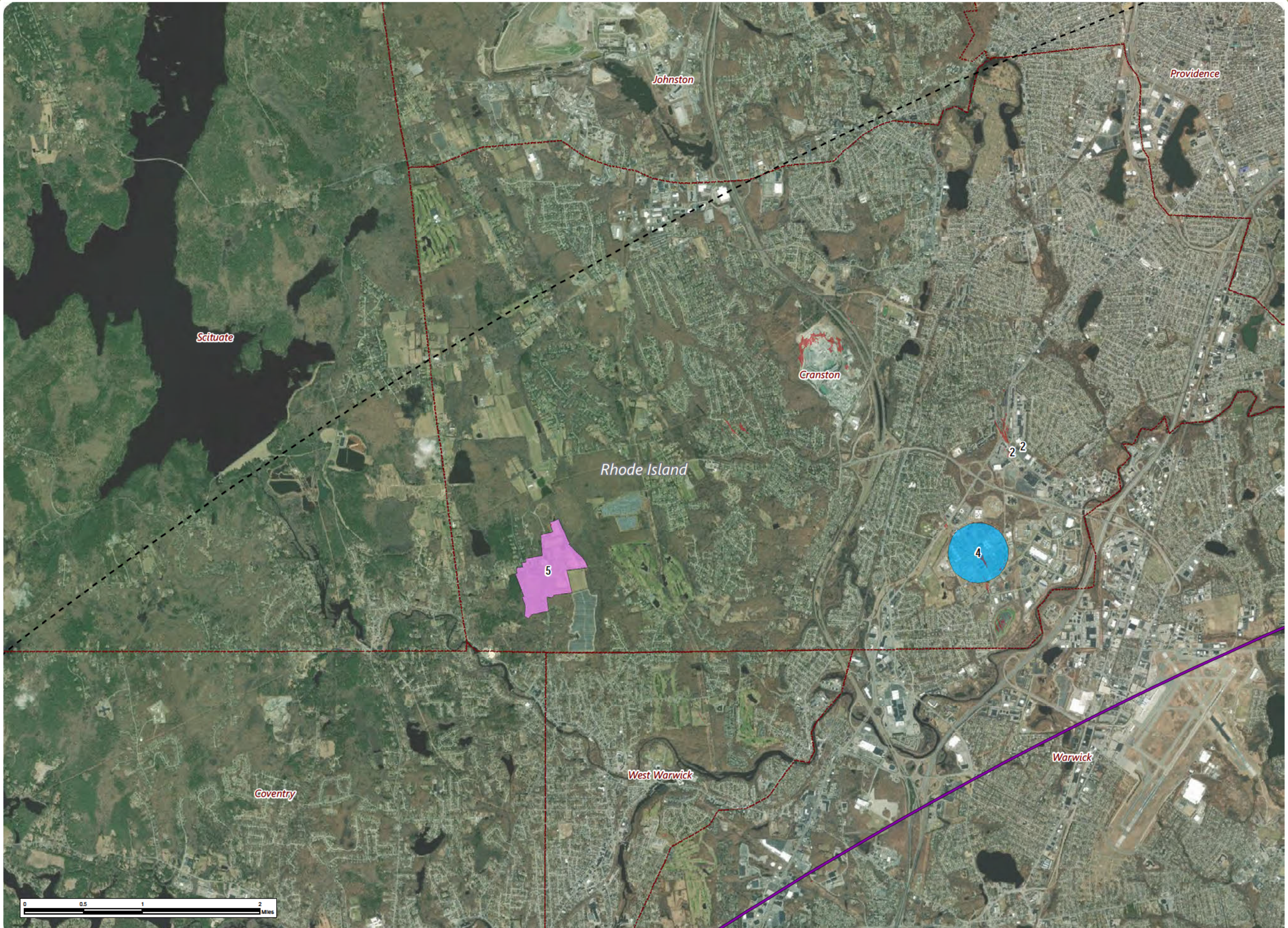


# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)
40-Mile Visual Study Area
Above-Ground Historic Property
NRHP-Listed Property
Other Potential Historic Property
Municipal Boundary
State Boundary
Turbine Distance Intervals

Label Key for Historic Properties
No Adverse Effect
Potential Adverse Effect

Sheet 10 of 28

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on July 28, 2022. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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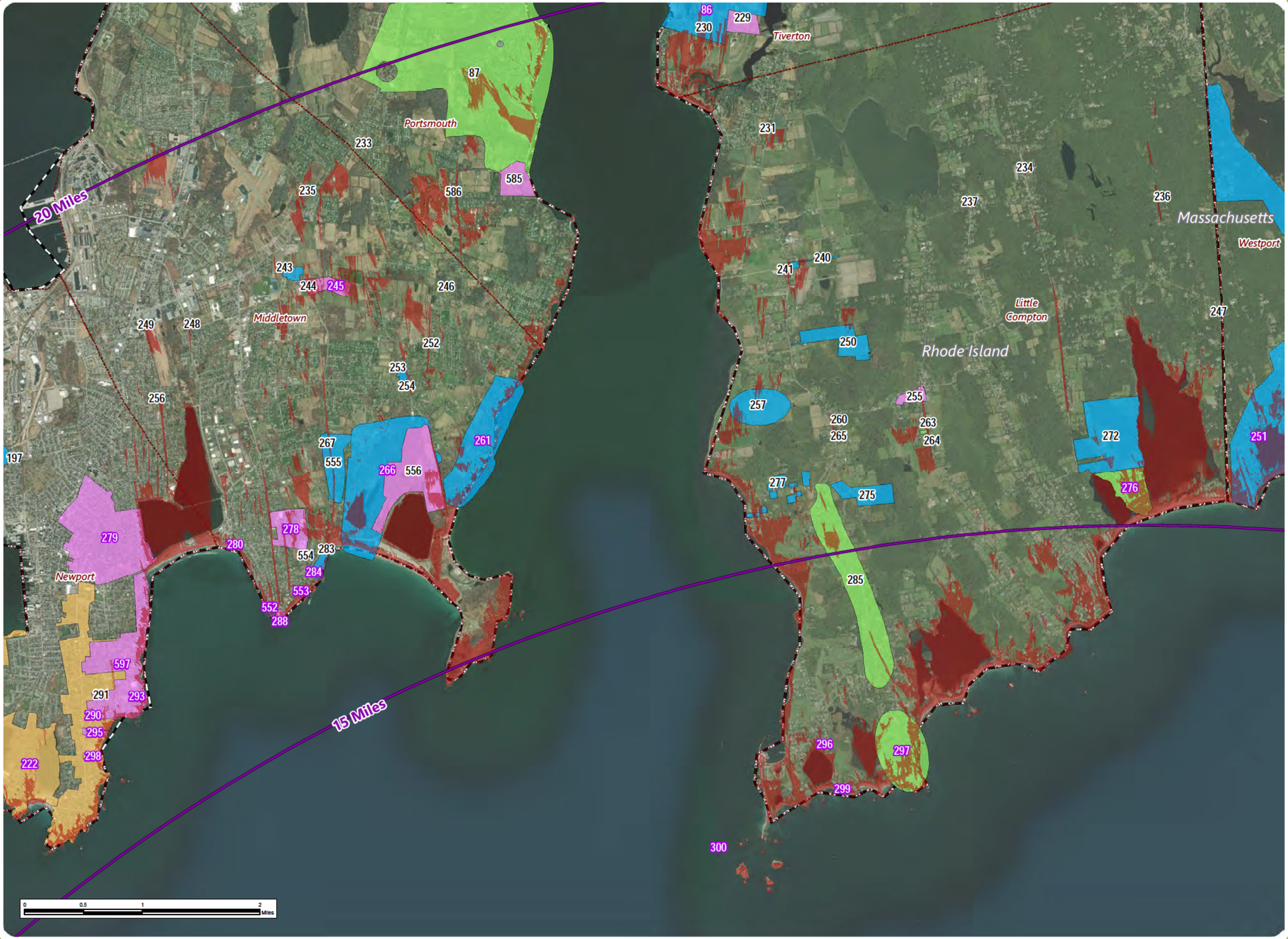


# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

## HRVEA (EDR 2023)

Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above-Ground Historic Property

National Historic Landmark

NRHP-Listed Property

NRHP-Eligible Property

Other Potential Historic Property

Municipal Boundary

State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

Sheet 11 of 28

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on July 28, 2022. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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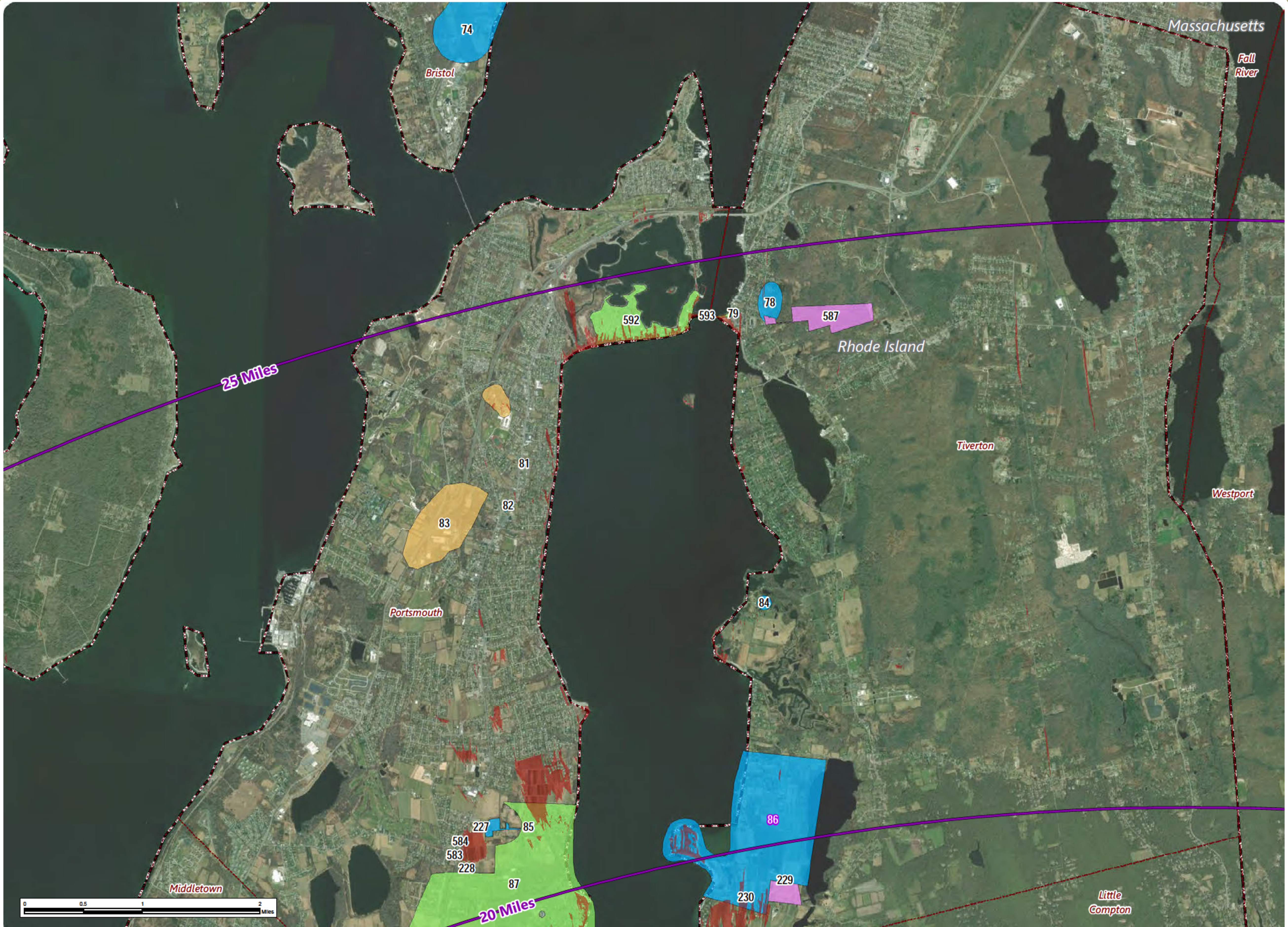


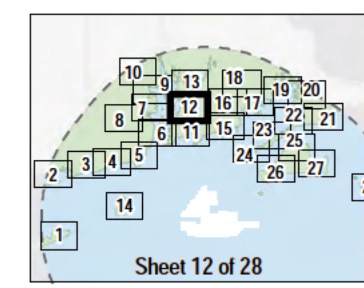

# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)
40-Mile Visual Study Area
Above-Ground Historic Property
National Historic Landmark
NRHP-Listed Property
NRHP-Eligible Property
Other Potential Historic Property
Municipal Boundary
State Boundary
Turbine Distance Intervals

Label Key for Historic Properties
No Adverse Effect
Potential Adverse Effect

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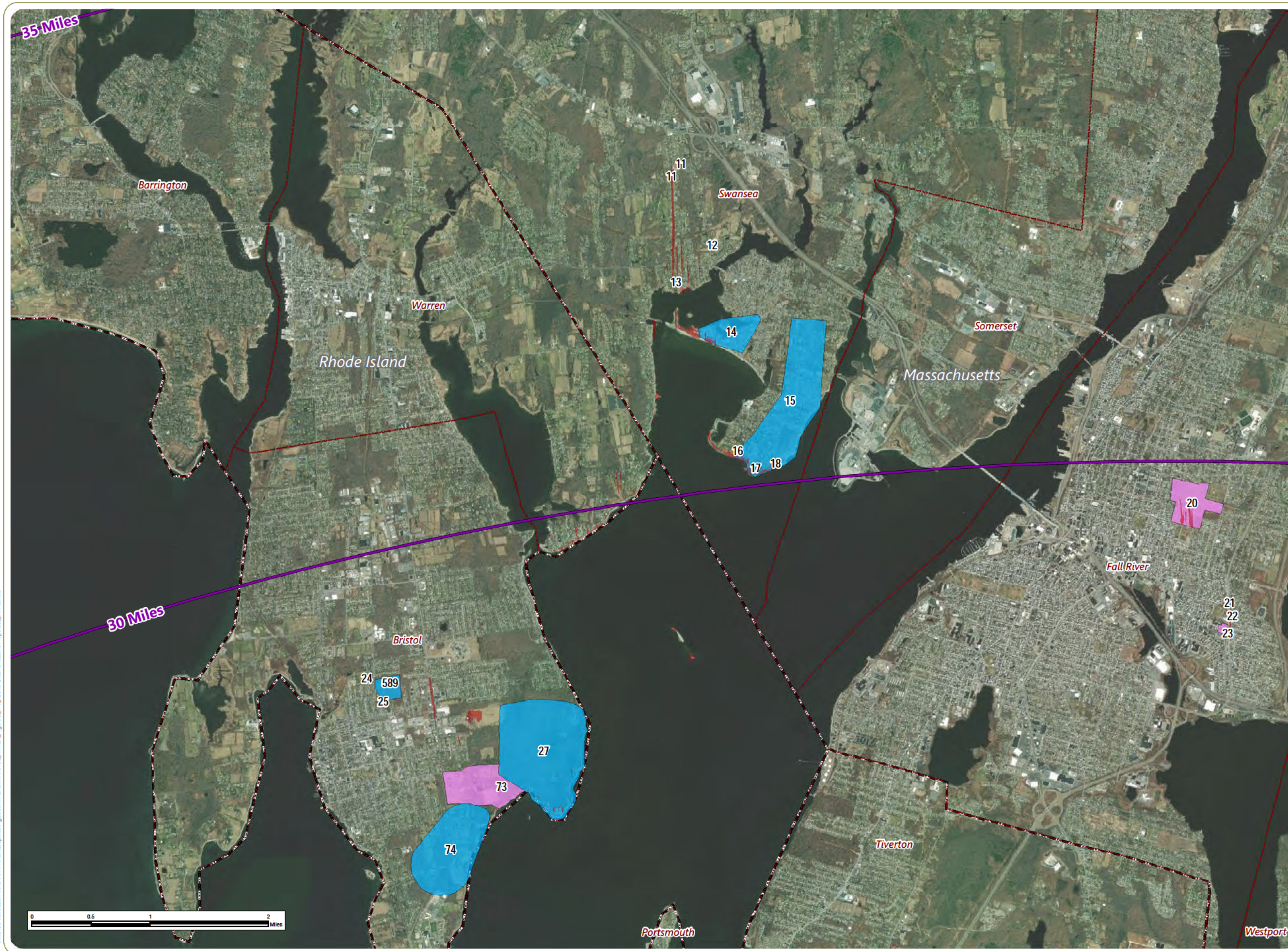



# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**

Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above-Ground Historic Property

NRHP-Listed Property

Other Potential Historic Property

Municipal Boundary

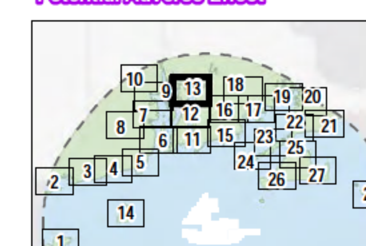
State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

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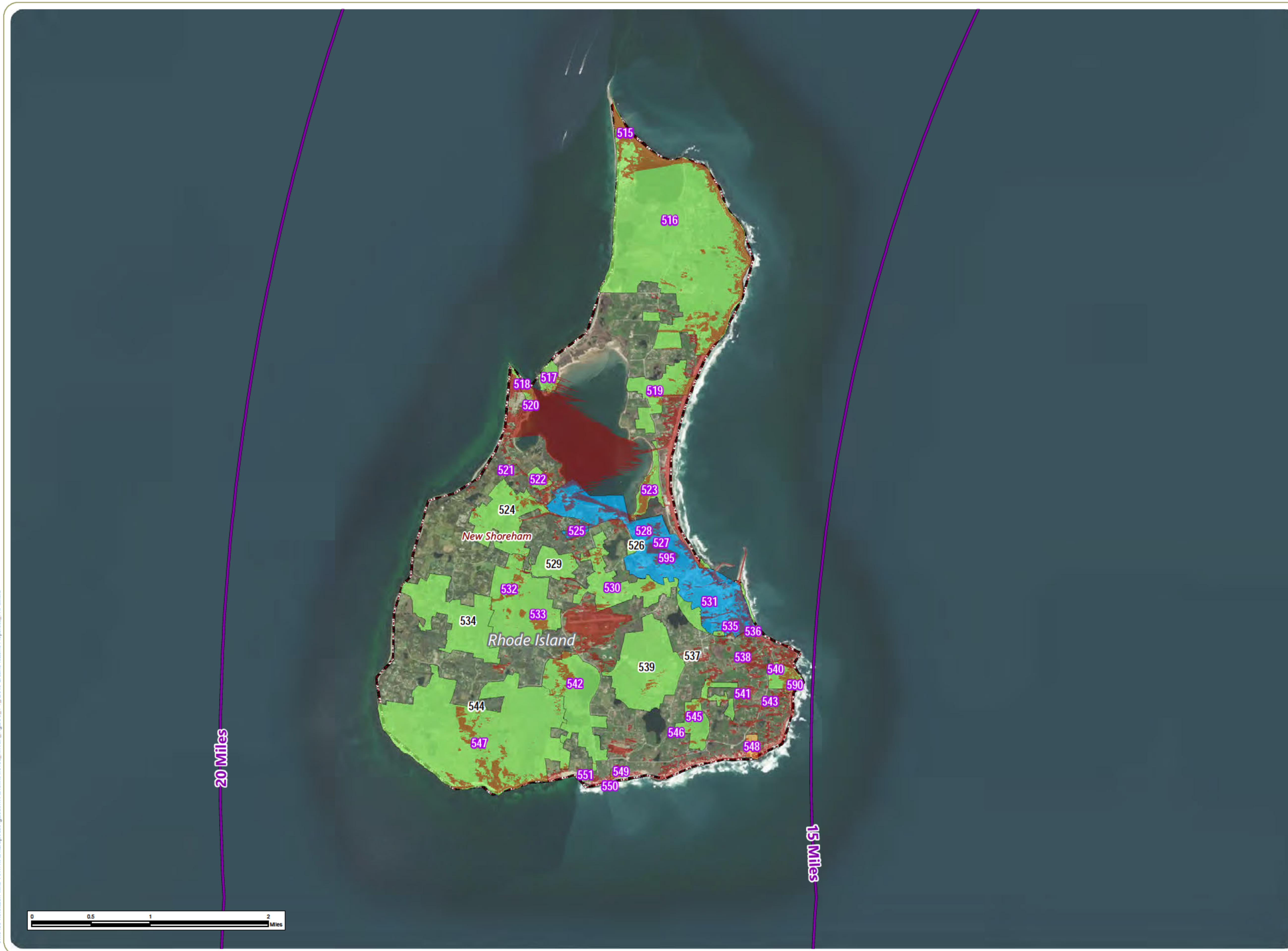



# Revolution Wind Farm

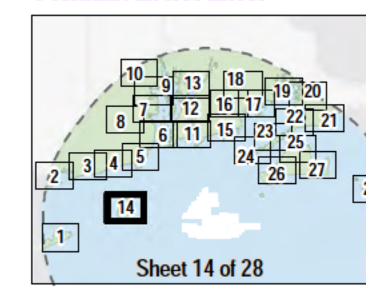
Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)
40-Mile Visual Study Area

Above-Ground Historic Property
National Historic Landmark
NRHP-Listed Property
NRHP-Eligible Property
Other Potential Historic Property
Municipal Boundary
State Boundary
Turbine Distance Intervals

Label Key for Historic Properties
No Adverse Effect
Potential Adverse Effect

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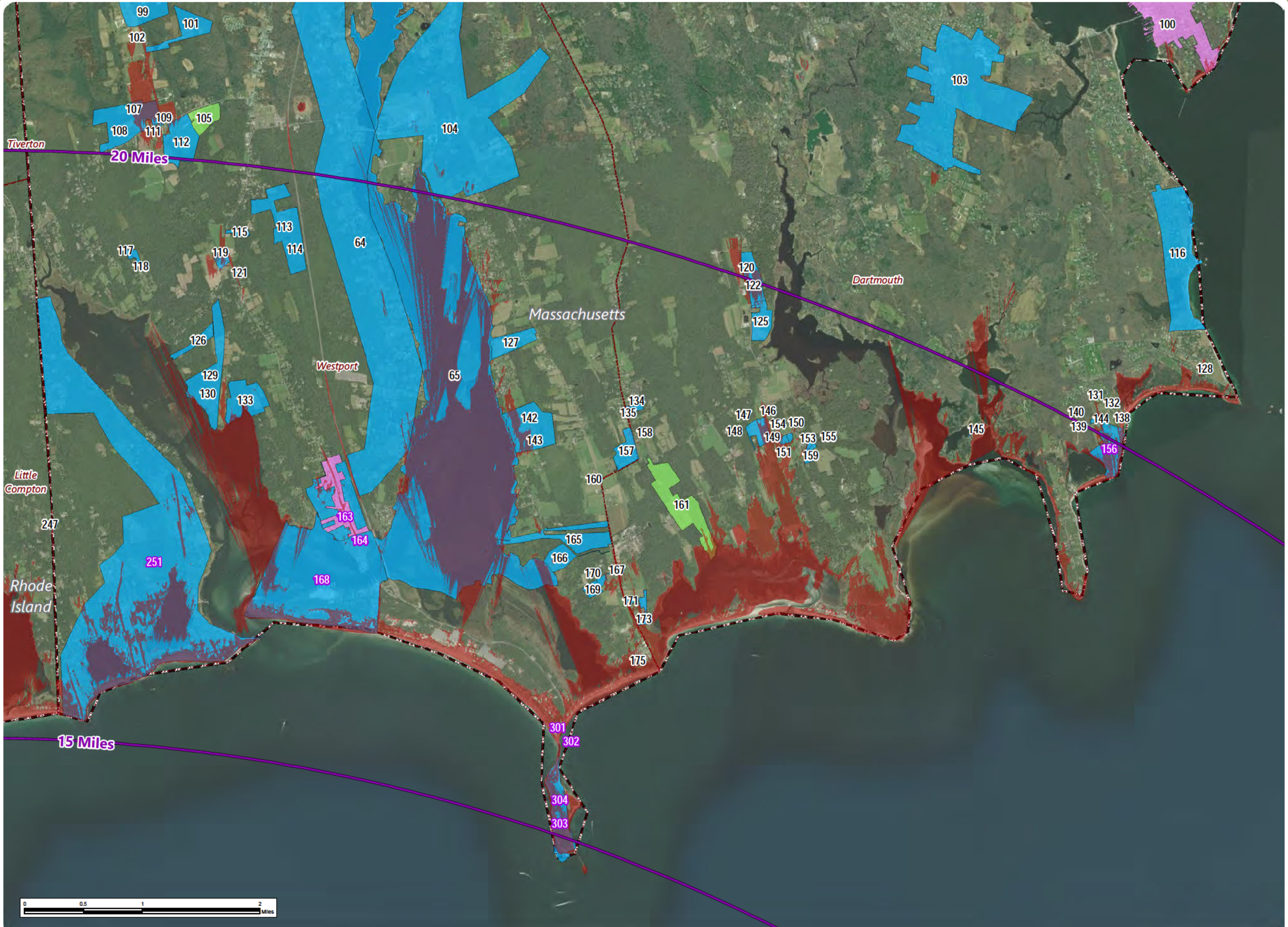


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Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)
40-Mile Visual Study Area
Above-Ground Historic Property
NRHP-Listed Property
NRHP-Eligible Property
Other Potential Historic Property
Municipal Boundary
State Boundary
Turbine Distance Intervals

Label Key for Historic Properties
No Adverse Effect
Potential Adverse Effect

Sheet 15 of 28

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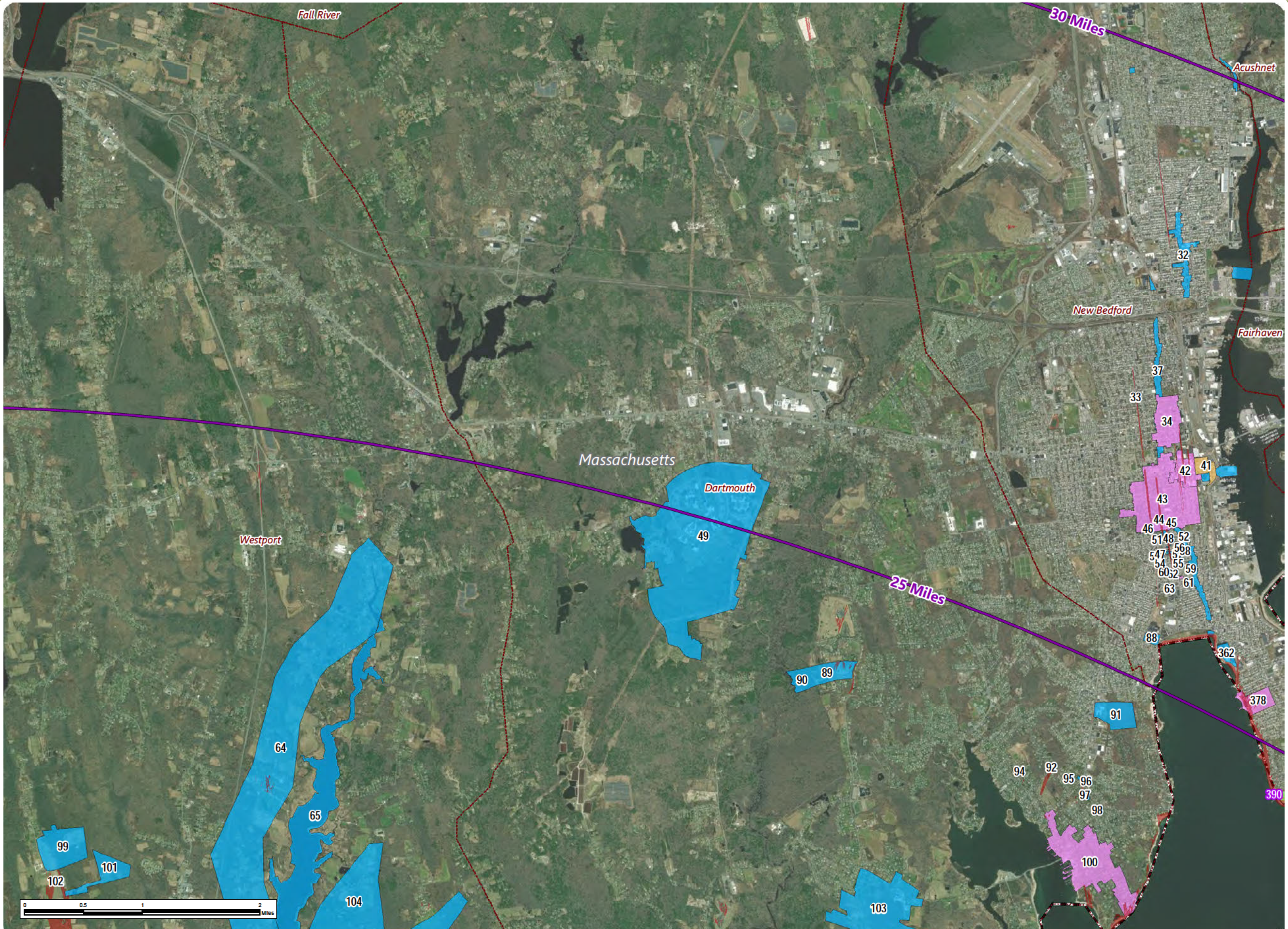



# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

## HRVEA (EDR 2023)

Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

- Preliminary Area of Potential Effects (PAPE)
- 40-Mile Visual Study Area

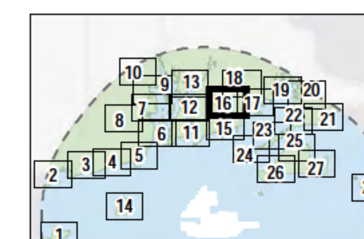
Above-Ground Historic Property

- National Historic Landmark
- NRHP-Listed Property
- NRHP-Eligible Property
- Other Potential Historic Property
- Municipal Boundary
- State Boundary
- Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

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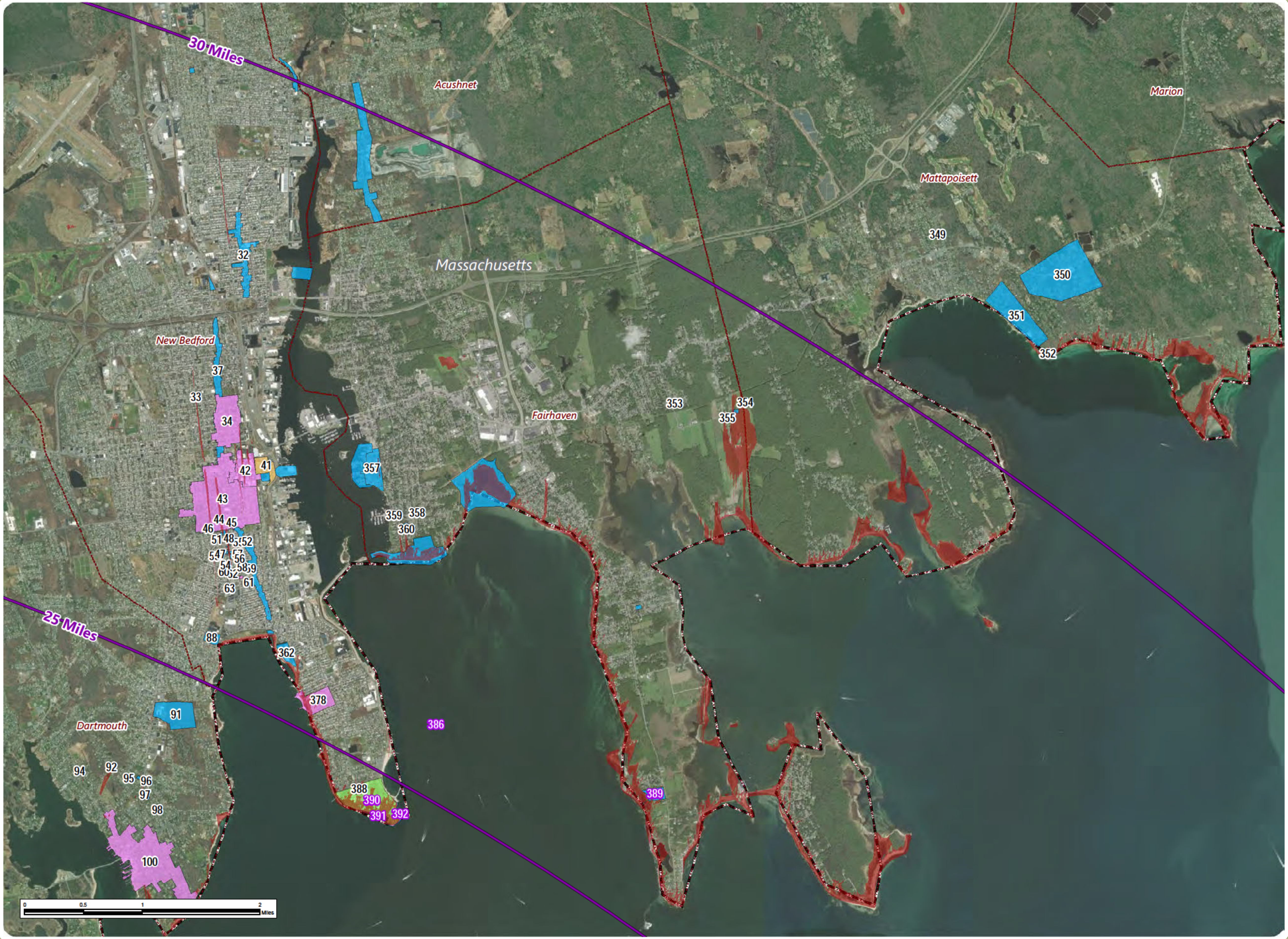



# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

## HRVEA (EDR 2023)

Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above-Ground Historic Property

National Historic Landmark

NRHP-Listed Property

NRHP-Eligible Property

Other Potential Historic Property

Municipal Boundary

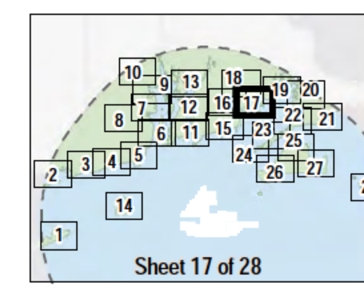
State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

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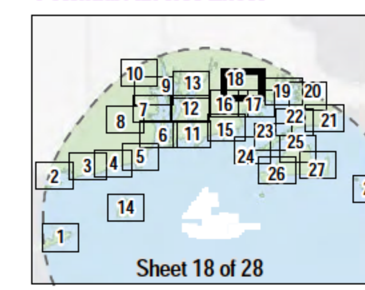
Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)
40-Mile Visual Study Area
Above-Ground Historic Property
Other Potential Historic Property
Municipal Boundary
State Boundary
Turbine Distance Intervals

Label Key for Historic Properties
No Adverse Effect
Potential Adverse Effect

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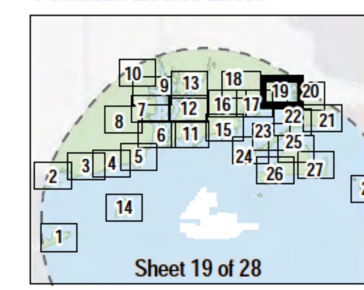
Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)
40-Mile Visual Study Area
Above-Ground Historic Property
NRHP-Listed Property
Other Potential Historic Property
Municipal Boundary
State Boundary
Turbine Distance Intervals

Label Key for Historic Properties
No Adverse Effect
Potential Adverse Effect

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# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above-Ground Historic Property

NRHP-Listed Property

Other Potential Historic Property

Traditional Cultural Property (TCP)

Municipal Boundary

State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

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# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**

Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above-Ground Historic Property

Other Potential Historic Property

Traditional Cultural Property (TCP)

Municipal Boundary

State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

[redacted]

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## Revolution Wind Farm

Outer Continental Shelf
(OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

- Preliminary Area of Potential Effects (PAPE)
- 40-Mile Visual Study Area

Above-Ground Historic Property

- NRHP-Listed Property
- Other Potential Historic Property
- Traditional Cultural Property (TCP)
- Municipal Boundary
- State Boundary
- Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

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## Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above-Ground Historic Property

NRHP-Listed Property

Other Potential Historic Property

Traditional Cultural Property (TCP)

Municipal Boundary

State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

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## Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

- Preliminary Area of Potential Effects (PAPE)
- 40-Mile Visual Study Area

Above-Ground Historic Property

- NRHP-Eligible Property
- Other Potential Historic Property
- Traditional Cultural Property (TCP)
- Municipal Boundary
- State Boundary
- Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

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# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

## HRVEA (EDR 2023) Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above-Ground Historic Property

NRHP-Listed Property

Other Potential Historic Property

Traditional Cultural Property (TCP)

Municipal Boundary

State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

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Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**

Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above Ground Historic Property

NRHP-Listed Property

NRHP-Eligible Property

Other Potential Historic Property

Traditional Cultural Property (TCP)

Municipal Boundary

State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

[redacted]

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on July 28, 2022. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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[redacted]

# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**

Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above-Ground Historic Property

NRHP-Listed Property

Other Potential Historic Property

Traditional Cultural Property (TCP)

Municipal Boundary

State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

[redacted]

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on July 28, 2022. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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[redacted]

# Revolution Wind Farm

Outer Continental Shelf (OCS-A0486)

**HRVEA (EDR 2023)**
Figure 3.1-1: Above-Ground Historic Properties Within the Preliminary Area of Potential Effects

Preliminary Area of Potential Effects (PAPE)

40-Mile Visual Study Area

Above-Ground Historic Property

National Historic Landmark

Other Potential Historic Property

Traditional Cultural Property (TCP)

Municipal Boundary

State Boundary

Turbine Distance Intervals

Label Key for Historic Properties

No Adverse Effect

Potential Adverse Effect

[redacted]

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on July 28, 2022. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

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# APPENDIX C

## Visual Simulations at the Pertinent Key Observation Points for Adversely Affected National Historic Landmarks

Revolution Wind | Powered by Ørsted & Eversource

**Environmental Data**
Date Taken: 7/26/2017
Time: 7:03 AM
Temperature: 59°F
Humidity: 95%
Visibility: >10 miles
Wind Direction: Calm
Wind Speed: 0 mph
Conditions Observed: Fair

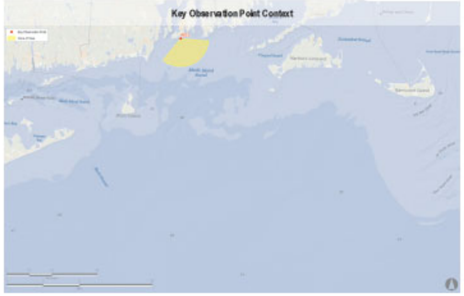
**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 22.8 feet AMSL

**Notes:**

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

**Key Observation Point Information**
County: Newport
Town: Newport
State: Rhode Island
Location: Aquidneck Island
Latitude, Longitude: 41.45119° N, 71.31157° W
Direction of View (Center): South-Southeast (155.7°)
Field of View: 124° x 55°

**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Shoreline Residential
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark





## AI03: Newport Cliff Walk, Newport, Rhode Island Existing Conditions

[illegible]

# Revolution Wind

Powered by Ørsted & Eversource

**AI03: Newport Cliff Walk, Newport, Rhode Island**

**Visual Simulation: 2023 Project Construction (South Fork Wind and Vineyard Wind North)**

[illegible]

**Environmental Data**
Date Taken: 7/26/2017
Time: 7:03 AM
Temperature: 59°F
Humidity: 95%
Visibility: >10 miles
Wind Direction: Calm
Wind Speed: 0 mph
Conditions Observed: Fair

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 22.8 feet AMSL

**Key Observation Point Information**
County: Newport
Town: Newport
State: Rhode Island
Location: Aquidneck Island
Latitude, Longitude: 41.45119° N, 71.31157° W
Direction of View (Center): South-Southeast (155.7°)
Field of View: 124° x 55°

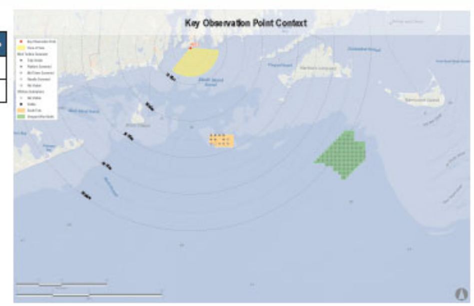
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Shoreline Residential
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark

**Notes:**

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSSs Visible¹ | Total Number of WTGs & OSSs in Project | Distance to Nearest Visible WTG (miles) | Distance to Furthest Visible WTG (miles) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 12 | 12 | 24.5 | 28.0 |
| Vineyard Wind North | 2023 | 14 MW | 0 | 69 | NA | NA |




Revolution Wind | Powered by Ørsted & Eversource

**AI03: Newport Cliff Walk, Newport, Rhode Island**

**Visual Simulation: 2023 Project Construction with Revolution Construction added (Revolution Wind, South Fork Wind, and Vineyard Wind North)**

[illegible]

**Environmental Data**
Date Taken: 7/26/2017
Time: 7:03 AM
Temperature: 59°F
Humidity: 95%
Visibility: >10 miles
Wind Direction: Calm
Wind Speed: 0 mph
Conditions Observed: Fair

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 22.8 feet AMSL

**Notes:**

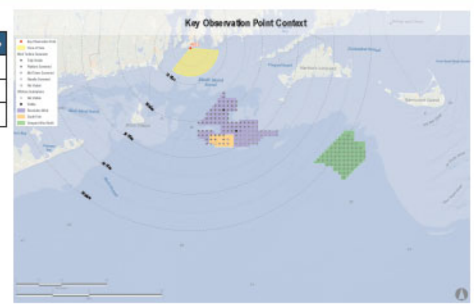
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

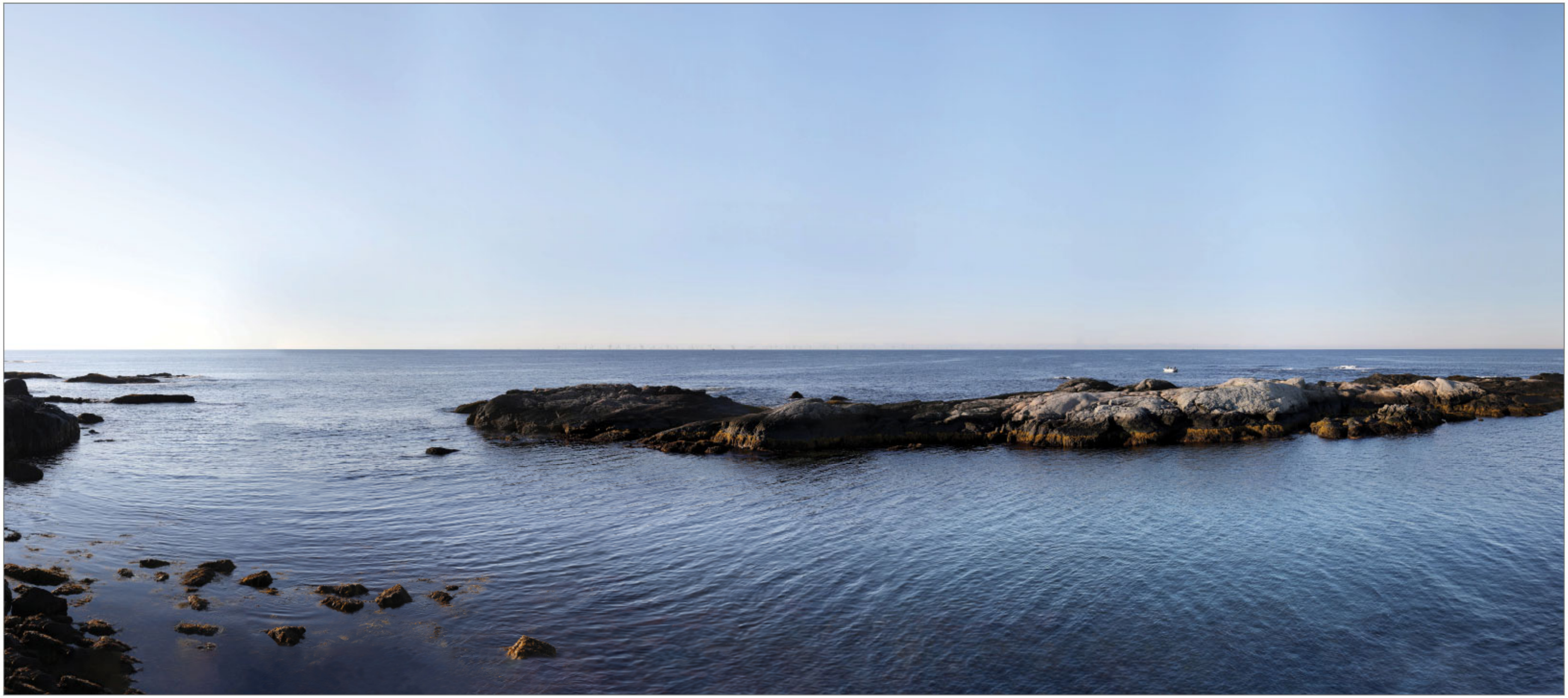
**Key Observation Point Information**
County: Newport
Town: Newport
State: Rhode Island
Location: Aquidneck Island
Latitude, Longitude: 41.45119° N, 71.31157° W
Direction of View (Center): South-Southeast (155.7°)
Field of View: 124° x 55°

**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Shoreline Residential
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSSs Visible* | Total Number of WTGs & OSSs in Project | Distance to Nearest Visible WTG (st mi) | Distance to Furthest Visible WTG (st mi) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 12 | 13 | 24.5 | 28.8 |
| Vineyard Wind North | 2023 | 14 MW | 0 | 69 | NA | NA |
| Revolution Wind | 2023 | 12 MW | 102 | 102 | 15.3 | 33.8 |



Revolution Wind | Powered by Ørsted & Eversource

AI03: Newport Cliff Walk, Newport, Rhode Island

Visual Simulation: Full Lease Build-out Including Revolution Wind

**Environmental Data**
Date Taken: 7/28/2017
Time: 7:03 AM
Temperature: 59°F
Humidity: 98%
Visibility: >10 miles
Wind Direction: Calm
Wind Speed: 0 mph
Conditions Observed: Fair

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 22.8 feet AMSL

**Key Observation Point Information**
County: Newport
Town: Newport
State: Rhode Island
Location: Aquidneck Island
Latitude, Longitude: 41.45119° N, 71.31157° W
Direction of View (Center): South-Southeast (155.7°)
Field of View: 124° x 55°

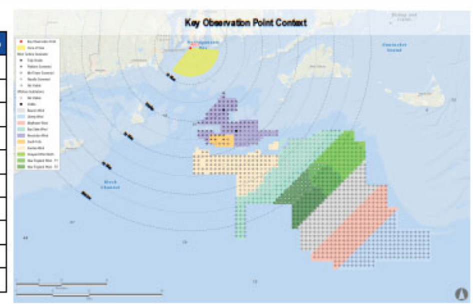
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Shoreline Residential
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark

**Notes:**

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSSs Visible* | Total Number of WTGs & OSSs in Project | Distance to Nearest Visible WTG (miles) | Distance to Furthest Visible WTG (miles) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 12 | 13 | 24.5 | 28.8 |
| Vineyard Wind North | 2023 | 14 MW | 0 | 69 | NA | NA |
| Revolution Wind | 2023 | 12 MW | 102 | 102 | 15.3 | 33.8 |
| New England Wind Phase 1 | 2024 | 18 MW | 0 | 41 | 46.0 | 46.8 |
| New England Wind Phase 2 | 2024 | 18 MW | 37 | 79 | 46.8 | 51.1 |
| Sunrise Wind | 2024 | 15 MW | 123 | 123 | 28.8 | 42.8 |
| Mayflower Wind | 2024 | 12 MW | 0 | 149 | NA | NA |
| Liberty Wind | 2025-2030 | 12 MW | 0 | 139 | NA | NA |
| Beacon Wind | 2025-2030 | 12 MW | 0 | 157 | NA | NA |
| Bay State Wind | 2025-2030 | 12 MW | 166 | 165 | 37.1 | 44.5 |




# Revolution Wind

Powered by Ørsted & Eversource

**AI03: Newport Cliff Walk, Newport, Rhode Island**

**Visual Simulation: Full Lease Build-out Excluding Revolution Wind**

Simulation Size 54" in width by 28.2" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

**Environmental Data**
Date Taken: 7/26/2017
Time: 7:03 AM
Temperature: 59°F
Humidity: 90%
Visibility: >10 miles
Wind Direction: Calm
Wind Speed: 0 mph
Conditions Observed: Fair

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 22.8 feet AMSL

**Key Observation Point Information**
County: Newport
Town: Newport
State: Rhode Island
Location: Aquidneck Island
Latitude, Longitude: 41.45119° N, 71.31157° W
Direction of View (Center): South-Southeast (155.7°)
Field of View: 124° x 55°

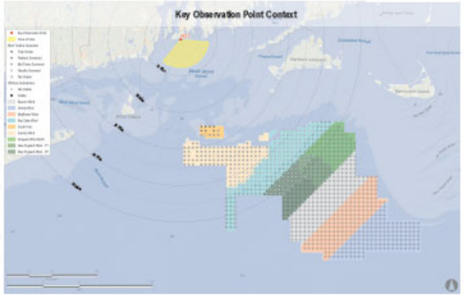
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Shoreline Residential
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark

**Notes:**

- Photosimulation Size 54" in width by 28.2" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSSs Visible* | Total Number of WTGs & OSSs in Project | Distance to Nearest Visible WTG (st mi) | Distance to Furthest Visible WTG (st mi) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 12 | 13 | 24.5 | 29.0 |
| Vineyard Wind North | 2023 | 14 MW | 0 | 69 | NA | NA |
| New England Wind Phase 1 | 2024 | 15 MW | 9 | 41 | 45.0 | 49.5 |
| New England Wind Phase 2 | 2024 | 19 MW | 37 | 79 | 46.0 | 51.1 |
| Sunrise Wind | 2024 | 15 MW | 122 | 123 | 29.5 | 42.5 |
| Mayflower Wind | 2024 | 12 MW | 0 | 149 | NA | NA |
| Liberty Wind | 2025-2030 | 12 MW | 0 | 139 | NA | NA |
| Beacon Wind | 2025-2030 | 12 MW | 0 | 157 | NA | NA |
| Bay State Wind | 2025-2030 | 12 MW | 100 | 165 | 37.1 | 44.5 |




Revolution Wind | Powered by Ørsted & Eversource

**AI03: Newport Cliff Walk, Newport, Rhode Island**

**Visual Simulation: Revolution Wind Without Other Foreseeable Future Changes**

**Environmental Data**
Date Taken: 7/26/2017
Time: 7:03 AM
Temperature: 59°F
Humidity: 95%
Visibility: >10 miles
Wind Direction: Calm
Wind Speed: 0 mph
Conditions Observed: Fair

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 22.8 feet AMSL

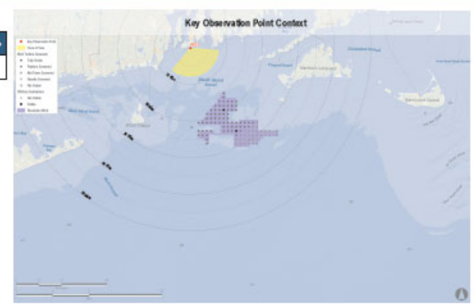
**Notes:**

**Key Observation Point Information**
County: Newport
Town: Newport
State: Rhode Island
Location: Aquidneck Island
Latitude, Longitude: 41.45119° N, 71.31157° W
Direction of View (Center): South-Southeast (155.7°)
Field of View: 124° x 55°

**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Shoreline Residential
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSS in Visible* | Total Number of WTGs & OSS in Project | Distance to Nearest Visible WTG (stat mi) | Distance to Furthest Visible WTG (stat mi) |
|---|---|---|---|---|---|---|
| Revolution Wind | 2023 | 12 MW | 102 | 102 | 15.3 | 33.8 |




**Revolution Wind** | Powered by Ørsted & Eversource

**BI04: Southeast Lighthouse, New Shoreham, Rhode Island**

**Existing Conditions**

**Environmental Data**
Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 68°F
Humidity: 63%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (88.9°)
Field of View: 124° x 55°

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

**Notes:**

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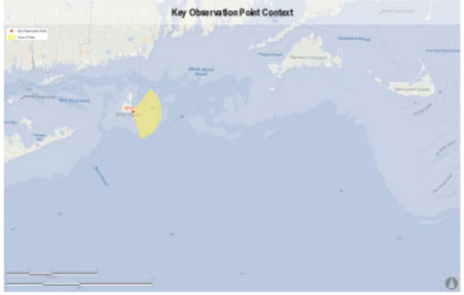
- [illegible]
- [illegible]

[illegible]




Revolution Wind | Powered by Ørsted & Eversource

**BI04: Southeast Lighthouse, New Shoreham, Rhode Island**

**Visual Simulation: 2023 Project Construction (South Fork Wind and Vineyard Wind North)**

[illegible]

**Environmental Data**
Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 68°F
Humidity: 63%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

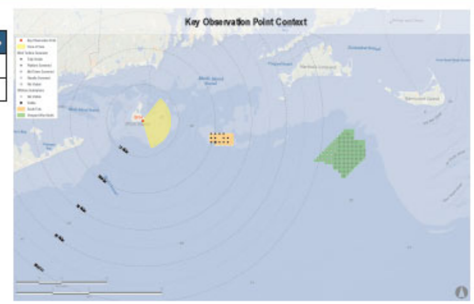
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

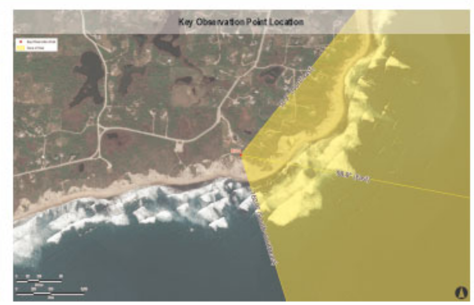
**Notes:**

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSS Visible* | Total Number of WTGs & OSS in Project | Distance to Nearest Visible WTG (nm) | Distance to Furthest Visible WTG (nm) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 13 | 13 | 19.0 | 24.0 |
| Vineyard Wind North | 2023 | 14 MW | 15 | 89 | 49.8 | 53.7 |



**Revolution Wind** | Powered by Ørsted & Eversource

**BI04: Southeast Lighthouse, New Shoreham, Rhode Island**

**Visual Simulation: 2023 Project Construction with Revolution Construction added (Revolution Wind, South Fork Wind, and Vineyard Wind North)**

[illegible]

**Environmental Data**
Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 66°F
Humidity: 65%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

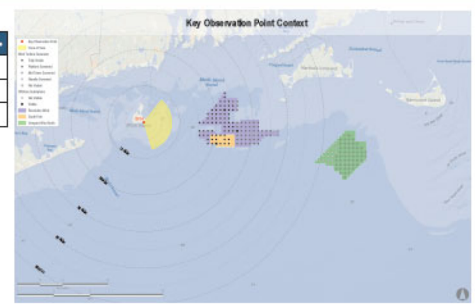
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

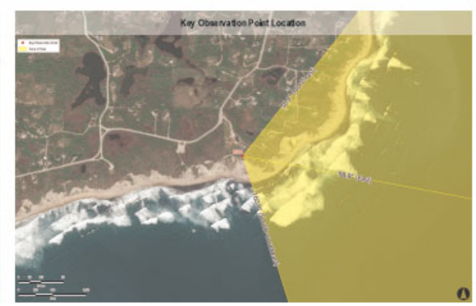
**Notes:**

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSSs Visible* | Total Number of WTGs & OSSs in Project | Distance to Nearest Visible WTG (miles) | Distance to Furthest Visible WTG (miles) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 13 | 13 | 19.0 | 24.8 |
| Vineyard Wind North | 2023 | 14 MW | 15 | 69 | 49.8 | 53.7 |
| Revolution Wind | 2023 | 12 MW | 102 | 102 | 15.2 | 37.2 |



**Revolution Wind** | Powered by Ørsted & Eversource

**BI04: Southeast Lighthouse, New Shoreham, Rhode Island**

**Visual Simulation: Full Lease Build-out Including Revolution Wind**

**Environmental Data**
Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 68°F
Humidity: 69%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (88.9°)
Field of View: 124° x 55°

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

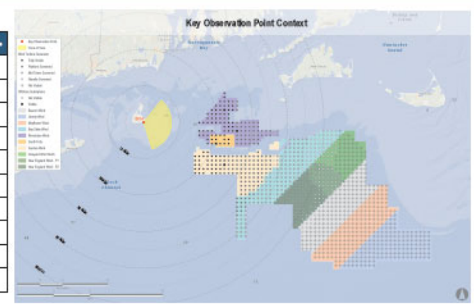
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

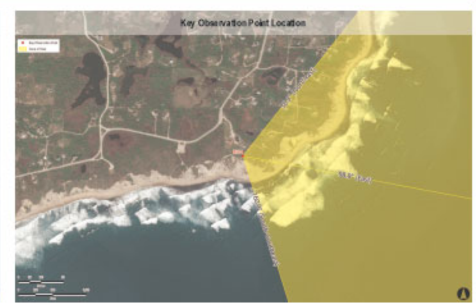
**Notes:**

- Photosimulation Size 94" in width by 29.2" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSS screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and structure height. This analysis does not consider the screening effects of intervening vegetation, structures and topography.
- Offshore [illegible] locations and dimensions are based on preliminary publicly available project data. Projects for which this data is not yet fully available, WTGs are used for silhouette positions; OSS positions and dimensions [illegible] in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP [illegible].
- The existing WTGs associated with the Block Island Wind Farm are [illegible] miles from KOP [illegible]. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective [illegible]. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulation.
- Photographs were not obtained from [illegible] during field review due to public access restrictions. In place of an actual photograph from this location, ESR created a virtual three-dimensional (3D) model of the island.

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSS to Visible* | Total Number of WTGs & OSS in Project | Distance to Nearest Visible WTG (statute miles) | Distance to Furthest Visible WTG (statute miles) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 13 | 13 | 19.8 | 24.8 |
| Vineyard Wind North | 2023 | 14 MW | 15 | 69 | 49.8 | 53.7 |
| Revolution Wind | 2023 | 12 MW | 102 | 102 | 15.2 | 37.2 |
| New England Wind Phase 1 | 2024 | 18 MW | 41 | 41 | 48.3 | 56.6 |
| New England Wind Phase 2 | 2024 | 19 MW | 79 | 79 | 43.1 | 54.9 |
| Sunrise Wind | 2024 | 15 MW | 123 | 123 | 15.9 | 38.8 |
| Mayflower Wind | 2024 | 12 MW | 0 | 149 | NA | NA |
| Liberty Wind | 2025-2030 | 12 MW | 0 | 139 | NA | NA |
| Beacon Wind | 2025-2030 | 12 MW | 13 | 157 | 51.6 | 53.9 |
| Bay State Wind | 2025-2030 | 12 MW | 103 | 165 | 33.0 | 53.3 |




Simulation Size:94" in width by 29.2" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

Revolution Wind | Powered by Ørsted & Eversource

**BI04: Southeast Lighthouse, New Shoreham, Rhode Island**

**Visual Simulation: Full Lease Build-out Excluding Revolution Wind**

Photosimulation sized 34" in width by 20.2" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

**Environmental Data**
Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 66°F
Humidity: 65%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (88.9°)
Field of View: 124° x 55°

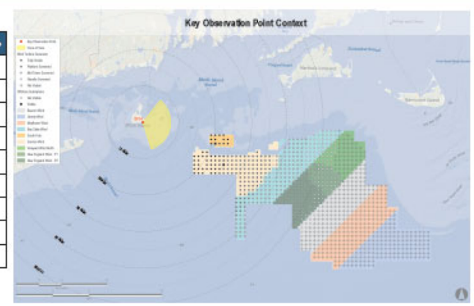
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

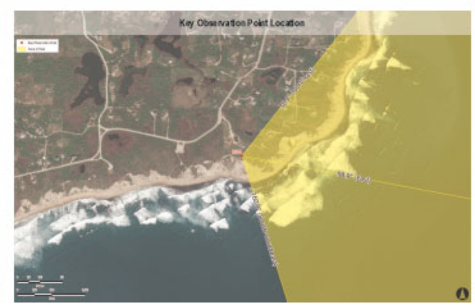
**Notes:**

- Photosimulation sized 34" in width by 20.2" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSSs Visible* | Total Number of WTGs & OSSs in Project | Distance to Nearest Visible WTG (st. mi) | Distance to Furthest Visible WTG (st. mi) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 13 | 13 | 19.0 | 24.0 |
| Vineyard Wind North | 2023 | 14 MW | 15 | 69 | 48.6 | 53.7 |
| New England Wind Phase 1 | 2024 | 15 MW | 41 | 41 | 40.0 | 50.5 |
| New England Wind Phase 2 | 2024 | 18 MW | 79 | 79 | 43.1 | 54.9 |
| Sunrise Wind | 2024 | 15 MW | 123 | 123 | 15.9 | 30.8 |
| Mayflower Wind | 2024 | 12 MW | 0 | 149 | NA | NA |
| Liberty Wind | 2025-2030 | 12 MW | 0 | 130 | NA | NA |
| Beacon Wind | 2025-2030 | 12 MW | 13 | 157 | 51.6 | 53.9 |
| Bay State Wind | 2025-2030 | 12 MW | 160 | 165 | 33.0 | 53.3 |



# Revolution Wind

Powered by Ørsted & Eversource

**BI04: Southeast Lighthouse, New Shoreham, Rhode Island**

**Visual Simulation: Revolution Wind Without Other Foreseeable Future Changes**

**Environmental Data**
Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 66°F
Humidity: 69%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (86.9°)
Field of View: 124° x 55°

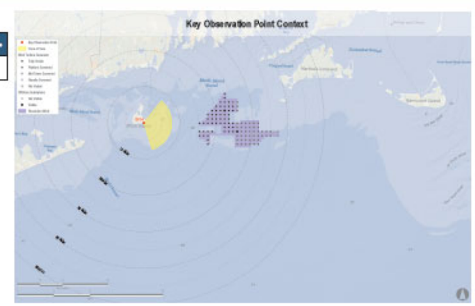
**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

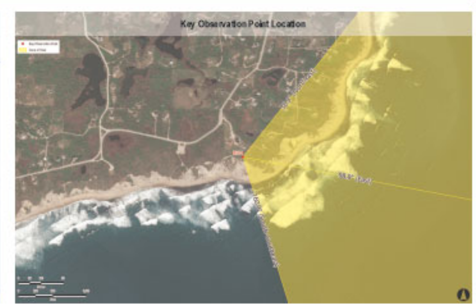
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

**Notes:**

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSS Visible* | Total Number of WTGs & OSS in Project | Distance to Nearest Visible WTG (mi km) | Distance to Furthest Visible WTG (mi km) |
|---|---|---|---|---|---|---|
| Revolution Wind | 2023 | 12 MW | 102 | 102 | 15.2 | 37.2 |



Revolution Wind | Powered by Ørsted & Eversource

**BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island**

**Existing Conditions**

[illegible]

**Environmental Data**
Date Taken: 9/10/2017
Temperature: 61° F
Humidity: 93%
Visibility: >10 miles
Wind Direction: North-Northeast
Wind Speed: 6 mph
Conditions Observed: Fair

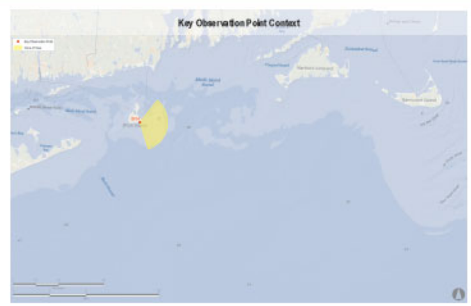
**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

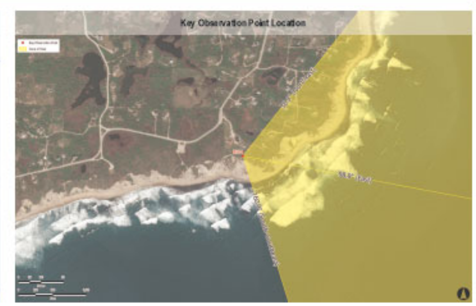
**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

**Notes:**

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]



Revolution Wind | Powered by Ørsted & Eversource

**BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island**

**Visual Simulation: 2023 Project Construction (South Fork Wind and Vineyard Wind North)**

[illegible]

**Environmental Data**
Date Taken: 9/10/2017
Temperature: 61°F
Humidity: 93%
Visibility: >10 miles
Wind Direction: North-Northwest
Wind Speed: 6 mph
Conditions Observed: Fair

**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

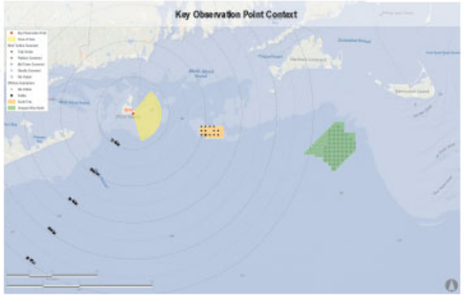
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

**Notes:**

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSSs Visible* | Total Number of WTGs & OSSs in Project | Distance to Nearest Visible WTG (mi) | Distance to Furthest Visible WTG (mi) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 13 | 13 | 19.0 | 24.0 |
| Vineyard Wind North | 2023 | 14 MW | 0 | 69 | NA | NA |




Revolution Wind | Powered by Ørsted & Eversource

**BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island**

**Visual Simulation: 2023 Project Construction with Revolution Construction added (Revolution Wind, South Fork Wind, and Vineyard Wind North)**

[illegible] 94" in width by 29.2" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

**Environmental Data**
Date Taken: 9/10/2017
Temperature: 61°F
Humidity: 93%
Visibility: >10 miles
Wind Direction: North-Northwest
Wind Speed: 6 mph
Conditions Observed: Fair

**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

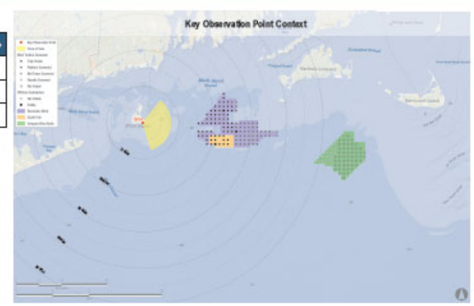
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

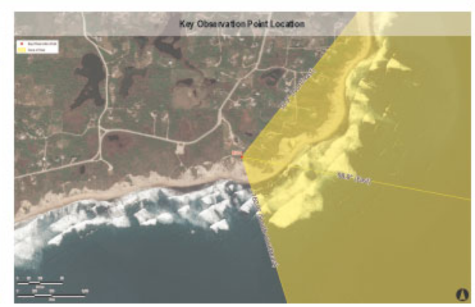
**Notes:**

- Photosimulation Size: 94" in width by 29.2" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSS Visible* | Total Number of WTGs & OSS in Project | Distance to Nearest Visible WTG (mi) | Distance to Nearest Visible WTG (km) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 13 | 13 | 15.0 | 24.0 |
| Vineyard Wind North | 2023 | 14 MW | 0 | 69 | NA | NA |
| Revolution Wind | 2023 | 12 MW | 102 | 102 | 15.2 | 37.2 |



Revolution Wind | Powered by Ørsted & Eversource

**BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island**

**Visual Simulation: Full Lease Build-out Including Revolution Wind**

Simulation Size: 34" in width by 20.2" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

**Environmental Data**
Date Taken: 9/10/2017
Temperature: 61°F
Humidity: 93%
Visibility: >10 miles
Wind Direction: North-Northwest
Wind Speed: 6 mph
Conditions Observed: Fair

**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (88.9°)
Field of View: 124° x 55°

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

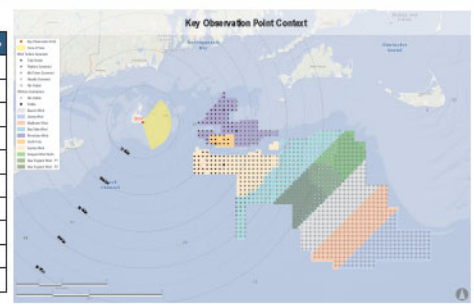
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

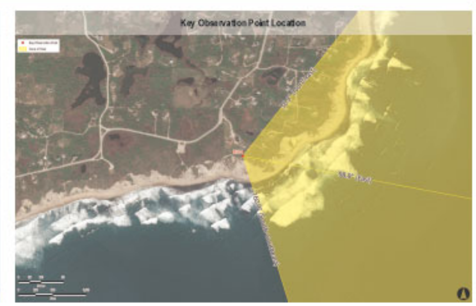
**Notes:**

- Photosimulation Size: 34" in width by 20.2" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSS screened from view [illegible]
- Offshore Substation [illegible]
- Nighttime photosimulations are digitally adjusted from daytime photographs. [illegible]
- The existing WTGs associated with the Block Island Wind Farm [illegible]
- Photographs were not obtained [illegible] three-dimensional (3D) modeled the island.

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSS Visible* | Total Number of WTGs & OSS in Project | Distance to Nearest Visible WTG (mi) | Distance to Furthest Visible WTG (mi) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 13 | 13 | 19.9 | 24.8 |
| Vineyard Wind North | 2023 | 14 MW | 0 | 69 | NA | NA |
| Revolution Wind | 2023 | 12 MW | 102 | 102 | 15.2 | 37.2 |
| New England Wind Phase 1 | 2024 | 18 MW | 4 | 41 | 48.0 | 48.8 |
| New England Wind Phase 2 | 2024 | 19 MW | 53 | 79 | 43.1 | 50.7 |
| Sunrise Wind | 2024 | 15 MW | 123 | 123 | 15.9 | 28.2 |
| Mayflower Wind | 2024 | 12 MW | 0 | 149 | NA | NA |
| Liberty Wind | 2025-2030 | 12 MW | 0 | 139 | NA | NA |
| Beacon Wind | 2025-2030 | 12 MW | 0 | 157 | NA | NA |
| Bay State Wind | 2025-2030 | 12 MW | 134 | 165 | 33.0 | 45.0 |



Revolution Wind | Powered by Ørsted & Eversource

**BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island**

**Visual Simulation: Full Lease Build-out Excluding Revolution Wind**

[illegible]

[illegible]

**Environmental Data**
Date Taken: 9/10/2017
Temperature: 61°F
Humidity: 93%
Visibility: >10 miles
Wind Direction: North-Northwest
Wind Speed: 6 mph
Conditions Observed: Fair

**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

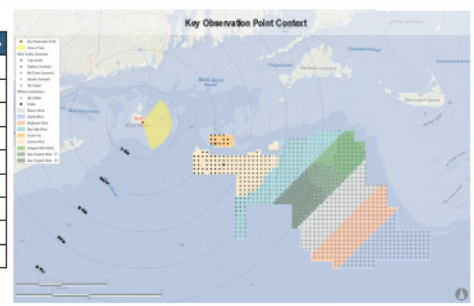
**Notes:**

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

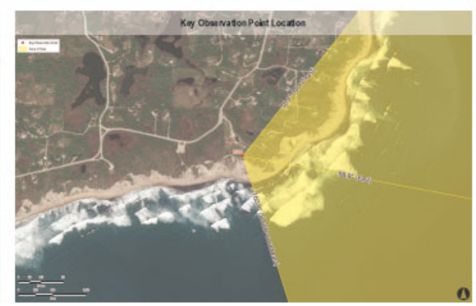
**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSSs Visible* | Total Number of WTGs & OSSs in Project | Distance to Nearest Visible WTG (statute miles) | Distance to Furthest Visible WTG (statute miles) |
|---|---|---|---|---|---|---|
| South Fork Wind Farm | 2023 | 12 MW | 13 | 13 | 19.9 | 24.9 |
| Vineyard Wind North | 2023 | 14 MW | 0 | 69 | NA | NA |
| New England Wind Phase 1 | 2024 | 15 MW | 4 | 41 | 40.9 | 40.9 |
| New England Wind Phase 2 | 2024 | 19 MW | 58 | 79 | 43.1 | 50.7 |
| Sunrise Wind | 2024 | 15 MW | 123 | 123 | 15.9 | 30.2 |
| Mayflower Wind | 2024 | 12 MW | 0 | 149 | NA | NA |
| Liberty Wind | 2025-2030 | 12 MW | 0 | 130 | NA | NA |
| Beacon Wind | 2025-2030 | 12 MW | 0 | 157 | NA | NA |
| Bay State Wind | 2025-2030 | 12 MW | 134 | 165 | 33.9 | 45.9 |

Key Observation Point Context



Key Observation Point Location



Revolution Wind | Powered by Ørsted & Eversource

**BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island**

**Visual Simulation: Revolution Wind Without Other Foreseeable Future Changes**

**Environmental Data**
Date Taken: 9/10/2017
Temperature: 61°F
Humidity: 89%
Visibility: >10 miles
Wind Direction: North-Northwest
Wind Speed: 6 mph
Conditions Observed: Fair

**Key Observation Point Information**
County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55165° W
Direction of View (Center): East (96.9°)
Field of View: 124° x 55°

**Camera Information**
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

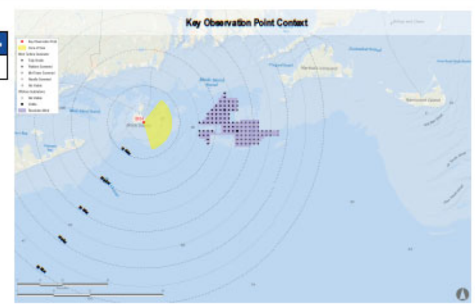
**Visual Resources**
Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

**Notes:**

- Photosimulation Size: 34" in width by 20.7" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

**Reasonably Foreseeable Projects Represented in Visual Simulation**

| Project | Year of Development | WTG Model | Potential Number of WTGs & OSSs Visible* | Total Number of WTGs & OSSs in Project | Distance to Nearest Visible WTG (mi km) | Distance to Furthest Visible WTG (mi km) |
|---|---|---|---|---|---|---|
| Revolution Wind | 2023 | 12 MW | 100 | 100 | 15.2 | 37.2 |





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# Memorandum of Agreement

**DRAFT MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND FARM AND REVOLUTION WIND EXPORT CABLE PROJECT**

**WHEREAS,** the Bureau of Ocean Energy Management (BOEM) plans to authorize construction and operation of the Revolution Wind Farm and Revolution Wind Export Cable Project (Project) pursuant to Section 8(p)(1)(C) of the Outer Continental Shelf (OCS) Lands Act (43 U.S.C. 1337(p)(1)(C)), as amended by the Energy Policy Act of 2005 (Public Law No. 109-58) and in accordance with Renewable Energy Regulations at 30 Code of Federal Regulations (CFR) Part 585; and

**WHEREAS,** BOEM determined that the Project constitutes an undertaking subject to Section 106 of the National Historic Preservation Act (NHPA), as amended (54 USC 306108), and its implementing regulations (36 CFR 800); and

**WHEREAS,** BOEM plans to approve with conditions the Construction and Operations Plan (COP) submitted by Revolution Wind, LLC (Revolution Wind); and

**WHEREAS,** BOEM determined the construction, operation, maintenance, and eventual decommissioning of the Project, designed for up to 100 offshore Wind Turbine Generators (WTGs), up to two offshore substations, up to two export cables collocated in one easement connecting from the OCS to landfall on Rhode Island shores, one onshore transmission cable connecting from landfall to one onshore substations and adjacent interconnection facility (ICF) with a buried connection line, and an overhead connection from the ICF to the existing TNEC Davisville Substation have the potential to adversely affect historic properties as defined under 36 CFR 800.16(l); and

**WHEREAS,** BOEM is preparing an Environmental Impact Statement (EIS) for the Project pursuant to the National Environmental Policy Act (42 USC 4321 et seq.) (NEPA) and elected to use the NEPA substitution process with its Section 106 consultation pursuant to 36 CFR 800.8(c); and

**WHEREAS,** BOEM notified in advance the State Historic Preservation Officers (SHPOs) of Connecticut, Massachusetts, New York, and Rhode Island and the Advisory Council on Historic Preservation (ACHP) on April 6, 2021 of their decision to use NEPA substitution and followed the standards for developing environmental documents to comply with the Section 106 consultation for this Project pursuant to 36 CFR 800.8(c), and posted this decision in the Federal Register with BOEM's Notice of Intent to prepare an EIS for the Project on April 30, 2021; and

**WHEREAS,** BOEM notified and invited the Secretary of the Interior (SOI), as represented by the National Park Service (NPS), to consult regarding this Project pursuant to the Section 106 regulations, including consideration of the potential effects to National Historic Landmarks (NHLs) as required under NHPA Section 110(f) (54 USC 306107) and 36 CFR 800.10, the NPS accepted BOEM's invitation to consult, and BOEM invited the NPS to sign this MOA as a concurring party; and

**WHEREAS,** in accordance with 36 CFR 800.3, BOEM invited Connecticut SHPO, Massachusetts SHPO, Rhode Island SHPO, and New York SHPO to consult on the Project on April 2, 2021, and Connecticut SHPO formally accepted on April 30, 2021, and Massachusetts SHPO, Rhode Island SHPO, and New York SHPO accepted through participation in consultation following that date; and

**WHEREAS,** the Project is within a commercial lease area that was subject to previous NHPA Section 106 review by BOEM regarding the issuance of the commercial lease and approval of site assessment activities. Both Section 106 reviews for the lease issuance and the approval of the site assessment plan were conducted pursuant to the PA and concluded with No Historic Properties Affected for lease issuance on June 4, 2013, and site assessment approval on October 12, 2017 consistent with the Programmatic Agreement (PA) regarding the review of OCS renewable energy activities offshore Massachusetts and Rhode Island (*Programmatic Agreement Among The U.S. Department of the Interior, Bureau of Ocean Energy Management; the State Historic Preservation Officers of Massachusetts and Rhode Island; The Mashpee Wampanoag Tribe; the Narragansett Indian Tribe; the Wampanoag Tribe of Gay Head (Aquinnah); and the Advisory Council on Historic Preservation; Regarding the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island*) (Attachment 1).

**WHEREAS,** consistent with 36 CFR 800.16(d) and BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (May 27, 2020), BOEM defined the area of potential effects (APE) for the undertaking as the depth and breadth of the seabed potentially impacted by any bottom-disturbing activities, constituting the marine archaeological resources portion of the APE (marine APE); the depth and breadth of terrestrial areas potentially impacted by any ground disturbing activities, constituting the terrestrial archaeological resources portion of the APE (terrestrial APE); the viewshed from which offshore or onshore renewable energy structures would be visible, constituting the viewshed portion of the APE (visual APE); and any temporary or permanent construction or staging areas that may fall into any of the aforementioned offshore or onshore portions of the APE where direct, indirect, or cumulative effects could occur (see Attachment 2 APE Maps); and

**WHEREAS,** BOEM identified 451 aboveground historic properties in the offshore Project components' portion of the visual APE and two historic properties in the onshore Project components' portion of the visual APE; nineteen submerged historic properties and thirteen ancient submerged landforms and features (ASLFs) in the marine APE; and two historic properties in the terrestrial APE; and

**WHEREAS,** BOEM identified twelve NHLs within the visual APE for onshore and offshore development sand, BOEM's planning and action will avoid adverse effects on seven of the twelve NHLs in the visual APE (Montauk Point Lighthouse, Original U.S. Naval War College Historic District, Fort Adams Historic District, Battle of Rhode Island Historic District, Nantucket Historic District, New Bedford Historic District, and William Watts Sherman House); for other NHLs BOEM, to the maximum extent possible, BOEM has undertaken such planning and action as may be necessary to minimize harm from adverse effects on the other five of the twelve identified NHLs in the APE (Block Island Southeast Lighthouse, Bellevue Avenue Historic District, The Breakers, Marble House, and Ocean Drive Historic District) pursuant to 36 CFR 800.10 and NHPA Section 110(f), including the planning and action implemented for NHLs by this MOA; and

**WHEREAS,** within the range of Project alternatives analyzed in the EIS (EIS Chapter 2, Table 2.1-1), BOEM determined that 101 aboveground historic properties would be subject to visual adverse effects from WTGs (see Attachment 3), no submerged historic properties related to shipwrecks or sunken crafts will be adversely affected by physical disturbance from export cable construction within the avoidance buffers of these resources, nine ASLFs may be potentially adversely affected by physical disturbance in the lease area and from export cable construction, and two historic properties in the terrestrial APE would be adversely affected with implementation of the undertaking; and

**WHEREAS,** BOEM determined that the implementation of project design and avoidance measures identified in this MOA will avoid adverse effects to 350 aboveground historic properties in the offshore visual APE (including seven NHLs), and to 19 submerged shipwrecks or sunken crafts and to four ASLFs in the marine APE; and

**WHEREAS,** BOEM determined all of the ASLFs identified in the marine APE are eligible for the National Register of Historic Places (NRHP) under Criteria A and D; and

**WHEREAS,** under each of the Project alternatives analyzed in the EIS, BOEM determined the Project would visually adversely affect the 101 aboveground historic properties in Massachusetts and Rhode Island, including five NHLs in Rhode Island, and that the visual adverse effect would be cumulative with the potential adverse effects from other reasonably foreseeable offshore wind energy projects; and

**WHERAS,** BOEM has identified historic sunken military craft (i.e., USS S-51) in the marine APE that are subject to the Sunken Military Craft Act (Public Law 108–375 Title XIV), administered by the Department of the Navy for the protection of these craft and associated remains, BOEM has invited the Department of the Navy to consult on this undertaking and they accepted the invitation, and BOEM and the Department of the Navy will continue to coordinate consultation on the Sunken Military Craft Act through this Section 106 review to ensure compliance with that act; and

**WHEREAS,** the Connecticut SHPO, Massachusetts SHPO, New York SHPO, and Rhode Island SHPO concurred with BOEM's finding of adverse effect on [insert dates of SHPO's concurrence for the Massachusetts SHPO, Rhode Island SHPO, Connecticut SHPO, and New York SHPO (August 19, 2022); and

**WHEREAS,** throughout this document the term 'Tribal Nation' has the same meaning as a federally recognized 'Indian Tribe,' as defined at 36 CFR 800.16(m); and

**WHEREAS,** BOEM invited the following federally recognized Tribal Nations (Tribal Nations) to consult on this Project: Mashpee Wampanoag Tribe, Shinnecock Indian Nation, Mashantucket (Western) Pequot Tribal Nation, Wampanoag Tribe of Gay Head (Aquinnah), Mohegan Tribe of Indians of Connecticut, Narragansett Indian Tribe, Delaware Tribe of Indians, The Delaware Nation; and

**WHEREAS,** the Mashpee Wampanoag Tribe, Shinnecock Indian Nation, Mashantucket (Western) Pequot Tribal Nation, Wampanoag Tribe of Gay Head (Aquinnah), Narragansett Indian Tribe, Delaware Tribe of Indians, The Delaware Nation accepted BOEM's invitation to consult and BOEM invited these Tribal Nations to sign this MOA as concurring parties; and

**WHEREAS,** in accordance with 36 CFR 800.3, BOEM invited other federal agencies, state and local governments, and additional consulting parties with a demonstrated interest in the undertaking to participate in this consultation, the list of those accepting participation and declining to participate by either written response or no response to direct invitations are listed in Attachment 4; and

**WHEREAS,** BOEM has consulted with Revolution Wind in its capacity as applicant seeking federal approval of the COP, and, because Revolution Wind has responsibilities under the MOA, BOEM has invited the applicant to be an invited signatory to this MOA; and

**WHEREAS,** in accordance with 36 CFR 800.6(a)(1), BOEM has notified the ACHP of its adverse effect determination with specified documentation, including adverse effects to the NHLs pursuant to 36 CFR 800.10(b), and ACHP is consulting on the resolution of adverse effects to the historic properties pursuant to 36 CFR 800.6(a)(1)(iii) and 36 CFR 800.10(b); and

**WHEREAS,** pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act, Department of the Army permits will be required from the United States Army Corps of Engineers (USACE) for this Project and BOEM invited USACE to consult; and

**WHEREAS,** the USACE designated BOEM as the Lead Federal Agency pursuant to 36 CFR 800.2(a)(2) to act on its behalf for purposes of compliance with Section 106 for this Project (in a letter dated July 27, 2022), BOEM invited the USACE to sign this MOA as a concurring party, and the USACE accepted the invitation to sign this MOA as a concurring party;

**WHEREAS,** BOEM has consulted with the signatories, invited signatories, and consulting parties participating in the development of this MOA regarding the delineation of the APEs, the identification and evaluation of historic properties, the assessment of potential effects to the historic properties, and on measures to avoid, minimize, and mitigate adverse effects to historic properties; and

**WHEREAS,** pursuant to 36 CFR 800.6, BOEM invited Revolution Wind to sign as an invited signatory and the consulting parties as listed in Attachment 4 to sign as concurring parties; however, the refusal of any consulting party to sign this MOA or otherwise concur does not invalidate or affect the effective date of this MOA, and consulting parties who choose not to sign this MOA will continue to receive information if requested and have an opportunity to participate in consultation as specified in this MOA; and

**WHEREAS,** the signatories agree, consistent with 36 CFR 800.6(b)(2), that adverse effects will be resolved in the manner set forth in this MOA; and

**WHEREAS,** BOEM requires all on-site actions prescribed for the mitigation at terrestrial archaeological sites and ASLFs to be concluded prior to Project construction or other ground or seafloor disturbing activities proceeding at those sites, not precluding Project construction or ground construction from proceeding off these sites, and not requiring that all mitigation be completed prior to the Project proceeding; and

**WHEREAS,** BOEM conducted five consulting party meetings, on December 21, 2021, April 8, 2022, September 27, 2033, April 7, 2023, and June 7, 2023; and

**WHEREAS,** BOEM sought and considered the views of the public regarding Section 106 for this Project through the NEPA process by holding virtual public scoping meetings when initiating the NEPA and NHPA Section 106 review on May 13, 18, and 20, 2021 and in-person and virtual public hearings related to the Draft EIS on September 29 and October 4–6 and 11, 2022; and

**WHEREAS,** BOEM made the first, redacted Draft MOA available to the public for review and comment from September 2, 2022 to October 17, 2022, and made an updated version of the redacted Draft MOA available to the public using BOEM's Project website, and BOEM did receive comments from the public; and

**NOW, THEREFORE,** BOEM, the Connecticut SHPO, Massachusetts SHPO, New York SHPO, and Rhode Island SHPO, and the ACHP agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

## STIPULATIONS

BOEM, with the assistance of Revolution Wind, shall ensure that the following measures are carried out as conditions of its approval of the undertaking:

## I. MEASURES TO AVOID ADVERSE EFFECTS TO IDENTIFIED HISTORIC PROPERTIES

A. Marine APE

1. BOEM will include the following avoidance measures for adverse effects within the marine APE as conditions of approval of the Revolution Wind COP:

   i. Revolution Wind will avoid the 19 known shipwreck or sunken craft sites and potentially significant debris fields previously identified during marine archaeological surveys (Target-01 to Target-11 and Target-13 to Target-20) by a distance of no less than 164 feet (50 meters) from the known extent of the resource for placement of Project structures and when conducting seafloor-disturbing activities.

   ii. Revolution Wind will avoid ASLFs previously identified during marine archaeological resource assessments for the Project and incorporated avoidance buffering into the mapped ASLF feature boundary. This avoidance will protect ASLFs from the known extent of the resource for placement of Project structures and when conducting seafloor-disturbing activities. Target-27 and Target-31 to Target-33 (four ASLFs) are avoidable and adverse effects to other ASLFs could be avoidable through micrositing or through design options dependent on WTG placement and Project alternative selection. Where the nine other ASLFs cannot be avoided, the mitigation measures at Section III.A will be applied.

B. Visual APE

1. To maintain avoidance of adverse effects on historic properties in the visual APE where BOEM determined no adverse effects or where no effects would occur, BOEM will require Revolution Wind to ensure Project structures are within the BOEM-approved Project design envelope (PDE), sizes, scale, locations, lighting prescription, and distances that BOEM used to inform the definition of APE for the Project and for determining effects in the Finding of Effect (see the Project COP).

2. This measure (i.e., Stipulation I.B.1) will avoid adverse effects on seven of the twelve NHLs in the visual APE (Montauk Point Lighthouse, Original U.S. Naval War College Historic District, Fort Adams Historic District, Battle of Rhode Island Historic District, Nantucket Historic District, New Bedford Historic District, and William Watts Sherman House), through the Project distance and lack of visibility resulting from BOEM conditions of approval for the COP and PDE specifications for sizes, scale, locations, lighting prescription for the Project.

## II. MEASURES TO MINIMIZE ADVERSE EFFECTS TO IDENTIFIED HISTORIC PROPERTIES

A. Marine APE

1. Should full avoidance not be feasible for nine known ASLFs (Targets 21 through 26 and Targets 28 through 30), Revolution Wind in consultation with BOEM will minimize the extent of project disturbance introduced on these sites. Disturbed portions of ASLFs will be addressed under mitigation measures at MOA Stipulations III. Actions during minimization and mitigation at ASLFs would necessarily require consultation with Tribal Nations.

B. Terrestrial APE

1. Although the [redacted] #1 and [redacted] #2 sites were determined by BOEM to not be avoidable by project disturbance, Revolution Wind will minimize the extent of Project disturbance within these site areas by protecting portions of the site where disturbance can be avoided from Project impacts during construction, operations, maintenance, decommissioning and environmental restoration activities or mitigate those site portions prior to such activities. Protection measures may include fencing the resources or similar means to separate projects activities from the undisturbed site portions. Mitigation is described under Stipulation III, below.

C. Visual APE

1. BOEM has undertaken planning and actions to minimize visual adverse effects to historic properties, including minimizing harm to the five adversely affected NHLs (Block Island Southeast Lighthouse, Bellevue Avenue Historic District, The Breakers, Marble House, and Ocean Drive Historic District). The minimization measures below will minimize visual adverse effects to all adversely affected aboveground historic properties in the visual APE and will minimize the undertaking's cumulative visual adverse effects, that would add to the potential visual adverse effects of other reasonably foreseeable offshore wind energy developments. BOEM will include these minimization measures for adverse effects within the visual APE as conditions of approval of the Revolution Wind COP:

   i. Revolution Wind will use uniform WTG design, speed, height, and rotor diameter to reduce visual contrast and decrease visual clutter.

   ii. Revolution Wind will use uniform spacing of 1 nautical mile (1.15 mile) to decrease visual clutter, aligning WTGs to allow for safe transit corridors.

   iii. The option to reduce the number of constructed WTGs from a maximum proposed number of 100.

   iv. Revolution Wind will apply a paint color to the WTGs no lighter than RAL 9010 pure white and no darker than RAL 7035 light gray to help reduce potential visibility of the turbines against the horizon during daylight hours.

   v. Revolution Wind will implement an aircraft detection lighting system (ADLS) to automatically activate lights when aircraft approach. The WTGs and OSS would be lit and marked in accordance with FAA and USCG lighting standards and consistent with BOEM's *Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development* (April 28, 2021) to reduce light intrusion.

## III. MEASURES TO MITIGATE ADVERSE EFFECTS TO IDENTIFIED HISTORIC PROPERTIES

A. Marine APE

1. Revolution Wind cannot avoid nine ASLFs (Targets 21 through 26 and Targets 28 through 30). To resolve the adverse effects to the nine ASLFs, BOEM will include the following as conditions of approval of the Revolution Wind COP and require fulfillment of any on-site preconstruction work at these nine ASLFs for the following mitigation measures prior to construction at these ASLFs. Mitigation measures under Stipulation III.A must be completed within four years of MOA execution, unless a different timeline is agreed upon by the

consulting Tribal Nations and SHPO within whose state the mitigation is being performed, accepted by BOEM. Revolution Wind will fund mitigation measures as described in Attachment 5 (Mitigation Funding Amounts Proposed by Signatories and Consulting Parties) and Attachment 6 (Historic Property Treatment Plan [HPTP] for the Revolution Wind Farm Ancient Submerged Landform Feature, Outer Continental Shelf, Federal and Rhode Island Waters of Rhode Island Sound):

i. Preconstruction Geoarchaeology. Revolution Wind will fulfill the following commitments: collaborative review of existing geophysical and geotechnical data with Tribal Nations; selection of coring locations in consultation with Tribal Nations; collection of two to three vibracores within each affected ASLF with a sampling focus on areas that will be disturbed by Project construction activities; written verification to BOEM that the samples collected are sufficient for the planned analyses and consistent with the agreed scope of work; for appropriate samples, collaborative laboratory analyses at a laboratory located in Rhode Island or Massachusetts; screening of recovered sediments for debitage or micro-debitage associated with indigenous land uses; third-party laboratory analyses, that may include but is not limited to a suite of micro- and macro-faunal analyses, micro- and macro-botanical analyses, radiocarbon dating of organic subsamples, and chemical analyses for potential indirect evidence of indigenous occupations, based on the recovered cores and materials; temporary curation of archival core sections; draft reports for review by consulting Tribal Nations and, in state waters, Tribal Nations and RHIHPC); final reporting; and public or professional presentations summarizing the results of the investigations, developed with the consent of the consulting Tribal Nations.

    a. The Preconstruction Geoarchaeology effort will be conducted in accordance with BOEM’s Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585. The qualified professional archaeologists leading the research will meet the SOI’s professional qualification standards for archeology (62 FR 33708) and BOEM’s standards for Qualified Marine Archaeologists.

    b. Revolution Wind will submit the Draft Tribal Audience Report, Draft Technical Report, Final Tribal Audience Report, Final Technical Report, and Draft Public or Professional Presentations to the consulting Tribal Nations and, in state waters, Tribal Nations and RHIHPC for review. Revolution Wind will provide draft descriptions and documentation of the GIS to the consulting Tribal Nations and, in state waters, Tribal Nations and RHIHPC for review and will provide a description of the draft Story Maps to the interested consulting Tribal Nations following the initial working sessions.

ii. Open-Source GIS and Story Maps. Revolution Wind will fulfill the following commitments: consultation with the Tribal Nations to determine the appropriate open-source GIS platform; review of candidate datasets and attributes for inclusion in the GIS; data integration; development of custom reports or queries to assist in future research or tribal maintenance of the GIS; work Sessions with Tribal Nations to develop Story Map content; training session with Tribal Nations to review GIS functionality; review of Draft Story Maps with Tribal Nations; delivery of GIS to Tribal Nations; and delivery of Final Story Maps.

    a. The GIS developed under this measure will be free to use and free to modify by the Tribal Nations. To the extent feasible, all data will be provided in formats that allow for interoperability with other GIS platforms that the Tribal Nations may use. All datasets incorporated in the GIS will comply with Federal Geographic Data Committee data and metadata standards.

b. Revolution Wind will submit the Description of the GIS with appropriate schema, data organization, and custom reports/queries, Draft Story Map descriptions with details on content, formatting, and intended audiences, and Final Technical Description of the GIS with schema, data organization, and custom reports/queries to the consulting Tribal Nations and, in state waters, Tribal Nations and RHIHPC for review.

B. Terrestrial APE

1. Revolution Wind cannot avoid [redacted] #1 and [redacted] #2 sites by project disturbances. To resolve the adverse effects to the two archaeological sites, BOEM will include the following as conditions of approval of the Revolution Wind COP and require fulfillment of the following as mitigation measures prior to construction. BOEM requires all on-site actions prescribed for the mitigation at archaeological sites (terrestrial and marine) to be concluded prior to Project construction or other ground or seafloor disturbing activities proceed at those sites, not precluding Project construction or ground construction from proceeding off these sites, and not requiring that all mitigation be completed prior to the Project proceeding. Mitigation measures under Stipulation III.B must be completed within four years of MOA execution, unless a different timeline is agreed upon by the consulting Tribal Nations and SHPO within whose state the mitigation is being performed, accepted by BOEM. Revolution Wind will fund mitigation measures as described in Attachment 5 (Mitigation Funding Amounts Proposed by Signatories and Consulting Parties) and Attachment 7 (HPTP for the Revolution Wind Farm, the [redacted] #1 and #2 Sites, Town of North Kingstown, Washington County, Rhode Island):

i. Data Recovery Investigations, Temporary Avoidance Measures, and Ongoing Protection Measures. Revolution Wind will fulfill the following commitments: Submission of the application for Phase III investigations to the Rhode Island SHPO for permit approval prior to execution of the Phase III Data Recovery Program (Attachment 7). Temporary avoidance measures will be implemented prior to construction and will include temporary placement of construction barrier fencing (e.g., snow fencing) to protect the non-impact areas of the two archaeological sites which have been committed to protection and avoidance. Cultural monitoring will occur during construction, as provided for by Revolution Wind, and will include maintaining fencing and monitoring of all ground disturbing work (Attachment 7) within and adjacent to the archaeological sites impact areas. Following Phase III investigations, the preparation of a Historic Property Archaeological Protection Plan will be developed by Revolution Wind to carry over protection measures throughout ongoing Operations and Maintenance for the Project.

a. Revolution Wind will develop the project consistent with the Rhode Island Historical Preservation & Heritage Commission's (RIHPHC) Standards for Archaeological Survey (the *Standards)* and RIHPHC's Performance Standards and Guidelines for Archaeology in Rhode Island (the *Guidelines)*.

b. Revolution Wind will submit the Draft Phase III Archaeological Data Recovery Report, Final Phase III Archaeological Data Recovery Report; Draft Archaeological Construction Monitoring Report draft and final; [redacted] 1 and 2 Site Form Updates; and Historic Property Archaeological

Protection Plan draft and final to the consulting Tribal Nations and RHIHPC for review. The reports will be prepared in accordance with the *Standards*.

C. Visual APE

1. BOEM will ensure the following mitigation measures to resolve the adverse effects to historic properties and to minimize harm to NHLs are required as conditions of approval of the Revolution Wind COP and are implemented by Revolution Wind, unless otherwise specified. Those forms of mitigation BOEM has determined effective for treating NHLs are also determined effective in treating other visually impacted historic properties. To mitigate visual and cumulative visual adverse effects to NHLs, TCPs, and other historic properties, BOEM will ensure the implementation of the mitigation measures described in this MOA and the HPTPs attached to this MOA. Where the integrity of historic properties would be diminished by the visual adverse effects and cumulative visual adverse effects of the project, the proposed mitigation measures serve to support other means of conveying the significance of the historic property and to minimize the harm to NHLs, including documentation, interpretation, and dissemination of information and property preservation planning and activities (including repair and stabilization). See Attachment 5 for proposed budgets for each mitigation effort, reflecting good faith estimates, based on the experience of qualified consultants with similar activities and comparable historic properties. Tasks associated with the mitigation of visual adverse effects can occur during and/or after Project construction. Mitigation measures under III.C must be completed within five years of MOA execution, unless a different timeline is agreed upon by the SHPO within whose state the mitigation is being performed, accepted by BOEM. Tasks may be completed simultaneously, as applicable. Revolution Wind will fund mitigation measures in accordance with Attachment 5 and pursuant to the following measures under III.C.

2. Traditional Cultural Properties (TCPs).

   i. [redacted] <u>Traditional Cultural Property.</u> BOEM will include the following as described in Attachment 8 (Historic Properties Treatment Plan for the Revolution Wind Farm: the [redacted] Traditional Cultural Property [redacted] Massachusetts & Atlantic Outer Continental Shelf) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

      a. <u>GIS Database of Contributing Resources to the TCP</u>

         1) Revolution Wind will fund the development of a GIS database incorporating the results of on-going documentation of the TCP and will include information on existing conditions at each contributing resource and/or significant element of the TCP district as described in Attachment 8.

         2) Revolution Wind will have the documentation developed by professionals meeting the qualifications specified in the SOI's Professional Qualifications Standards (36 CFR Part 61). The GIS will be developed by professionals with demonstrated experience in the creation and organization of spatial databases of cultural resources and the relevant and specific attributes necessary for recordation and management. The GIS development will be overseen by a qualified Geographic Information Systems Professional

3) Revolution Wind will submit the Request for Proposal (RFP), proposals by qualified consultants in response to the RFP, preliminary draft of the exhibit, and final exhibit to the consulting Tribal Nations and MHC for review.

b. Development of Interpretative Materials

1) Revolution Wind will fund the development of GIS story maps or comparable presentations that could include relevant archival data, oral histories, news stories, video footage, and public domain datasets [redacted] as described in Attachment 8.

2) Revolution Wind will have the documentation developed by a qualified Geographic Information Systems Professional

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, draft deliverables, and final deliverables to the consulting Tribal Nations and MHC for review.

c. Climate Adaptation Planning Study

1) Revolution Wind will fund the development of a Climate Adaptation Plan that is focused on the specific resources and characteristics of the [redacted] and needs of the associated traditional community as described in Attachment 8.

2) Revolution Wind will have the documentation developed by qualified professionals with Global Association of Risk Professionals' Sustainability and Climate Risk certification and/or demonstrated experience in the preparation of climate change risk assessments for municipal, state, or federal governments.

3) Revolution Wind will submit the RFP, proposals by qualified consultants in response to the RFP, draft plan, and final plan to the consulting Tribal Nations and MHC for review.

ii. [redacted] Traditional Cultural Property. BOEM will include the following as described in Attachments 9 and 10 [redacted] Traditional Cultural Property [redacted] Massachusetts & Atlantic Outer Continental Shelf for federal Tribal Nations and non-federal Tribes) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Support for [redacted]

1) Revolution Wind will support the identification of appropriate printed and/or digital media for interpretative exhibits; archival research on the history, development, and historical/cultural significance of [redacted] design and production of draft and final interpretive materials; and consultation, meetings, and discussions including the [redacted] on these matters.

2) Revolution Wind will submit the RFP, consultant bids in response to the RFP, draft deliverables, and final deliverables to the consulting Tribal Nations and MHC for review.

b. Scholarships and Training for [redacted] Resource Stewardship

1) Revolution Wind will fund scholarships and fees for professional training or certification programs in the fields of Astronomy, Archaeology or Anthropology, Marine Sciences, Aquaculture, Marine Fisheries, Marine Construction, Native American Studies, Ethnohistory, History, Biology, and related fields as described in Attachments 9 and 10.

2) Revolution Wind will have the documentation prepared by professionals with demonstrated experience in education and training program management and fiscal reporting.

3) Revolution Wind will submit the RFP, consultant bids in response to the RFP, executed contracts between the implementing party and selected consultants, draft Scholarship Program Proposal, and final Scholarship Program Proposal to the consulting Tribal Nations and MHC for review.

c. Coastal Resilience and Habitat Restoration

1) Revolution Wind will provide funding for planning and implementation of targeted efforts to mitigate future losses of character defining features and contributing resources for the TCP, support economically sustainable [redacted] practices, and documentation and/or recover of threatened elements of cultural sites associated with the TCP as described in Attachments 9 and 10.

2) Revolution Wind will have the documentation prepared by professionals with demonstrated experience in archaeology, habitat restoration, coastal resilience planning program management and fiscal reporting, as appropriate to the specific funded activities. All archaeological surveys or other subsurface terrestrial investigations on any land owned or controlled by the Commonwealth of Massachusetts, its agencies or political subdivisions or on any historical or archeological landmarks or on any lands restricted by Massachusetts General Law (MGL) c. 184, § 31 will be conducted in accordance with MHC regulations (950 CMR 70).

3) Revolution Wind will submit the RFP, consultant bids in response to the RFP, draft deliverables, and final deliverables to the consulting Tribal Nations and MHC for review.

d. Archaeological and Cultural Sites Data Compilation

1) Revolution Wind will fund updated inventories of archaeological and cultural resource data pertaining to the TCP and the preparation of updated historic contexts for the interpretation of such resources as described in Attachments 9 and 10.

2) Revolution Wind will have the updated inventory prepared by professionals meeting the SOI's professional qualification standards in archeology and/or

history (36 CFR 60) and in direct consultation with each participating Tribal Nation.

3) Revolution Wind will submit the RFP, consultant bids in response to the RFP, draft and final historic context(s) and MHC inventory forms; and open-source GIS database to the consulting Tribal Nations and MHC for review.

e. Maritime Cultural Landscapes & Interconnected Contexts

1) Revolution Wind will fund a publicly-available and inclusive synthesis of information and knowledge about the maritime cultural landscapes along the shores, coastal islands, and waters of southern New England and Long Island as described in Attachments 9 and 10.

2) Revolution Wind will have the documentation prepared by professionals meeting the SOI's professional qualification standards in cultural anthropology, archeology, and/or history (36 CFR 60) and in direct consultation with each of the consulting Tribal Nation's Tribal Historic Preservation Office or other designated tribal representative.

3) Revolution Wind will submit the RFP, consultant bids in response to the RFP, draft and final reports, and open-source GIS database to the consulting Tribal Nations and MHC for review.

3. Rhode Island National Historic Landmarks and Historic Property Documentation Mitigation Measures.

i. BOEM will include the following as described in Attachment 11 (Historic Property Treatment Plan for the Revolution Wind Farm: Documentation of Twenty-Six Historic Properties in Rhode Island) as conditions of approval of the Revolution Wind COP.

a. The HPTP at Attachment 11 provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions in the resolution of adverse effects from the Revolution Wind Project for the following NHLs and historic properties in addition to any mitigation fund actions that could further be applied to mitigating adverse effects for some or all these NHLs and historic properties under III.C.6:

1) Abbott Phillips House, Little Compton
2) Warren Point Historic District, Little Compton
3) Tunipus Goosewing Farm, Little Compton
4) Fort Varnum/Camp Varnum, Narragansett
5) Narragansett Pier MRA, Narragansett
6) Life Saving Station at Narragansett Pier, Narragansett
7) The Towers Historic District, Narragansett
8) The Towers/Tower Entrance of Narragansett Casino, Narragansett
9) Dunmere, Narragansett
10) Ocean Road Historic District, Narragansett
11) Champlain Farm Historic District, New Shoreham
12) Mitchell Farm Historic District, New Shoreham
13) Beacon Hill Historic District, New Shoreham
14) Lewis-Dickens Farm Historic District, New Shoreham
15) Lakeside Drive and Mitchell Lane Historic District, New Shoreham

16) Indian Head Neck Road Historic District, New Shoreham
17) Beach Avenue Historic District, New Shoreham
18) Old Town and Center Roads Historic District, New Shoreham
19) Corn Neck Road Historic District, New Shoreham
20) Pilot Hill Road and Seaweed Lane Historic District, New Shoreham
21) New Shoreham Historic District, New Shoreham
22) Ochre Point-Cliffs Historic District, Newport
23) Ocean Drive Historic District NHL, Newport
24) Bellevue Avenue Historic District NHL, Newport
25) Brownings Beach Historic District, South Kingstown
26) Puncatest Neck Historic District, Tiverton

b. <u>National Historic Landmark and National Register of Historic Places nomination updates for historic districts in  Newport</u>

1) Update the existing nomination information for the Bellevue Avenue Historic District, Newport.

2) Update the existing nomination information for the Ocean Drive Historic District, Newport.

3) Update the existing nomination information for the Ochre Point-Cliffs Historic District, Newport.

c. <u>Complete New National Register of Historic Places Nomination Documentation</u>

1) In Little Compton at the following historic properties: Abbott Phillips House, Warren Point Historic District, Tunipus Goosewing Farm.

2) In New Shoreham at the following historic properties: West Side Road South, West Side Road North, Beacon Hill, African American Settlement, Lewis-Dickens Farm, Lakeside Drive and Mitchell Lane, Indian Head Neck Road, Beach Avenue, Old Town and Center Roads, Corn Neck Road, Pilot Hill Road and Seaweed Land, and New Shoreham Historic District.

d. <u>New and updated historic property surveys</u>

1) Update the previous *Historic and Architectural Resources of Narragansett, Rhode Island*.

2) Complete intensive-level surveys of the Matunuck and Green Hill neighborhoods in South Kingston.

e. <u>Preparation of the National Historic Landmark and Historic Property Documentation</u>

1) For the nomination form and survey documentation, Revolution Wind will review any previous nomination forms for a historic property or NHL; research other available historic sources and documentation; conduct field and condition assessments and NRHP-eligibility analysis; provide annotated photographs; draft the nomination forms; submit draft documents for review and comment to the RI SHPO, the participating municipal government, historical commission or organization, and, if requested, to the owners of the

historic property or properties; and develop final nomination documents to be provided to RI SHPO, the participating municipal government, historical commission or organization, and, if requested, to the owners of the historic property or properties. Final updates and new NHL and NRHP documents will be submitted by Revolution Wind to RI SHPO and other participating parties for their files and use. Revolution Wind is not responsible for submitting documents for historic property or NHL nominations or updates to RIHPHC's State Review Board or the NPS.

2) Revolution Wind will have the documentation prepared by professionals meeting the SOI's professional qualification standards in archeology and/or history (36 CFR 60) and in consultation with RI SHPO. Documentation will comply with the applicable standards of the SOI's *Guidance on the Identification of Historic Properties* (36 CFR 800.4); NPS's *National Register Bulletin 15: How to Apply the National Register Criteria* for *Evaluation*; NPS's *National Register Bulletin 16a: How to Complete the National Register Registration Form*; and RIHPHC *Standards* and *Guidelines*.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, draft updated historic property inventory if required, final updated historic property inventory if required, draft report to the RI SHPO and participating (if any) municipal government and historical commission or organization for review.

4. Town of Middletown historic property mitigation.

i. BOEM will apply the following mitigation measures described in Attachment 12 (Historic Properties Treatment Plan for the Revolution Wind Farm: Nine Historic Properties, Town of Middletown, Newport County, Rhode Island) as conditions of approval of the Revolution Wind COP. The nine historic properties include the Bailey Farm, Clambake Club of Newport, Paradise Rocks Historic District, Sea View Villa, St. Georges School, Indian Avenue Historic District, Whetstone, Land Trust Cottages, and the Bluff/John Bancroft Estate. To resolve adverse effects, Revolution Wind will fund and implement the following mitigation measures.

a. Support on-going maintenance and aesthetic improvements to the Third Beach Road and Hanging Rocks Road through stone wall preservation and observation trails within the Paradise Rocks Historic District.

1) Revolution Wind will provide funding for the proposed stone wall preservation and for preparing interpretive information to provide the Town, its community, and SHPO with improved experience of local history and historical sites.

2) This will include Revolution Wind reviewing current Town of Middletown Charter and Code of Ordinances; reviewing existing planning documents, guidance, and regulations; existing photographs and documents of present conditions of stone walls; developing draft and final plan (including drawings, if necessary), to be distributed to the RI SHPO, the Town of Middleton, Norman Bird Sanctuary and other property owners for review and comment; and soliciting public engagement to discuss preservation priorities;

3) Develop draft and final reports on these actions to be distributed to RI SHPO, the Town of Middleton, Norman Bird Sanctuary and other property owners.

4) Revolution Wind will develop the project consistent with Town of Middletown Charter and Code of Ordinances and the SOI's Standards for the Treatment of Historic Properties (36 CFR 68).

5) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, draft updated historic property inventory if required, final updated historic property inventory if required, draft report to the RI SHPO, the Town of Middleton, Norman Bird Sanctuary, and other property owners.

b. Update the previous *Historic and Architectural Resources of Middletown, Rhode Island: A Preliminary Report.*

1) Revolution Wind will provide funding to update this report to provide the Town, its community, and SHPO with additional information on local history.

2) Revolution Wind will review the existing Historic and Architectural Resources of Middletown, Rhode Island: A Preliminary Report and existing historic property documentation available at local repositories and the RIHPHC files; develop a methodology for completion of the survey to be distributed to RI SHPO, Rhode Island Historical Society, Town of Middletown, Norman Bird Sanctuary, Clambake Club of Newport, and any other participating property owners for review and comment; complete the survey per the RI SHPO-approved methodology; develop draft and final survey reports to be distributed to RI SHPO, Rhode Island Historical Society, Town of Middletown, Norman Bird Sanctuary, Clambake Club of Newport, and any other participating property owners for review and comment; and address any comments received for distribution with the final document(s) to these participating parties.

3) Revolution Wind will develop the project consistent with SHPO *Standards* and *Guidelines* and SOI reporting standards in the SOI's Guidance on the Identification of Historic Properties (36 CFR 800.4); and the SOI Professional Qualifications Standards (36 CFR Part 61), as applicable.

4) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, draft updated historic property inventory if required, final updated historic property inventory if required, draft report to the RI SHPO, Rhode Island Historical Society, Town of Middletown, Norman Bird Sanctuary, and Clambake Club of Newport for review.

5. Town of Aquinnah historic property mitigation.

i. BOEM will include the following as described in Attachment 13 (Historic Properties Treatment Plan for the Revolution Wind Farm, Nine Historic Properties, Town of Aquinnah, Dukes County, Massachusetts) as conditions of approval of the Revolution Wind COP. These nine properties consist of 71 Moshup Trail, Leonard Vanderhoop House, Edwin DeVries Vanderhoop Homestead, Tom Cooper House, Theodore Haskins House, 3 Windy Hill Drive, Gay Head – Aquinnah Town Center Historic District, Gay Head – Aquinnah Shops, Gay Head – Aquinnah Coast Guard Station Barracks. To resolve adverse effects, Revolution Wind will fund and implement the following mitigation measures.

a. Funding for Weatherization Improvements to the Edwin D. Vanderhoop Homestead, which houses the Aquinnah Cultural Center.

1) Revolution Wind will fund energy efficiency improvements to the Edwin D. Vanderhoop Homestead to help to increase the energy efficiency and to help ensure the long-term preservation of this historic property as described in Attachment 13. Mitigation funds are being sought by the Town of Aquinnah for historically appropriate weatherization of this building to preserve and protect each element of this irreplaceable local venue and its contents.

2) Revolution Wind will develop the project consistent with the Town of Aquinnah Building Code, as applicable; the Town of Aquinnah Energy and Climate Committee guidance, as applicable; the SOI's Standards for Rehabilitation (36 CFR 67.7); and National Park Service's Improving Energy Efficiency in Historic Buildings Preservation Brief 3.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, preliminary draft plans and specifications, final plans and specifications, and as-built documentation including photographs to the MHC, Dukes County, Town of Aquinnah, and Wampanoag Tribe of Gay Head (Aquinnah) for review.

b. Complete Identified Needs from the Americans with Disabilities Act (ADA) Compliance Plan.

1) Revolution Wind will fund and complete the next phase of work identified in the proposed ADA Compliance Plan for the Aquinnah Circle and the Gay Head – Aquinnah Shops Area to ensure all visitors are able to access and enjoy the Gay Head – Aquinnah Shops as described in Attachment 13. To improve and expand access, Revolution Wind will fund the construction. The intent is to support establishment of fully ADA Compliant access to the Cliffs, shops, and Overlook Park, including replacement of the existing stairs, ramp access and appropriate pathways to and from other parts of the Circle.

2) Revolution Wind will develop the project consistent with Town of Aquinnah, MA Building Code, as applicable; Martha's Vineyard regulations; Commission's planning guidance, as applicable; ADA; the Massachusetts Office on Disability Guidelines as applicable; and the SOI's Standards and Guidelines for Rehabilitation (36 CFR 68).

3) Revolution Wind will submit photographs and documentation of existing conditions, a RFP, proposals by qualified consultants in response to the RFP, preliminary draft of the construction plans including schedule, cost, and specifications, and final construction plan to the MHC, Dukes County, Town of Aquinnah, and Wampanoag Tribe of Gay Head (Aquinnah) for review.

ii. Town of Aquinnah, Dukes County, Massachusetts*: The Gay Head Lighthouse*. BOEM will include the following as described in Attachment 14 (Historic Properties Treatment Plan for the Revolution Wind Farm: The Gay Head Lighthouse, Town of Aquinnah, Dukes County, Massachusetts) as conditions of approval of the Revolution Wind COP.

Revolution Wind will fund and commence the following based on funds from and the consultation described under Section III.C.3.

a. Historic Rehabilitation of the Gay Head Lighthouse

1) Revolution Wind will contribute funds (see Attachment 5) and provide contracting support to the Town of Aquinnah for the next phase of rehabilitation at the Gay Head Lighthouse to ensure the long-term preservation of the lighthouse by completing physical repairs and/or rehabilitation of the historic building materials as described in Attachment 14, consulting with the Gay Head Light Advisory Committee throughout the process. This repair and/or restoration will prioritize restoration of the curtain wall pursuant to the ICC Commonwealth Corporation Report of December 2021 Inspection Gay Head Lighthouse Aquinnah, MA dated April 13, 2022.

2) Revolution Wind will develop the project consistent with the Town of Aquinnah, MA Building Code; Martha's Vineyard Commission planning guidance, as applicable; Preservation Restriction (MGL Chapter 184, Section 31-33); United States Coast Guard Aid to Navigation (ATON) Access Easement (U. S. Department of Homeland Security and U. S. Coast Guard, 2005); Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character; Preservation Brief 47: Maintaining the Exterior of Small and Medium Size Historic Buildings; National Register Bulletin 34: Guidelines for Evaluating and Documenting Historic Aids to Navigation; Historic Lighthouse Preservation Handbook; IALA-AISM Lighthouse Conservation Manual; Preservation Restriction (RIGL Title 42, Section 42-45-9); the SOI's Standards for Treatment of Historic Properties (36 CFR 68); the SOI Professional Qualifications Standards (36 CFR Part 61), as applicable; the SOI's Standards for Treatment of Historic Properties (36 CFR 68); and the SOI's Professional Qualifications Standards (36 CFR Part 61), as applicable. The Gay Head Lighthouse Advisory Committee will be given the opportunity to review the demonstrated experience and qualifications of all bidders in regard to their work on similar lighthouse restoration projects.

3) At such time as the Town of Aquinnah notifies Revolution Wind that sufficient funds are available for the defined scope of repair and/or restoration, Revolution Wind will submit proposed scopes of work including draft text, project plans, and design specifications; photographic and written documentation of existing conditions (prior to repair or restoration work); draft specifications and construction drawings; final Specifications and construction drawings; progress reports; and a Summary Report of the work completed to the MHC, Dukes County, and Town of Aquinnah, Gay Head Lighthouse Advisory Committee, and Wampanoag Tribe of Gay Head (Aquinnah) for review.

6. Mitigation Fund

i. Fund Establishment. BOEM will require Revolution Wind to establish and contribute funds to a mitigation fund to resolve visual adverse effects to the historic properties, above-ground NHLs and historic properties in Rhode Island and Massachusetts, listed below (in no specific order).

1) Block Island Southeast Lighthouse NHL
2) Bellevue Avenue Historic District NHL
3) The Breakers NHL
4) Marble House NHL
5) Ocean Drive Historic District NHL
6) Ochre Point - Cliffs Historic District
7) Kay St.-Catherine St.-Old Beach Rd. Historic District / The Hill
8) Horsehead/Marbella
9) Brownings Beach Historic District
10) Puncatest Neck Historic District
11) Island Cemetery/Old Burial Ground
12) New Shoreham Historic District
13) Old Harbor Historic District
14) Captain Mark L. Potter House
15) Spring Cottage
16) Spring House Hotel
17) Spring Street Historic District
18) WWII Lookout Tower – Spring Street
19) Caleb W. Dodge Jr. House
20) Captain Noah Dodge
21) Captain Welcome Dodge Sr.
22) Pilot Hill Road and Seaweed Lane
23) WWII Lookout Tower at Sands Pond
24) Mohegan Cottage
25) Lewis-Dickens Farm
26) Miss Abby E. Vaill/1 of 2 Vaill cottages
27) Hon. Julius Deming Perkins/"Bayberry Lodge"
28) West Side and Grace Cove Roads
29) Peleg Champlin House
30) Lakeside Drive and Mitchell Lane
31) African American Settlement
32) Nathan Mott Park
33) Champlin Farm
34) Old Town and Center Roads
35) Beacon Hill
36) Beach Avenue
37) Indian Head Neck Road
38) Corn Neck Road
39) Hippocampus/Boy's camp/Beane Family
40) Mitchell Farm
41) U.S. Coast Guard Brick House
42) US Lifesaving Station
43) US Weather Bureau Station
44) Hygeia House
45) Sakonnet Light Station
46) Block Island North Lighthouse
47) Point Judith Lighthouse
48) Beavertail Light
49) Tarpaulin Cove Light Clark's Point Light
50) Butler Flats Light Station
51) Nobska Point Lighthouse

52) Captain Samuel Hancock – Captain Mitchell West House
53) Russell Hancock House
54) Ernest Flanders House, Shop, Barn
55) Simon Mayhew House
56) Flaghole
57) Salters Point
58) 744 Sconticut Neck Road
59) Scrubby Neck Schoolhouse
60) Gooseberry Neck Observation Towers
61) Gooseneck Causeway
62) Westport Harbor
63) Horseneck Point Lifesaving Station
64) Clam Shack Restaurant
65) Westport Point Historic District
66) Westport Point Revolutionary War Properties
67) Westport Point Historic District

ii. Fund Establishment. BOEM will require the Revolution Wind to establish a mitigation fund to resolve visual adverse effects to historic properties from the Project, including five NHLs. Attachment 5 provides a basis for the total funding amounts, based on input of qualified consultants with experience fulfilling activities similar to those that can be funded through the mitigation fund and for historic properties comparable to those adversely effected by the Project.

iii. Fund Amount and Application to Mitigation of Adverse Effects. In order to mitigate the Project's adverse visual impacts to historic properties, Revolution Wind must provide the total amount of $3,873,000 of funding in support of historic preservation and public interpretive and commemorative activities; see Attachment 5. The measures listed in Attachment 5 were proposed or based on proposals by consulting parties and included in draft documents BOEM circulated to consulting parties and included in Appendix J to the Project EIS. BOEM continues to believe that these measures are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected, and the heightened significance and concerns of the NHLs. In the specific context of this undertaking, including the numerous privately owned properties involved, the signatories agree that it is appropriate to provide flexibility to implement these or other specific activities for preservation, interpretation, and commemoration to mitigate adverse effects to historic properties, and the signatories agree that the level of funding identified in Attachment 5 is appropriate.

iv. Depositing the Fund and the Allocation of Funds through Grants. Within 120 days of Revolution Wind of receiving a no objection to the complete Facility Design Report/Fabrication and Installation Report, Revolution Wind must pay half the total funding amount, $1,936,500, to an escrow account. Within 1 year of the first payment, Revolution will place another $1,936,500 into that escrow account. Those payments will be deposited into a fund to be drawn from by a third-party administrator for the purpose of providing grants until the fund balance is expended. Revolution Wind's deposit of such funds into this mitigation fund will satisfy Revolution Wind's obligations as it relates to mitigation for adverse visual impacts to the historic properties listed in Stipulation III.C.1, unless additional consultation is required in the event of unallocated funds, as described below. These grants are to support mitigation activities for the preservation, interpretation, or commemoration of historic sites, buildings, or events. Grants will be awarded for the long-term protection, preservation, and commemoration of adversely affected historical properties in the following order of preference. Grants must first be awarded to the historic properties listed in Stipulation III.C.3.i. If after 3 years from the date the administrator begins accepting grant applications there are funds still unapplied, then grants should be awarded for alternative mitigation options for adversely affected historic property identified in Attachment 5.

v. Unallocated Funds. If after five years from the date the administrator begins accepting applications any funds are unallocated, then BOEM will consult with the consulting parties on appropriate use of the remaining funds to resolve adverse effects. The signatories agree that the existence of unapplied funds does not constitute a breach of this agreement.

vi. Fund Administrator Selection. BOEM and Revolution Wind will identify, within 1 year of execution of this MOA, an appropriate non-profit or governmental historic preservation organization, such as [TBD] or another similarly situated entity, to administer the fund and the funded activities, to ensure the effectiveness of these activities as mitigation for the undertaking's adverse effect to the historic properties. BOEM and Revolution Wind will consult on the selection of this fund administrator with the consulting parties and the administrator must be acceptable to BOEM. BOEM will invite the selected third-party administrator to sign the MOA as an invited signatory, and the addition of this invited signatory will not require an amendment to this MOA unless changes are proposed to this mitigation fund at Stipulation III.C.6. The same consultation process would be followed in the case of replacement of a fund administrator, if needed.

vii. Fund Administration and Monitoring. BOEM will consult with the third-party administrator and the SHPO in the respective state where funding would be applied, prior to allowing the third-party administrator to issue any grants. The third-party administrator's fees and administrative costs will be paid from the fund and must not exceed 6 percent of the fund amount. BOEM with the assistance of the third-party administrator must ensure, through the annual reporting process (see Stipulation XI), that all granted funds are used exclusively for the purposes described in Stipulation III.C.6 for direct costs of preservation, interpretation, or commemoration of the historic properties adversely affected by the Project. The mitigation fund administrator must prohibit the use of grant funds for indirect costs, such as accountant fees, employee salary or benefits, or legal fees.

viii. Mitigation Fund Operating Procedures and Reporting. BOEM will consult with the third-party administrator to develop operating procedures for the mitigation fund, and BOEM will review and approve the final operating procedures. BOEM will ensure that the third-party administrator has procedures under which it will provide a copy of all grants made and an annual report on expenditure of funds and activities to BOEM, SHPO, and Revolution Wind. Revolution Wind will summarize the third-party administrator's annual report to describe funded mitigation activities, progress, completion, and outcomes in the annual report per Stipulation XI, with sufficient detail for BOEM to ensure that the mitigation is being implemented according to this section (III.C.6).

ix. Grant-supported Mitigation Standards. BOEM will ensure that the operating procedures include the following, where applicable.

a. In such cases where Historic Architectural Building Survey (HABS) documentation and HABS-like documentation mitigation would be implemented, the grantee shall first consult with the historic property owner to identify photographic documentation specifications.

b. Where Historic Structure Report mitigation is included within a grant, the documentation shall be prepared in accordance with the *Historic Structure Reports and Preservation Plans: A Preparation Guide – Second Edition*, as may be amended, and the project team must include an individual meeting the SOI's professional qualifications standards for historic architecture.

c. Where funding for visitor experience, public access, climate resiliency, or comparable actions would be granted, all projects must meet the SOI's standards for the Treatment of Historic Properties and these projects should not constitute adverse effects themselves on the historic properties.

d. Consistent with NHPA Section 110(f) and as described in EIS Appendix J, the Finding of Effect, BOEM has undertaking planning and actions as may be necessary to minimize harm to NHLs. The mitigation funding for NHLs under this MOA does not replace any other planning and actions BOEM has taken to comply with that statutory requirement.

## IV. PROJECT MODIFICATIONS

A. If Revolution Wind proposes any modifications to the Project that expands the Project beyond the Project Design Envelope included in the COP and/or occurs outside the defined APEs or the proposed modifications change BOEM's final Section 106 determinations and findings for this Project, Revolution Wind shall notify and provide BOEM with information concerning the proposed modifications. BOEM will determine if these modifications require alteration of the conclusions reached in the Finding of Effect and, thus, will require additional consultation with the signatories, invited signatories and consulting parties. If BOEM determines additional consultation is required, Revolution Wind will provide the signatories, invited signatories, and consulting parties with the information concerning the proposed changes, and they will have 30 calendar days from receipt of this information to comment on the proposed changes. BOEM shall take into account any comments from signatories, invited signatories, and consulting parties prior to agreeing to any proposed changes. Using the procedure below, BOEM will, as necessary, consult with the signatories, invited signatories, and consulting parties to identify and evaluate historic properties in any newly affected areas, assess the effects of the modification, and resolve any adverse effects.

1. If the Project is modified and BOEM identifies no additional historic properties or determines that no historic properties are adversely affected due to the modification, BOEM, with the assistance of Revolution Wind, will notify and consult with the signatories, invited signatories, and consulting parties following the consultation process set forth in this Stipulation IV.A.1.

   i. Revolution Wind will notify all the signatories, invited signatories, and consulting parties about this proposed change and BOEM's determination by providing a written summary of the project modification including any maps, a summary of any additional surveys and/or research conducted to identify historic properties and assess effects, and copies of the surveys.

ii. BOEM and Revolution Wind will allow the signatories, invited signatories, and consulting parties 30 calendar days to review and comment on the proposed change, BOEM's determination, and the documents.

iii. After the 30-calendar review period has concluded and no comments require additional consultation, Revolution Wind will notify the signatories and consulting parties that BOEM has approved the project modification and, if they received any comments, provide a summary of the comments and BOEM's responses.

iv. BOEM, with the assistance of Revolution Wind, will conduct any consultation meetings if requested by the signatories or consulting parties.

v. This MOA will not need to be amended if no additional historic properties are identified and/or adversely affected.

2. If BOEM determines new adverse effects to historic properties will occur due to a Project modification, BOEM with the assistance of Revolution Wind will notify and consult with the signatories, invited signatories, and consulting parties regarding BOEM's finding and the proposed measures to resolve the adverse effect(s) including the development of a new treatment plan(s) following the consultation process set forth in this Stipulation IV.A. 2.

   i. Revolution Wind will notify all signatories, invited signatories, and consulting parties about this proposed modification, BOEM's determination, and the proposed resolution measures for the adverse effect(s).

   ii. The signatories, invited signatories, and consulting parties will have 30 calendar days to review and comment on the adverse effect finding and the proposed resolution of adverse effect(s), including a draft treatment plan(s).

   iii. BOEM, with the assistance of Revolution Wind, will conduct additional consultation meetings, if necessary, during consultation on the adverse effect finding and during drafting and finalization of the treatment plan(s).

   iv. BOEM, with the assistance of Revolution Wind, will respond to the comments and make necessary edits to the documents.

   v. Revolution Wind will send the revised draft final documents to the other signatories, invited signatories, and consulting parties for review and comment during a 30-calendar day review and comment period. With this same submittal of draft final documents, Revolution Wind will provide a summary of all the comments received on the documents and BOEM's responses.

   vi. BOEM, with the assistance of Revolution Wind, will respond to the comments on the draft final documents and make necessary edits to the documents.

   vii. Revolution Wind will notify all the signatories, invited signatories, and consulting parties that BOEM has approved the project modification and will provide the final document(s) including the final treatment plan(s) and a summary of comments and BOEM's responses to comments, if they receive any on the draft final documents, after BOEM has received concurrence from the appropriate SHPO(s) on the finding of new adverse effect(s), BOEM has accepted the final treatment plan(s), and BOEM has approved the Project modification.

viii. The MOA will not need to be amended under Section XIII, after the treatment plan(s) is accepted by BOEM, for the treatment plan to become part of the MOA requirements.

3. If any of the signatories, invited signatories, or consulting parties object to determinations, findings, or resolutions made pursuant to these measures (Stipulation IV.A.1 and 2), BOEM will resolve any such objections pursuant to the dispute resolution process set forth in Stipulation XI.

## V. REVIEW PROCESS FOR DOCUMENTS PRODUCED UNDER MOA STIPULATIONS

A. The following process will be used for any document, report, or plan produced in accordance with Stipulations I through IV of this MOA:

1. Draft Document

i. Revolution Wind shall provide the document to BOEM for technical review and approval

a. BOEM has 15 calendar days to complete its technical review.

b. If BOEM does not provide approval, it shall submit its comments back to Revolution Wind, who will have 15 calendar days to address the comments.

ii. BOEM, with the assistance of Revolution Wind, shall provide the draft document to consulting parties, except the ACHP, for review and comment.

a. Consulting parties shall have 30 calendar days to review and comment.

b. BOEM, with the assistance of Revolution Wind, shall coordinate a meeting with consulting parties to facilitate comments on the document if requested by a consulting party.

c. BOEM shall consolidate comments received and provide them to Revolution Wind within 15 calendar days of receiving comments from consulting parties.

2. Draft Final Document

i. Revolution Wind shall provide BOEM with the draft final document and response to consulting party comments for technical review and approval

a. BOEM has 15 calendar days to complete its technical review.

b. If BOEM does not provide approval, it shall submit its comments back to Revolution Wind, who will have 15 calendar days to address the comments.

ii. BOEM, with the assistance of Revolution Wind, shall provide the draft final document and response to previous comments to consulting parties, except the ACHP, for review and comment

a. Consulting parties have 30 calendar days to review and comment.

b. BOEM, with the assistance of Revolution Wind, shall coordinate a meeting with consulting parties to facilitate comments on the document if requested by a consulting party.

c. BOEM shall consolidate comments received and provide them to Revolution Wind within 15 calendar days of receiving comments from consulting parties.

3. Final Document

i. Revolution Wind shall provide BOEM with the final document and response to consulting party comments for approval.

a. BOEM has 15 calendar days to complete its technical review.

b. If BOEM does not provide approval, it shall submit its comments back to Revolution Wind, who will have 15 calendar days to address the comments.

c. BOEM, with the assistance of Revolution Wind, shall provide the final document and responses to previous comments to consulting parties, except the ACHP, within 30 calendar days of approving the final document.

## VI. SUBMISSION OF DOCUMENTS

A. Connecticut and New York, SHPOs, ACHP, NPS, Tribal Nations, and Consulting Parties.

1. All submittals to the Rhode Island, New York, and Connecticut SHPOs, ACHP, NPS, Tribal Nations, and consulting parties will be submitted electronically unless a specific request is made for the submittal be provided in paper format.

2. Rhode Island and Massachusetts SHPOs:

i. All submittals to the Massachusetts SHPO, if required for any HPTP, will be in paper format and delivered by U.S. Mail, delivery service, or by hand.

ii. Plans and specifications submitted to the Massachusetts SHPO, if required for any HPTP, must measure no larger than 11- x 17-inch paper format (unless another format is agreed to in consultation); therefore, all documents produced that will be submitted to Massachusetts SHPO under this MOA, must meet this format.

## VII. CURATION

A. Collections from federal lands or the OCS:

1. Any archaeological materials removed from federal lands or the OCS as a result of the actions required by this MOA shall be curated in accordance with 36 CFR 79, "Curation of Federally Owned and Administered Archaeological Collections," ACHP's "Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites" published in the Federal Register (64 Fed. Reg. 27085-27087 (May 18, 1999)), or other provisions agreed to by the consulting parties and following applicable State guidelines. No excavation should be initiated before acceptance and approval of a curation plan, which will be included by Revolution Wind in the application for Phase III investigations to the RI SHPO for permit approval for Phase III Data Recovery Program specified in Section B.1.i.

B. Collections from state, local government, and private lands:

1. Archaeological materials from state or local government lands in the APE and the records and documentation associated with these materials shall be curated within the state of their origin at a repository preferred by the SHPO, or an approved and certified repository, in accordance with the standards and guidelines required by the state. Lands as described here

may include the seafloor in state waters. The terrestrial APE for the Project, where archaeological materials could originate, is located only within Rhode Island. No excavation should be initiated before acceptance and approval of a curation plan.

2. Collections from private lands that would remain private property: In cases where archaeological survey and testing are conducted on private land, any recovered collections remain the property of the land owner. In such instances, BOEM and Revolution Wind, in coordination with the SHPO, and affected Tribal Nation(s), will encourage land owners to donate the collection(s) to an appropriate public or Tribal entity. To the extent a private landowner requests that the materials be removed from the site, Revolution Wind will seek to have the materials donated to the repository identified under Stipulation VII.B.1 through a written donation agreement developed in consultation with the consulting parties. BOEM, assisted by Revolution Wind, will seek to have all materials from each state curated together in the same curation facility within the state of origin. In cases where the property owner wishes to transfer ownership of the collection(s) to a public or Tribal entity, BOEM and Revolution Wind will ensure that recovered artifacts and related documentation are curated in a suitable repository as agreed to by BOEM, SHPO, and affected Tribal Nation(s), and following applicable State guidelines. To the extent feasible, the materials and records resulting from the actions required by this MOA for private lands, shall be curated in accordance with 36 CFR 79. No excavation should be initiated before acceptance and approval of a curation plan.

## VIII. PROFESSIONAL QUALIFICATIONS

A. SOI's Standards for Archaeology and Historic Preservation. Revolution Wind will ensure that all work carried out pursuant to this MOA will meet the SOI's Standards for Archaeology and Historic Preservation, 48 FR 44716 (September 29, 1983), taking into account the suggested approaches to new construction in the SOI's Standards for Rehabilitation.

B. SOI Professional Qualifications Standards. Revolution Wind will ensure that all work carried out pursuant to this MOA is performed by or under the direction supervision of historic preservation professionals who meet the SOI's Professional Qualifications Standards (48 FR 44738-44739). A "qualified professional" is a person who meets the relevant standards outlined in such SOI Standards. BOEM, or its designee, will ensure that consultants retained for services pursuant to the MOA meet these standards.

C. Investigations of ASLFs. Revolution Wind will ensure that the additional investigations of ASLFs will be conducted, and reports and other materials produced by one or more qualified marine archaeologists and geological specialists who meet the SOI's Professional Qualifications Standards and has experience both in conducting High Resolution Geophysical (HRG) surveys and processing and interpreting the resulting data for archaeological potential, as well as collecting, subsampling, and analyzing cores.

D. Tribal Consultation Experience. Revolution Wind will ensure that all work carried out pursuant to this MOA that requires consultation with Tribal Nations is performed by professionals who have demonstrated professional experience consulting with federally recognized Tribal Nations.

E. BOEM Acknowledgement of the Special Expertise of Tribal Nations. BOEM recognizes that all tribal participants and knowledge need not conform to the SOI's standards, acknowledging that Tribal Nations possess special expertise in assessing the eligibility of historic properties that may possess religious and cultural significance to Tribal Nations, pursuant to 36 CFR 800.4(c)(1).

## IX. DURATION

A. This MOA will expire at (1) the decommissioning of the Project in the lease area, as defined in Revolution Wind's lease with BOEM (Lease Number OCS-A 0486) or (2) 25-years from the date of COP approval, whichever occurs first. Prior to such time, BOEM may consult with the other signatories and invited signatories to reconsider the terms of the MOA and amend it in accordance with Amendment Stipulation (Stipulation XII).

## X. POST-REVIEW DISCOVERIES AND EMERGENCY SITUATIONS

A. <u>Implementation of Post-Review Discovery Plans</u>. If properties are discovered that may be historically significant or unanticipated effects on historic properties found, BOEM shall implement the post-review discovery plans found in Attachment 15 (Revolution Wind Export Cable Onshore Substation and Interconnection Facility, North Kingstown, Rhode Island: Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains) and Attachment 16 (Unanticipated Discoveries Plan for Submerged Archaeological Sites, Historic Properties, and Cultural Resources Including Human Remains: Revolution Wind Farm for Lease Area OCS A-0486 Construction and Operations Plan).

1. The signatories acknowledge and agree that it is possible that additional historic properties may be discovered during implementation of the Project, despite the completion of a good faith effort to identify historic properties throughout the APEs.

B. <u>All Post-Review Discoveries</u>. In the event of a post-review discovery of a property or unanticipated effects to a historic property prior to or during construction, operation, maintenance, or decommissioning of the Project, Revolution Wind will implement the following actions which are consistent with the post-review discovery plan:

1. Immediately halt all ground- or seafloor-disturbing activities within the area of discovery while taking into account whether stabilization and further protections are warranted to keep the discovered resource from further degradation and impact;
2. Notify BOEM in writing via report within 72 hours of the discovery, including any recommendations on need and urgency of stabilization and additional protections for the discovered resource;
3. Keep the location of the discovery confidential and take no action that may adversely affect the discovered property until BOEM or its designee has made an evaluation and instructs Revolution Wind on how to proceed; and
4. Conduct any additional investigations as directed by BOEM or its designee to determine if the resource is eligible for listing in the NRHP (30 CFR 585.802(b)). BOEM will direct Revolution Wind to complete additional investigations, as BOEM deems appropriate, if:

   i. the site has been impacted by Revolution Wind Project activities; or

   ii. impacts to the site from Revolution Wind Project activities cannot be avoided.

5. If investigations indicate that the resource is eligible for the NRHP, BOEM, with the assistance of Revolution Wind, will work with the other relevant signatories, invited signatories, and consulting parties to this MOA who have a demonstrated interest in the affected historic property and on the further avoidance, minimization or mitigation of adverse effects.

6. If there is any evidence that the discovery is from an indigenous society or appears to be a preserved burial site, Revolution Wind will contact the Tribal Nations (Mashpee Wampanoag Tribe, Shinnecock Indian Nation, Mashantucket (Western) Pequot Tribal Nation, Wampanoag Tribe of Gay Head [Aquinnah], Mohegan Tribe of Indians of Connecticut, Narragansett Indian Tribe, Delaware Tribe of Indians, The Delaware Nation) as identified in the notification lists included in the post-review discovery plans within 72 hours of the discovery with details of what is known about the discovery, and consult with the Tribal Nations pursuant to the post review discovery plan.

7. If BOEM incurs costs in addressing the discovery, under Section 110(g) of the NHPA, BOEM may charge Revolution Wind reasonable costs for carrying out historic preservation responsibilities, pursuant to its delegated authority under the OCS Lands Act (30 CFR 585.802 (c-d)).

C. Emergency Situations. In the event of an emergency or disaster that is declared by the President or the Governor of Rhode Island or Massachusetts, which represents an imminent threat to public health or safety, or creates a hazardous condition, BOEM shall immediately notify the Tribal Nations, SHPOs, and the ACHP of the condition which has initiated the situation and the measures taken to respond to the emergency or hazardous condition. Should the Tribal Nations, SHPOs, or the ACHP desire to provide technical assistance to BOEM, they shall submit comments within seven calendar days from notification, if the nature of the emergency or hazardous condition allows for such coordination.

## XI. MONITORING AND REPORTING

A. At the beginning of each calendar year by January 31, following the execution of this MOA until it expires or is terminated, Revolution Wind will prepare and, following BOEM's review and agreement to share this summary report, provide all signatories, invited signatories, and consulting parties to this MOA a summary report detailing work undertaken pursuant to the MOA. Such report shall include:

1. a description of how the stipulations relating to avoidance, minimization, and mitigation measures (Stipulations I, II, and III) were implemented;

2. any scheduling changes proposed; any problems encountered; and

3. any disputes and objections received in BOEM's efforts to carry out the terms of this MOA.

B. Revolution Wind can satisfy its reporting requirement under this stipulation by providing the relevant portions of the annual compliance certification required under 30 CFR 285.633.

C. BOEM with the assistance of Revolution Wind will hold annual meetings with the required signatories and invited signatories, to review work undertaken pursuant to the MOA for the first five calendar years of MOA implementation.

## XII. DISPUTE RESOLUTION

A. Should any signatory, invited signatory, or consulting party to this MOA object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, they must notify BOEM in writing of their objection. BOEM shall consult with such party to resolve the objection. If BOEM determines that such objection cannot be resolved, BOEM will:

1. Forward all documentation relevant to the dispute, including the BOEM's proposed resolution, to the ACHP. The ACHP shall provide BOEM with its advice on the resolution of the objection within 30 calendar days of receiving adequate documentation. Prior to reaching a final decision on the dispute, BOEM shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, signatories, invited signatories, and/or consulting parties, and provide them with a copy of this written response. BOEM will make a final decision and proceed accordingly.

2. If the ACHP does not provide its advice regarding the dispute within the 30 calendar-day time period, BOEM may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, BOEM shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories, invited signatories, or consulting parties to the MOA, and provide them and the ACHP with a copy of such written response.

B. BOEM's responsibility to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain unchanged.

C. At any time during the implementation of the measures stipulated in this MOA, should a member of the public object in writing to the signatories regarding the manner in which the measures stipulated in this MOA are being implemented, that signatory will notify BOEM. BOEM shall review the objection and may notify the other signatories as appropriate and respond to the objector.

## XIII. AMENDMENTS

A. This MOA may be amended when such an amendment is agreed to in writing by all signatories and invited signatories. The amendment will be effective on the date a copy signed by all of the signatories and invited signatories is filed with the ACHP.

B. Revisions to any attachment may be proposed by any signatory or invited signatory by submitting a draft of the proposed revisions to all signatories and invited signatories with a notification to the consulting parties. The signatories and invited signatories will consult for no more than 30 calendar days (or another time period agreed upon by all signatories and invited signatories) to consider the proposed revisions to the attachment. If the signatories and invited signatories unanimously agree to revise the attachment, Revolution Wind BOEM will provide a copy of the revised attachment to the other signatories, invited signatories, and consulting parties. Revisions to any attachment to this MOA will not require an amendment to the MOA.

## XIV. TERMINATION

A. If any signatory or invited signatory to this MOA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other signatories, invited signatories, and consulting parties to attempt to develop an amendment per Stipulation XII. If within 30 calendar days (or another time period agreed to by all signatories) an amendment cannot be reached, any signatory or invited signatory may terminate the MOA upon written notification to the other signatories.

B. Once the MOA is terminated, and prior to work continuing on the undertaking, BOEM must either(a) execute an MOA pursuant to 36 CFR 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR 800.7. BOEM shall notify the signatories and invited signatories as to the course of action it will pursue.

## XV. COORDINATION WITH OTHER FEDERAL AGENCIES

A. In the event that another federal agency not initially a party to or subject to this MOA receives an application for funding/license/permit for the undertaking as described in this MOA, that agency may fulfill its Section 106 responsibilities by stating in writing it concurs with the terms of this MOA and notifying the signatories and invited signatories that it intends to do so. Such federal agency may become a signatory, invited signatory, or a concurring party (collectively referred to as signing party) to the MOA as a means of complying with its responsibilities under Section 106 and based on its level of involvement in the undertaking. To become a signing party to the MOA, the agency official must provide written notice to the signatories and invited signatories that the agency agrees to the terms of the MOA, specifying the extent of the agency's intent to participate in the MOA. The participation of the agency is subject to approval by the signatories and invited signatories who must respond to the written notice within 30 calendar days, or the approval will be considered implicit. Any necessary amendments to the MOA as a result will be considered in accordance with the Amendment Stipulation (Stipulation XII).

B. Should the signatories and invited signatories approve the federal agency's request to be a signing party to this MOA, an amendment under Stipulation XII will not be necessary if the federal agency's participation does not change the undertaking in a manner that would require any modifications to the stipulations set forth in this MOA. BOEM will document these conditions and involvement of the federal agency in a written notification to the signatories, invited signatories, and consulting parties, and include a copy of the federal agency's executed signature page, which will codify the addition of the federal agency as a signing party in lieu of an amendment.

## XVI. ANTI-DEFICIENCY ACT

A. Pursuant to 31 USC 1341(a)(1), nothing in this MOA will be construed as binding the United States to expend in any one fiscal year any sum in excess of appropriations made by Congress for this purpose, or to involve the United States in any contract or obligation for the further expenditure of money in excess of such appropriations.

B. Execution of this MOA by BOEM, the Connecticut, Massachusetts, New York, and Rhode Island SHPOs, and the ACHP, and implementation of its terms evidence that BOEM has taken into account the effects of this undertaking on historic properties and afforded the ACHP an opportunity to comment.

[SIGNATURES COMMENCE ON FOLLOWING PAGE]

**MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Signatory:**

Bureau of Ocean Energy Management (BOEM)

_______________________________________ Date:_______________

Elizabeth Klein
Director
Bureau of Ocean Energy Management

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Signatory:**

Connecticut State Historic Preservation Officer (SHPO)

_______________________________________ Date:_______________
Catherine Labadia
Deputy State Historic Preservation Officer
Connecticut State Historic Preservation Office

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Signatory:**

Rhode Island State Historic Preservation Officer (SHPO)

_________________________________________ Date:________________

Jeffrey Emidy
Executive Director and State Historic Preservation Officer
Rhode Island Historical Preservation & Heritage Commission

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Signatory:**

New York State Historic Preservation Officer (SHPO)

_______________________________________ Date:_______________
Roger Daniel Mackay
Deputy Commissioner New York State Division for Historic Preservation

**MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Signatory:**

Massachusetts State Historic Preservation Officer (SHPO)

_______________________________________ Date:_______________

Brona Simon
State Historic Preservation Officer
Massachusetts Historical Commission

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Signatory:**

Advisory Council on Historic Preservation (ACHP)

_______________________________________ Date:_______________
Reid J. Nelson
Executive Director
Advisory Council on Historic Preservation

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Invited Signatory:**

Revolution Wind, LLC

_______________________________________ Date:_______________

Kellen Ingalls
Authorized Person
Revolution Wind, LLC

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Concurring Party:**

Mashpee Wampanoag Tribe

_______________________________________ Date:_______________
[Name]
[Title]
Mashpee Wampanoag Tribe

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Concurring Party:**

Shinnecock Indian Nation

_____________________________________ Date:_______________
[Name]
[Title]
Shinnecock Indian Nation

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Concurring Party:**

Mashantucket (Western) Pequot Tribal Nation

_____________________________________ Date:_______________

[Name]
[Title]
Mashantucket (Western) Pequot Tribal Nation

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Concurring Party:**

Wampanoag Tribe of Gay Head (Aquinnah)

______________________________________ Date:_______________
[Name]
[Title]
Wampanoag Tribe of Gay Head (Aquinnah)

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Concurring Party:**

Mohegan Tribe of Indians of Connecticut

_______________________________________ Date:_______________
[Name]
[Title]
Mohegan Tribe of Indians of Connecticut

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Concurring Party:**

Narragansett Indian Tribe

_____________________________________ Date:_______________
[Name]
[Title]
Narragansett Indian Tribe

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Concurring Party:**

The Delaware Tribe of Indians

______________________________________ Date:_______________
[Name]
[Title]
The Delaware Tribe of Indians

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Concurring Party:**

The Delaware Nation

_______________________________________ Date:_______________

[Name]
[Title]
The Delaware Nation

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

**Concurring Party:**

Organization

______________________________________ Date:_______________

Name
Title
Organization

**MEMORANDUM OF AGREEMENT**
**AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,**
**THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,**
**MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,**
**AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**
**REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT**

## LIST OF ATTACHMENTS TO THE MOA

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**ATTACHMENT 1 –PROGRAMMATIC AGREEMENT**

MAY 23 2012

PROGRAMMATIC AGREEMENT
Among
The U.S. Department of the Interior, Bureau of Ocean Energy Management;
the State Historic Preservation Officers of Massachusetts and Rhode Island;
The Mashpee Wampanoag Tribe;
The Narragansett Indian Tribe;
The Wampanoag Tribe of Gay Head (Aquinnah); and
The Advisory Council on Historic Preservation;
Regarding
the "Smart from the Start" Atlantic Wind Energy Initiative:
Leasing and Site Assessment Activities offshore Massachusetts and Rhode Islands

WHEREAS, the Energy Policy Act of 2005, Pub. L. No. 109-58, added Section 8(p)(1)(C) to the Outer Continental Shelf Lands Act (OCSLA), which grants the Secretary of the Interior the authority to issue leases, easements, or rights-of-way on the Outer Continental Shelf (OCS) for the purpose of renewable energy development, including wind energy development. *See* 43 U.S.C. § 1337(p)(1)(C); and

WHEREAS, the Secretary delegated this authority to the former Minerals Management Service (MMS), now the Bureau of Ocean Energy Management (BOEM), and promulgated final regulations implementing this authority at 30 CFR Part 585; and

WHEREAS, under the renewable energy regulations, the issuance of leases and subsequent approval of wind energy development on the OCS is a staged decision-making process that occurs in distinct phases: lease issuance; approval of a site assessment plan (SAP); and approval of a construction and operation plan (COP); and

WHEREAS, BOEM is currently identifying areas that may be suitable for wind energy leasing through collaborative, consultative, and analytical processes; and

WHEREAS, the issuance of a commercial wind energy lease gives the lessee the exclusive right to subsequently seek BOEM approval of plans (SAPs and COPs) for the development of the leasehold; and

WHEREAS, the lease does not grant the lessee the right to construct any facilities; rather, the lease grants the lessee the right to use the leased area to develop its plans, which must be approved by BOEM before the lessee implements them. *See* 30 CFR 585.600 and 585.601; and

WHEREAS, the SAP contains the lessee's detailed proposal for the construction of a meteorological tower and/or the installation of meteorological buoys ("site assessment activities") on the leasehold. *See* 30 CFR 585.605 - 585.618; and

WHEREAS, the lessee's SAP must be approved by BOEM before it conducts these "site assessment" activities on the leasehold; and

WHEREAS, BOEM may approve, approve with modification, or disapprove a lessee's SAP. *See* 30 CFR 585.613; and

WHEREAS, the COP is a detailed plan for the construction and operation of a wind energy project on the lease. *See* 30 CFR 585.620-585.638; and

WHEREAS, BOEM approval of a COP is a precondition to the construction of any wind energy facility on the OCS. *See* 30 CFR 585.600; and

WHEREAS, the regulations require that a lessee provide the results of surveys with its SAP and COP for the areas affected by the activities proposed in each plan, including an archaeological resource survey. *See* 30 CFR 585.610(b)(3) and 30 CFR 585.626(a)(5). BOEM refers to surveys undertaken to acquire this information as "site characterization" activities. *See Guidelines for Providing Geological and Geophysical, Hazards, and Archaeological Information Pursuant to 30 CFR Part 585* at: http://www.boem.gov/Renewable-Energy-Program/Regulatory-Information/GGARCH4-11-2011-pdf.aspx; and

WHEREAS, BOEM has embarked upon the "Smart from the Start" Atlantic Wind Energy Initiative for the responsible development of wind energy resources on the Atlantic OCS; and

WHEREAS, under the "Smart from the Start" Initiative, BOEM has identified areas on the OCS that appear most suitable for future wind energy activities offshore the Commonwealth of Massachusetts (MA) and the State of Rhode Island (RI); and

WHEREAS these areas are located: (1) within the Rhode Island-Massachusetts Wind Energy Area (WEA); and (2) within the MA Call area east of the Rhode Island-Massachusetts WEA (hereafter known as "Areas"); and

WHEREAS BOEM may issue multiple renewable energy leases and approve multiple SAPs on leases issued within these Areas; and

WHEREAS, BOEM has determined that issuing leases and approving SAPs within these Areas constitute multiple undertakings subject to Section 106 of the National Historic Preservation Act (NHPA; 16 U.S.C. § 470f), and its implementing regulations (36 CFR 800); and

WHEREAS, BOEM has determined that the implementation of the program is complex as the decisions on these multiple undertakings are staged, pursuant to 36 CFR § 800.14(b); and

WHEREAS, the implementing regulations for Section 106 (36 CFR § 800) prescribe a process that seeks to accommodate historic preservation concerns with the needs of Federal undertakings through consultation among parties with an interest in the effects of the undertakings, commencing at the early stages of the process; and

WHEREAS, the Section 106 consultations have been initiated and coordinated with other reviews, including the National Environmental Policy Act (NEPA), in accordance with 36 CFR § 800.3(b); and

WHEREAS, 36 CFR § 800.14(b)(3) provides for developing programmatic agreements (Agreements) for complex or multiple undertakings and § 800.14(b)(1)(ii) and (v) provide for developing Agreements when effects on historic properties cannot be fully determined prior to approval of an undertaking and for other circumstances warranting a departure from the normal section 106 process; and

WHEREAS, 36 CFR § 800.4(b)(2) provides for phased identification and evaluation of historic properties where alternatives consist of large land areas, and for the deferral of final identification and evaluation of historic properties when provided for in a Agreement executed pursuant to 36 CFR §800.14(b); and

WHEREAS, BOEM has determined that the identification and evaluation of historic properties shall be conducted through a phased approach, pursuant to 36 CFR § 800.4(b)(2), where the final identification of historic properties will occur after the issuance of a lease or leases and before the approval of a SAP; and

WHEREAS, the Section 106 consultations described in this Agreement will be used to establish a process for identifying historic properties located within the undertakings' Areas of Potential Effects (APE) that are listed in or eligible for listing in the National Register of Historic Places (National Register), and assess the potential adverse effects and avoid, reduce, or resolve any such effects through the process set forth in this Agreement; and

WHEREAS, according to 36 CFR § 800.16(l)(1) “historic property” means

> *any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria*; and

WHEREAS, the APEs, as defined in 36 CFR § 800.16(d) of the Advisory Council on Historic Preservation's (ACHP's) regulations implementing Section 106 of the NHPA, for the undertakings that are the subject of this Agreement, are: (1) the depth and breadth of the seabed that could potentially be impacted by seafloor/bottom-disturbing activities associated with the undertakings (e.g., core samples, anchorages and installation of meteorological towers and buoys); and (2) the viewshed from which lighted meteorological structures would be visible; and

WHEREAS, BOEM has identified and consulted with the State Historic Preservation Offices (SHPOs) for MA and RI, (collectively, "the SHPOs"); and

WHEREAS, BOEM initiated consultation in 2011 and 2012 through letters of invitation, telephone calls, emails, meetings, webinars, and the circulation and discussion of this Agreement in draft; and this outreach and notification included contacting over 66 individuals and entities, including federally-recognized Indian Tribes (Tribes), local governments, SHPOs, and the public; and

WHEREAS, BOEM has initiated formal government-to-government consultation with the following Tribes: the Mashpee Wampanoag Tribe, the Narragansett Indian Tribe, the Shinnecock Indian Nation, and the Wampanoag Tribe of Gay Head (Aquinnah); and

WHEREAS, these Tribes have chosen to consult with BOEM and participate in development of this Agreement, in which the term Tribe refers to them, within the meaning of 36 CFR § 800.16(m); and

WHEREAS, BOEM shall continue to consult with these Tribes to identify properties of religious and cultural significance that may be eligible for listing in the National Register of Historic Places (Traditional Cultural Properties or TCPs) and that may be affected by these undertakings; and

WHEREAS, BOEM involves the public and identifies other consulting parties through notifications, requests for comments, existing renewable energy task forces, contact with SHPOs, NEPA scoping meetings and communications for these proposed actions; and

WHEREAS, BOEM, the SHPOs, the Mashpee Wampanoag Tribe, the Narragansett Indian Tribe, and the Wampanoag Tribe of Gay Head (Aquinnah) and the ACHP are Signatories to this Agreement, and

WHEREAS, future submission of a COP and commercial-scale development that may or may not occur within the Areas would be separate undertakings and considered under future, separate Section 106 consultation(s) not under this Agreement; and

WHEREAS, BOEM requires a SAP to include the results of site characterization surveys that will identify potential archaeological resources that could be affected by the installation and operation of meteorological facilities. *See* (30 CFR § 585.611 (b)(6); and

WHEREAS, consultations conducted prior to the execution of this Agreement included all steps in the Section 106 process up to and including consulting on the scope of identification efforts that would be used to conduct site characterization surveys that would identify historic properties that may be impacted by activities described in the SAP pursuant to 36 CFR § 800.4(a); and

WHEREAS, these consultations resulted in recommendations to BOEM that the following items should be added to leases issued within the Areas, both to ensure that historic properties that may be impacted by activities described in the SAP are identified through a reasonable and good faith effort (§ 800.4(b)(1)), and also to ensure that properties identified through the geophysical surveys are not impacted by geotechnical sampling:

> *The lessee may only conduct geotechnical (sub-bottom) sampling activities in areas of the leasehold in which an analysis of the results of geophysical surveys has been completed for that area. The geophysical surveys must meet BOEM's minimum standards (see Guidelines for Providing Geological and Geophysical, Hazards, and Archaeological Information Pursuant to 30 CFR Part 285 at* http://www.boem.gov/Renewable-Energy-Program/Regulatory-Information/GGARCH4-11-2011-pdf.aspx*), and the analysis must be completed by a qualified marine archaeologist who both meets the Secretary of the Interior's Professional Qualifications Standards (48 FR 44738- 44739) and has experience analyzing marine geophysical data. This analysis must include a determination whether any potential archaeological resources are present in the area and the geotechnical (sub-bottom) sampling activities must avoid potential archaeological resources by a minimum of 50.0 meters (m; 164.0 feet). The avoidance distance must be calculated from the maximum discernible extent of the archaeological resource. In no case may the lessee's actions impact a potential archaeological resource without BOEM's prior approval*;

NOW, THEREFORE, BOEM, the ACHP, the SHPOs, Tribes, and the other concurring parties (the Parties), agree that Section 106 consultation shall be conducted in accordance with the following stipulations in order to defer final identification and evaluation of historic properties.

STIPULATIONS

I. SAP Decisions. Before making a decision on a SAP from a lessee, BOEM will treat all potential historic properties identified as a result of site characterization studies and consultations as historic properties potentially eligible for inclusion on the National Register and avoid them by requiring the lessee to relocate the proposed project, resulting in a finding of *No historic properties affected* (36 CFR § 800.4(d)(1)). If a potential historic property is identified, and the lessee chooses to conduct additional investigations, and:

   A. If additional investigations demonstrate that a historic property does not exist, then BOEM will make a determination of *No historic properties affected* and follow 36 CFR § 800.4(d)(1).

B. If additional investigations demonstrate that a historic property does exist and may be affected, BOEM will evaluate the historic significance of the property, in accordance with 800.4(c); make a determination of *Historic properties affected* and follow 36 CFR § 800.4(d)(2); and resolve any adverse effects by following 800.5.

II. Tribal Consultation. BOEM shall continue to consult with the Tribes throughout the implementation of this Agreement in a government-to-government manner consistent with Executive Order 13175, Presidential memoranda, and any Department of the Interior policies, on subjects related to the undertakings.

III. Public Participation

A. Because BOEM and the Parties recognize the importance of public participation in the Section 106 process, BOEM shall continue to provide opportunities for public participation in Section 106-related activities, and shall consult with the Parties on possible approaches for keeping the public involved and informed throughout the term of the Agreement.

B. BOEM shall keep the public informed and may produce reports on historic properties and on the Section 106 process that may be made available to the public at BOEM's headquarters, on the BOEM website, and through other reasonable means insofar as the information shared conforms to the confidentiality clause of this Agreement (Stipulation IV).

IV. Confidentiality. Because BOEM and the Parties agree that it is important to withhold from disclosure sensitive information such as that which is protected by NHPA Section 304 (16 U.S.C. § 470w-3) (*e.g.*, the location, character and ownership of an historic resource, if disclosure would cause a significant invasion of privacy, risk harm to the historic resources, or impede the use of a traditional religious site by practitioners), BOEM shall:

A. Request that each Party inform the other Parties if, by law or policy, it is unable to withhold sensitive data from public release.

B. Arrange for the Parties to consult as needed on how to protect such information collected or generated under this Agreement.

C. Follow, as appropriate, 36 CFR 800.11(c) for authorization to withhold information pursuant to NHPA Section 304, and otherwise withhold sensitive information to the extent allowable by laws including the Freedom of Information Act, 5 U.S.C. § 552, through the Department of the Interior regulations at 43 CFR Part 2.

D. Request that the Parties agree that materials generated during consultation be treated by the Parties as internal and pre-decisional until they are formally released, although the Parties understand that they may need to be released by one of the Parties if required by law.

V. Administrative Stipulations

A. In coordinating reviews, BOEM shall follow this process:

1. Standard Review: The Parties shall have a standard review period of thirty (30) calendar days for commenting on all documents which are developed under the terms of this Agreement, from the date they are sent by BOEM.

2. Expedited Request for Review: The Parties recognize the time-sensitive nature of this work and shall attempt to expedite comments or concurrence when BOEM so requests. The expedited comment period shall not be less than fifteen (15) calendar days from the date BOEM sends such a request.

3. If a Party cannot meet BOEM's expedited review period request, it shall notify BOEM in writing within the fifteen (15) calendar day period. If a Party fails to provide comments or respond within the time frame requested by BOEM (either standard or expedited), then BOEM may proceed as though it has received concurrence from that Party. BOEM shall consider all comments received within the review period.

4. All Parties will send correspondence and materials for review via electronic media unless a Party requests, in writing, that BOEM transmit the materials by an alternate method specified by that Party. Should BOEM transmit the review materials by the alternate method, the review period will begin on the date the materials were received by the Party, as confirmed by delivery receipt.

5. MA and RI SHPO Review Specifications: All submittals to the MA and RI SHPOs shall be in paper format and shall be delivered to the MA and RI SHPOs' offices by US Mail, by a delivery service, or by hand. Plans and specifications submitted to the MA and RI SHPOs shall measure no larger than 11" x 17" paper format (unless another format is specified in consultation). The MA and RI SHPOs shall review and comment on all adequately documented project submittals within 30 calendar days of receipt unless a response has been requested within the expedited review period specified in Stipulation V.A.2.

6. Each Signatory shall designate a point of contact for carrying out this Agreement and provide this contact's information to the other Parties, updating it as necessary while this Agreement is in force. Updating a point of contact alone shall not necessitate an amendment to this Agreement.

B. Dispute Resolution. Should any Signatory object in writing to BOEM regarding an action carried out in accordance with this Agreement, or lack of compliance with the terms of this Agreement, the Signatories shall consult to resolve the objection. Should the Signatories be unable to resolve the disagreement, BOEM shall forward its background information on the dispute as well as its proposed resolution of the dispute to the ACHP. Within 45 calendar days after receipt of all pertinent documentation, the ACHP shall either: (1) provide BOEM with written recommendations, which BOEM shall take into account in reaching a final decision regarding the dispute; or (2) notify BOEM that it shall comment pursuant to 36 CFR 800.7(c), and proceed to comment. BOEM shall take this ACHP comment into account, in accordance with 36 CFR 800.7(c)(4). Any ACHP recommendation or comment shall be understood to pertain only to the subject matter of the dispute; BOEM's responsibility to carry out all actions under this Agreement that are not subjects of dispute shall remain unchanged.

C. Amendments. Any Signatory may propose to BOEM in writing that the Agreement be amended, whereupon BOEM shall consult with the Parties to consider such amendment. This Agreement may then be amended when agreed to in writing by all Signatories, becoming effective on the date that the amendment is executed by the ACHP as the last Signatory.

D. Adding Federal Agencies. In the event that another Federal agency believes it has Section 106 responsibilities related to the undertakings which are the subject of this Agreement, that agency may attempt to satisfy its Section 106 responsibilities by agreeing in writing to the terms of this Agreement and notifying and consulting with the SHPOs and the ACHP. Any modifications to this agreement that may be necessary for meeting that agency's Section 106 obligations shall be considered in accordance with this Agreement.

E. Adding Concurring Parties. In the event that another party wishes to assert its support of this Agreement, that party may prepare a letter indicating its concurrence, which BOEM will attach to the Agreement and circulate among the Signatories.

F. Term of Agreement. The Agreement shall remain in full force until BOEM makes a final decision on the last SAP submitted under a lease issued under this portion of the "Smart from the Start" initiative, or for ten (10) years from the date the Agreement is executed, defined as the date the last signatory signs, whichever is earlier, unless otherwise extended by amendment in accordance with this Agreement.

G. Termination.

1. If any Signatory determines that the terms of the Agreement cannot or are not being carried out, that Party shall notify the other Signatories in writing and consult with them to seek amendment of the Agreement. If within sixty (60) calendar days, an amendment cannot be made, any Signatory may terminate the Agreement upon written notice to the other Signatories.

2. If termination is occasioned by BOEM's final decision on the last SAP contemplated under this portion of the "Smart from the Start" Initiative, BOEM shall notify the Parties and the public, in writing.

H. Anti-Deficiency Act. Pursuant to 31 U.S.C. § 1341(a)(1), nothing in this Agreement shall be construed as binding the United States to expend in any one fiscal year any sum in excess of appropriations made by Congress for this purpose, or to involve the United States in any contract or obligation for the further expenditure of money in excess of such appropriations.

I. Existing Law and Rights. Nothing in this Agreement shall abrogate existing laws or the rights of any consulting party or agency party to this Agreement.

J. Compliance with Section 106. Execution and implementation of this Agreement evidences that BOEM has satisfied its Section 106 responsibilities for all aspects of these proposed undertakings by taking into account the effects of these undertakings on historic properties and affording the ACHP a reasonable opportunity to comment with regard to the undertakings.

Programmatic Agreement concerning the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island

By:

Maureen A. Bornholdt ____________________ Date: 5-23-12

Maureen A. Bornholdt
Program Manager, Office of Renewable Energy Programs
Bureau of Ocean Energy Management

Programmatic Agreement concerning the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island

Brona Simon _________________________ Date: 5/31/12

Brona Simon
Massachusetts Historical Commission
Massachusetts State Historic Preservation Officer

Programmatic Agreement concerning the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island

Edward F. Sanderson ______________________ Date: 6/4/2012

[NAME] Edward F. Sanderson
[TITLE] Executive Director, Rhode Island Historical Preservation & Heritage Commission
Rhode Island State Historic Preservation Officer

Programmatic Agreement concerning the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island

________________________________ Date: 05 June 2012

John Brown
Tribal Historic Preservation Officer
Narragansett Indian Tribe

Programmatic Agreement concerning the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island

Cedric Cromwell  Date: 5/29/12

Cedric Cromwell
Tribal Chairman
Mashpee Wampanoag Tribe

Programmatic Agreement concerning the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island

John M. Fowler ______________________________ Date: 6/8/12 ______________

John M. Fowler
Executive Director
Advisory Council on Historic Preservation

**ATTACHMENT 2 – AREA OF POTENTIAL EFFECTS MAPS**

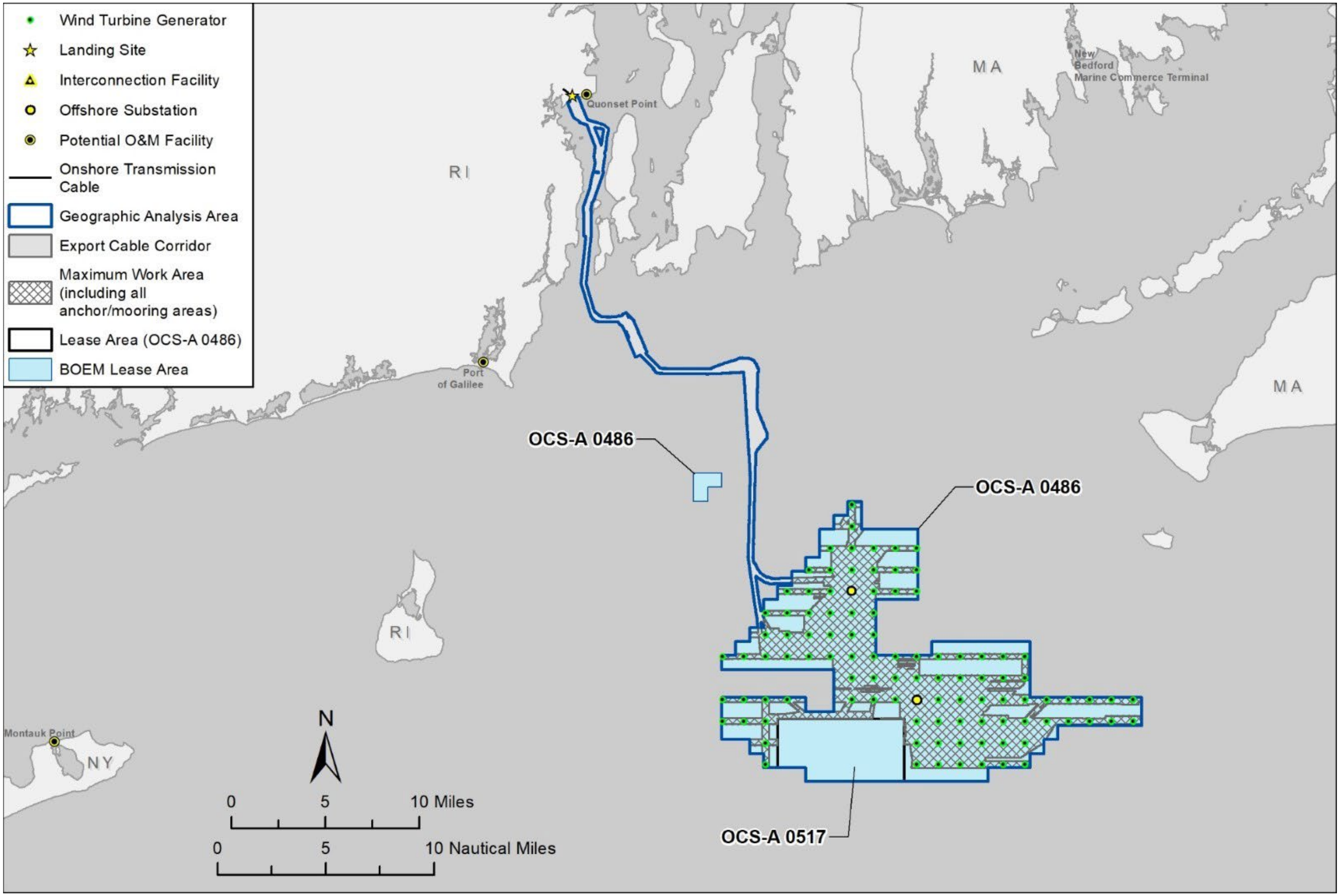


**Figure 1. Revolution Wind construction and operations plan proposed offshore Project elements.**

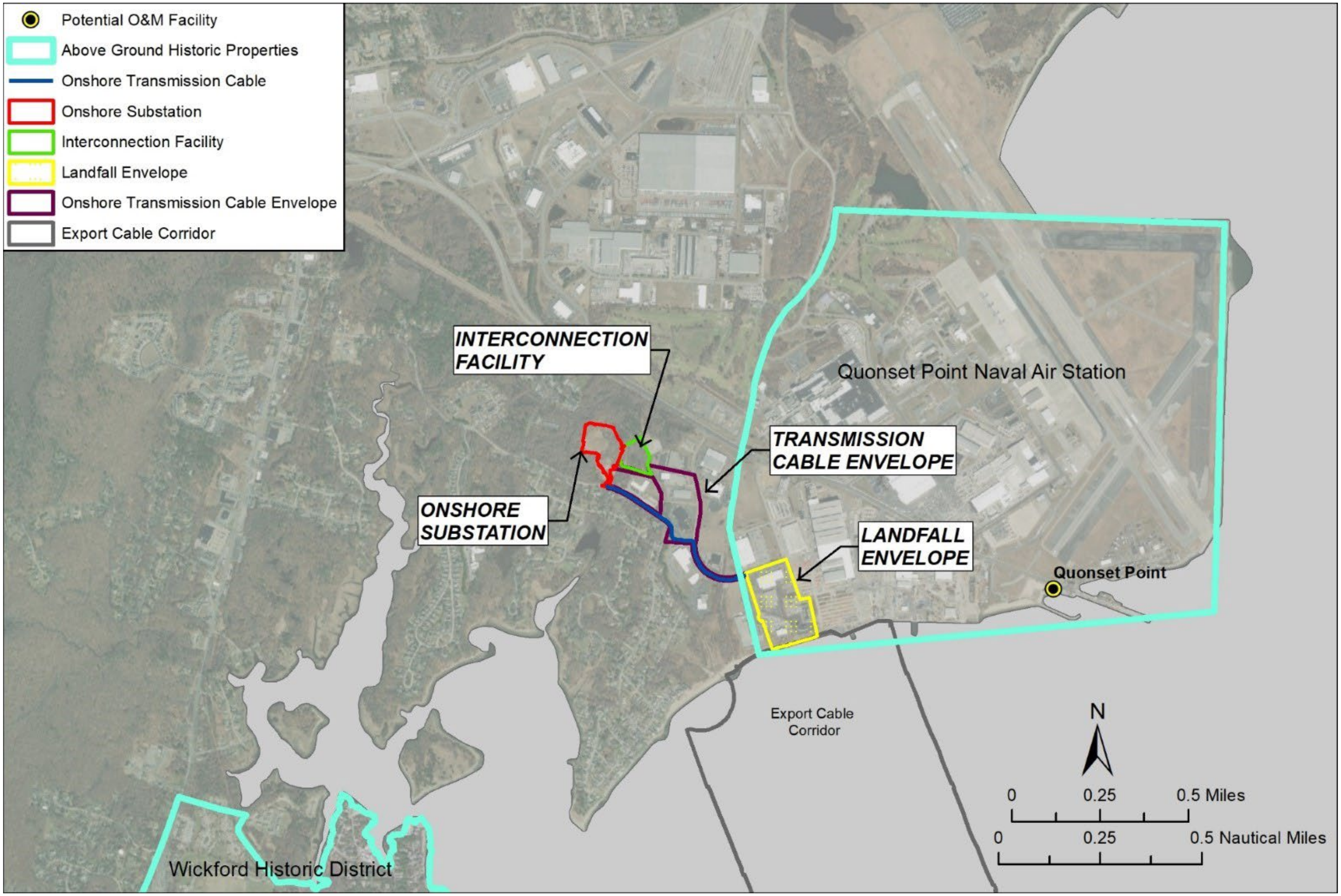


**Figure 2. Revolution Wind construction and operations plan proposed onshore Project elements.**

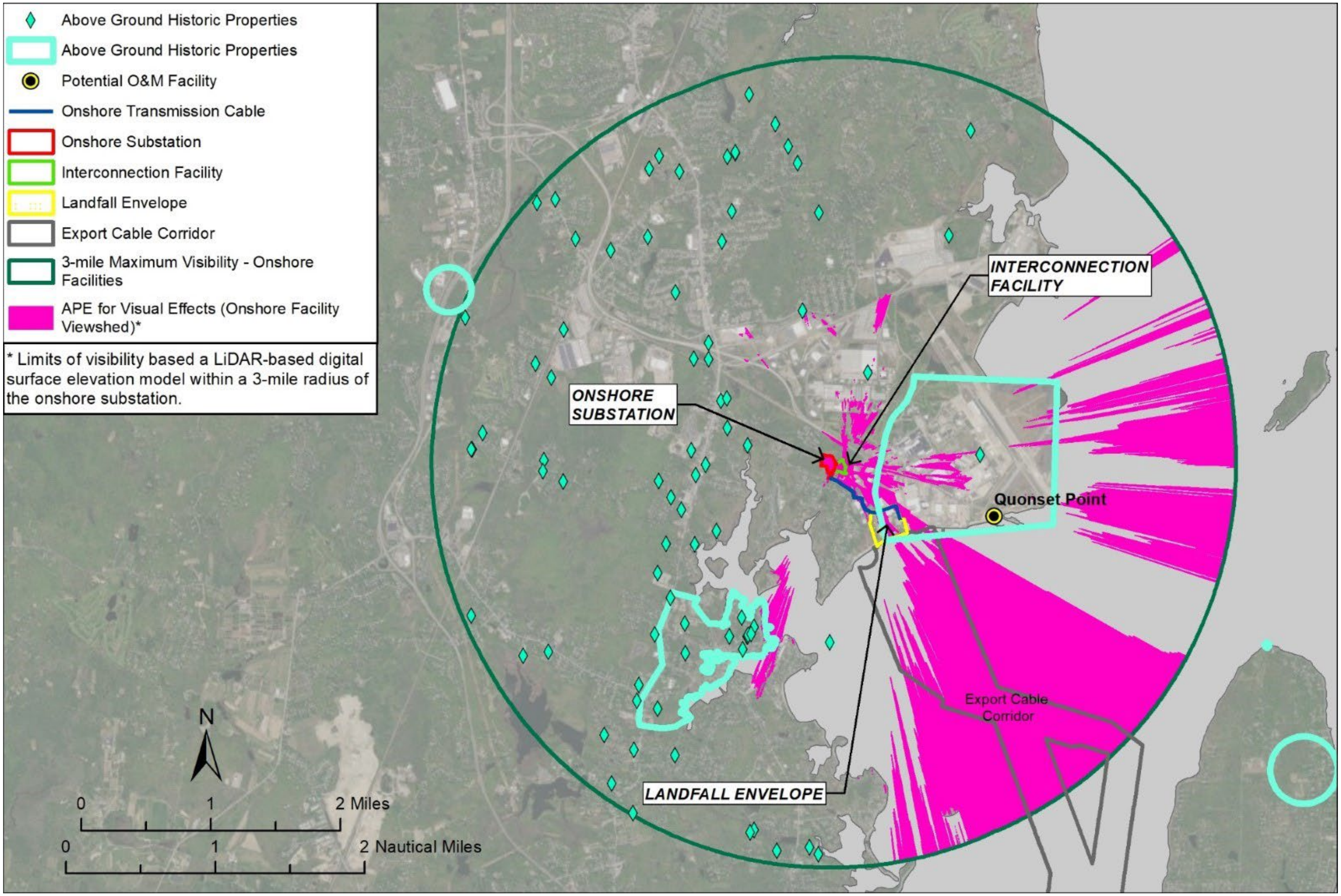


**Figure 3. Visual area of potential effects and visual effects assessment geographic analysis area – onshore.**

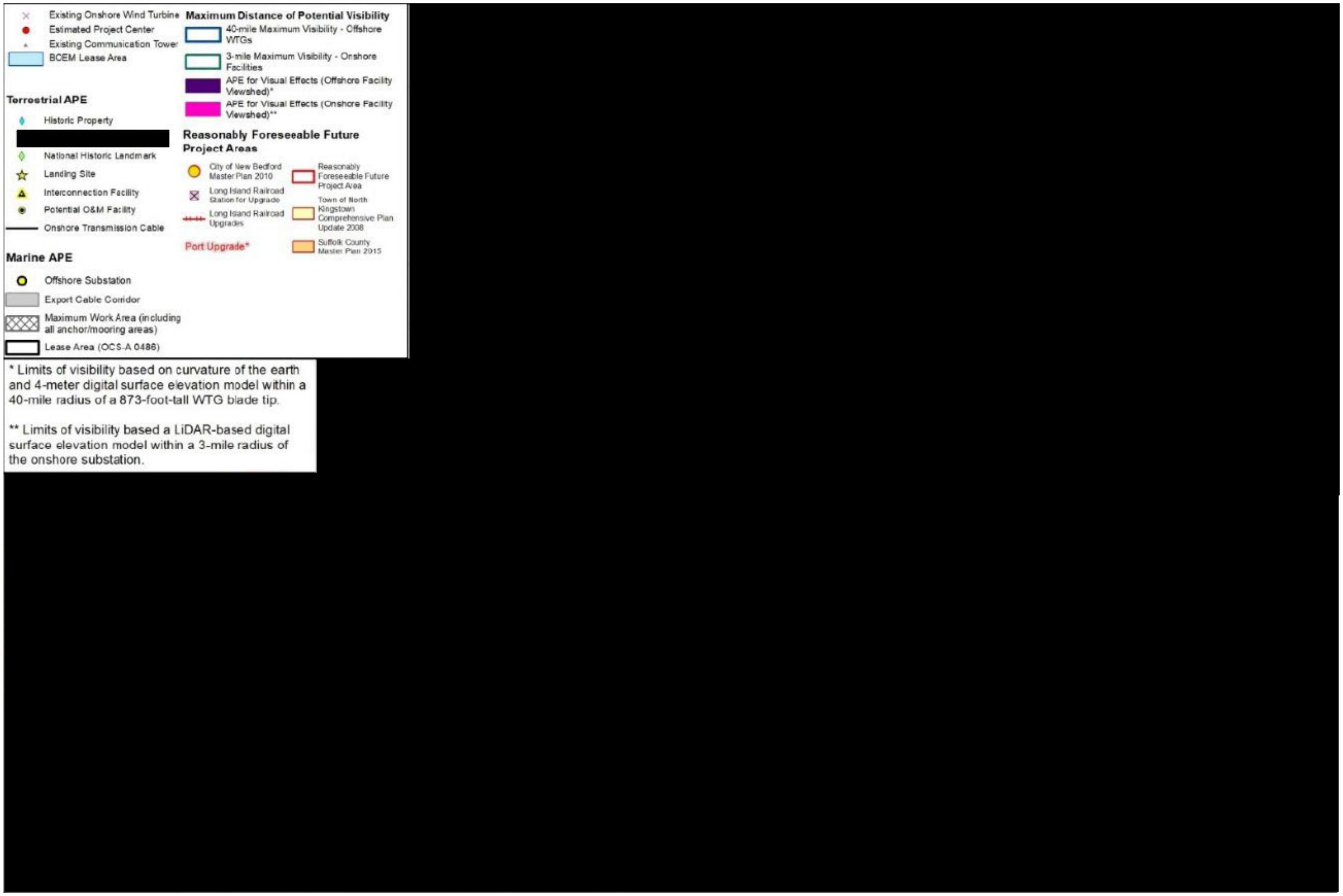


**Figure 4. Visual area of potential effects and visual effects assessment geographic analysis area – offshore.**

## ATTACHMENT 3 – ABOVE GROUND HISTORIC PROPERTIES ADVERSELY AFFECTED BY THE PROJECT

### Table 1. Above Ground Historic Properties Adversely Affected by the Project, in Order of Nearest Distance to Project WTGs

| Survey ID | Visually Sensitive Resource | Municipality | County | State | Property Designation | Distance to nearest RWF WTG (miles) |
|---|---|---|---|---|---|---|
| TCP-3 | [redacted] TCP | [redacted] | [redacted] | MA | NRHP-eligible (BOEM determined) | 6* |
| 300 | Sakonnet Light Station | Little Compton | Newport | RI | NRHP-listed resource | 12.7 |
| 297 | Warren Point Historic District | Little Compton | Newport | RI | NRHP-eligible resource (RIHPHC determined) | 12.9 |
| 299 | Abbott Phillips House | Little Compton | Newport | RI | RIHPHC historic resource | 13 |
| 504 | Flaghole | Chilmark | Dukes | MA | MHC historic inventory site | 13.3 |
| 296 | Stone House Inn | Little Compton | Newport | RI | NRHP-listed resource | 13.4 |
| 503 | Simon Mayhew House | Chilmark | Dukes | MA | MHC historic inventory site | 13.5 |
| 496 | 71 Moshup Trail | Aquinnah | Dukes | MA | MHC historic inventory site | 13.7 |
| 484 | Vanderhoop, Edwin DeVries Homestead | Aquinnah | Dukes | MA | NRHP-listed resource | 13.7 |
| 480 | Gay Head - Aquinnah Shops Area | Aquinnah | Dukes | MA | MHC historic inventory site | 13.7 |
| 474 | Flanders, Ernest House, Shop, Barn | Aquinnah | Dukes | MA | MHC historic inventory site | 13.8 |
| 495 | 3 Windy Hill Drive | Aquinnah | Dukes | MA | MHC historic inventory site | 13.9 |
| 479 | Gay Head Light | Aquinnah | Dukes | MA | NRHP-listed resource | 13.9 |
| 485 | Tom Cooper House | Aquinnah | Dukes | MA | MHC historic inventory site | 14 |
| 497 | Leonard Vanderhoop House | Aquinnah | Dukes | MA | MHC historic inventory site | 14 |
| 490 | Theodore Haskins House | Aquinnah | Dukes | MA | MHC historic inventory site | 14.1 |
| 486 | Gay Head - Aquinnah Coast Guard Station Barracks | Aquinnah | Dukes | MA | MHC historic inventory site | 14.1 |
| 491 | Gay Head - Aquinnah Town Center Historic District | Aquinnah | Dukes | MA | NRHP-listed resource | 14.2 |
| 303 | Gooseneck Causeway | Westport | Bristol | MA | MHC historic inventory site | 14.8 |
| 304 | Gooseberry Neck Observation Towers | Westport | Bristol | MA | MHC historic inventory site | 14.8 |
| 540 | Spring Street | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 14.9 |
| 590 | Capt. Mark L. Potter House | New Shoreham | Washington | RI | RIHPHC historic resource | 14.9 |
| 276 | Tunipus Goosewing Farm | Little Compton | Newport | RI | NRHP-Eligible Resource (RIHPHC Determined) | 15 |
| 543 | WWII Lookout Tower – Spring Street | New Shoreham | Washington | RI | NRHP-Eligible Resource (RIHPHC Determined) | 15.1 |
| 251 | Westport Harbor | Westport | Bristol | MA | MHC historic inventory site | 15.2 |
| 290 | Bellevue Avenue Historic District NHL | Newport | Newport | RI | NHL | 15.2 |
| 548 | Block Island Southeast Lighthouse NHL | New Shoreham | Washington | RI | NHL | 15.2 |
| 595 | New Shoreham Historic District | New Shoreham | Washington | RI | Local Historic | 15.3 |
| 536 | Spring Cottage | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.3 |
| 531 | Old Harbor Historic District | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC-determined) | 15.3 |
| 538 | Captain Welcome Dodge Sr. | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.3 |
| 541 | Caleb W. Dodge Jr. House | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.3 |
| 535 | Spring House Hotel | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.4 |
| 545 | Pilot Hill Road and Seaweed Lane | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.4 |
| 222 | Ocean Drive Historic District NHL | Newport | Newport | RI | NHL | 15.7 |
| 298 | Marble House NHL | Newport | Newport | RI | NHL | 15.7 |
| 597 | Ochre Point – Cliffs Historic District | Newport | Newport | RI | NRHP-listed resource | 15.8 |

| Survey ID | Visually Sensitive Resource | Municipality | County | State | Property Designation | Distance to nearest RWF WTG (miles) |
|---|---|---|---|---|---|---|
| 546 | WWII Lookout Tower at Sands Pond | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.8 |
| 552 | Sea View Villa | Middletown | Newport | RI | RIHPHC historic resource | 15.9 |
| 295 | Rosecliff/Oelrichs (Hermann) House/ Mondroe (J. Edgar) House | Newport | Newport | RI | NRHP-listed resource | 15.9 |
| 293 | The Breakers NHL | Newport | Newport | RI | NHL | 15.9 |
| 516 | Corn Neck Road | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 15.9 |
| 302 | Clam Shack Restaurant | Westport | Bristol | MA | MHC historic inventory site | 15.9 |
| 301 | Horseneck Point Lifesaving Station | Westport | Bristol | MA | MHC historic inventory site | 15.9 |
| 553 | Whetstone | Middletown | Newport | RI | RIHPHC historic resource | 16 |
| 284 | The Bluff/John Bancroft Estate | Middletown | Newport | RI | RIHPHC historic resource | 16 |
| 288 | Clambake Club of Newport | Middletown | Newport | RI | NRHP-listed resource | 16 |
| 530 | Old Town and Center Roads | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16 |
| 526 | Beach Avenue | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.1 |
| 519 | Mitchell Farm | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.1 |
| 523 | Indian Head Neck Road | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.2 |
| 168 | Westport Pt. Revolutionary War Properties | Westport | Bristol | MA | MHC historic inventory site | 16.2 |
| 261 | Indian Avenue Historic District | Middletown | Newport | RI | NRHP-listed resource | 16.2 |
| 278 | St. Georges School | Middletown | Newport | RI | NRHP-listed resource | 16.3 |
| 528 | Hygeia House | New Shoreham | Washington | RI | NRHP-listed resource | 16.3 |
| 527 | U.S. Weather Bureau Station | New Shoreham | Washington | RI | NRHP-listed resource | 16.3 |
| 549 | Miss Abby E. Vaill/1 of 2 Vaill cottages | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.4 |
| 550 | Hon. Julius Deming Perkins / "Bayberry Lodge" | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.4 |
| 542 | Lakeside Drive and Mitchell Lane | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.5 |
| 280 | Land Trust Cottages | Middletown | Newport | RI | NRHP-eligible resource (RIHPHC determined) | 16.6 |
| 482 | Russell Hancock House | Chilmark | Dukes | MA | MHC historic inventory site | 16.6 |
| 163 | Westport Point Historic District (1 of 2) | Westport | Bristol | MA | NRHP-eligible resource (MHC determined) | 16.7 |
| 164 | Westport Point Historic District (2 of 2) | Westport | Bristol | MA | NRHP-listed resource | 16.7 |
| 551 | Mohegan Cottage/Everett D. Barlow House | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.7 |
| 266 | Paradise Rocks Historic District | Middletown | Newport | RI | RIHPHC historic resource | 16.8 |
| 547 | Lewis- Dickens Farm | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.8 |
| 525 | Island Cemetery/Old Burial Ground | New Shoreham | Washington | RI | RI Historical Cemetery | 16.8 |
| 279 | Kay St.-Catherine St.-Old Beach Rd. Historic District/The Hill | Newport | Newport | RI | NRHP-listed resource | 16.9 |
| 532 | Beacon Hill Road | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.9 |
| 533 | Nathan Mott Park | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 16.9 |
| 515 | Block Island North Lighthouse | New Shoreham | Washington | RI | NRHP-listed resource | 17.1 |
| 522 | Champlin Farm | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.1 |
| 517 | Hippocampus/Boy's Camp/ Beane Family | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.2 |
| 520 | U.S. Lifesaving Station | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.4 |

| Survey ID | Visually Sensitive Resource | Municipality | County | State | Property Designation | Distance to nearest RWF WTG (miles) |
|---|---|---|---|---|---|---|
| 518 | U.S. Coast Guard Brick House | New Shoreham | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 17.4 |
| 521 | Peleg Champlin House | New Shoreham | Washington | RI | NRHP-listed resource | 17.5 |
| 469 | Hancock, Captain Samuel - Mitchell, Captain West House | Chilmark | Dukes | MA | NRHP-eligible resource (MHC determined) | 17.6 |
| 508 | Scrubby Neck Schoolhouse | West Tisbury | Dukes | MA | MHC historic inventory site | 18 |
| 345 | Point Judith Lighthouse | Narragansett | Washington | RI | NRHP-listed resource | 18.2 |
| 245 | Bailey Farm | Middletown | Newport | RI | NRHP-listed resource | 18.3 |
| 226 | Beavertail Light | Jamestown | Newport | RI | NRHP-listed resource | 18.4 |
| 582 | Horsehead/Marbella | Jamestown | Newport | RI | NRHP-listed resource | 18.6 |
| 333 | Ocean Road Historic District | Narragansett | Washington | RI | NRHP-listed resource | 18.9 |
| 335 | Dunmere | Narragansett | Washington | RI | NRHP-listed resource | 19.1 |
| 86 | Puncatest Neck Historic District | Tiverton | Newport | RI | RIHPHC historic resource | 19.4 |
| 576 | Fort Varnum/Camp Varnum | Narragansett | Washington | RI | NRHP-eligible resource (RIHPHC determined) | 19.6 |
| 156 | Salters Point | Dartmouth | Bristol | MA | MHC historic inventory site | 19.7 |
| 578 | Dunes Club | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| 329 | Life Saving Station at Narragansett Pier | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| 330 | The Towers Historic District | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| 591 | Narragansett Pier MRA | Narragansett | Washington | RI | NRHP-listed resource | 19.8 |
| 328 | The Towers/Tower Entrance of Narragansett Casino | Narragansett | Washington | RI | NRHP-listed resource | 19.9 |
| TCP-1 | [redacted] TCP | [redacted] | [redacted] | MA | NRHP-eligible resource (BOEM determined) | 20 |
| 343 | Brownings Beach Historic District | South Kingstown | Washington | RI | NRHP-listed resource | 21.8 |
| 444 | Tarpaulin Cove Light | Gosnold | Dukes | MA | NRHP-listed resource | 22.2 |
| 391 | Clark's Point Light | New Bedford | Bristol | MA | NRHP-listed resource | 24.6 |
| 390 | Fort Rodman Historic District | New Bedford | Bristol | MA | NRHP-eligible resource (MHC determined) | 24.6 |
| 392 | Fort Taber Historic District | New Bedford | Bristol | MA | NRHP-listed resource | 24.6 |
| 386 | Butler Flats Light Station | New Bedford | Bristol | MA | NRHP-listed resource | 25.6 |
| 389 | 744 Sconticut Neck Road | Fairhaven | Bristol | MA | MHC historic inventory site | 25.9 |
| 449 | Nobska Point Lighthouse | Falmouth | Barnstable | MA | NRHP-listed resource | 28 |

Notes: MHC = Massachusetts Historical Commission, RIHPC = Rhode Island Historical Preservation & Heritage Commission.

## ATTACHMENT 4 – LIST OF CONSULTING PARTIES

### Table 1. Parties Invited to Participate in Section 106 Consultation

| Participants in the Section 106 Process | Invited Consulting Parties |
|---|---|
| **SHPOs and state agencies** | Connecticut State Historic Preservation Office |
| | Connecticut Department of Economic and Community Development |
| | Rhode Island Historical Preservation & Heritage Commission |
| | New York State Division for Historic Preservation |
| | Massachusetts Historical Commission |
| | Massachusetts Board of Underwater Archaeological Resources |
| | Massachusetts Commissioner on Indian Affairs |
| | Rhode Island Department of Environmental Management |
| **Federal agencies** | National Park Service (NPS) |
| | National Oceanic and Atmospheric Administration – Habitat and Ecosystem Services Division |
| | U.S. Army Corps of Engineers, New England District |
| | U.S. Army Corps of Engineers, New York District |
| | Office of the Deputy Assistant Secretary of the Navy for Environment (DASN(E)) |
| | Chief of Naval Operations, Installations Division |
| | Naval Facilities Engineering Systems Command Headquarters– Cultural Resources |
| | Naval History and Heritage Command – Underwater Archaeology Branch |
| | Bureau of Safety and Environmental Enforcement |
| | U.S. Department of Defense - Office of the Deputy Assistant Secretary of Defense (Environment), Environmental Compliance and Planning |
| | U.S. Department of Defense - Office of the Assistant Secretary of Defense for Sustainment |
| | Advisory Council on Historic Preservation |
| | U.S. Coast Guard -Sector SE New England |
| | U.S. Coast Guard - Marine Transportation Systems (CG-5PW) |
| | U.S. Coast Guard – First Coast Guard District |
| | U.S. Fish and Wildlife Service |
| | Environmental Protection Agency |
| | Federal Aviation Administration |
| **Federally recognized Tribal Nations** | Mashpee Wampanoag Tribe |

| Participants in the Section 106 Process | Invited Consulting Parties |
|---|---|
| | Shinnecock Indian Nation |
| | Mashantucket (Western) Pequot Tribal Nation |
| | Wampanoag Tribe of Gay Head (Aquinnah) |
| | Mohegan Tribe of Indians of Connecticut |
| | Narragansett Indian Tribe |
| | Delaware Tribe of Indians |
| | The Delaware Nation |
| **Non-federally recognized Tribal Nations** | Chappaquiddick Tribe of Wampanoag Nation |
| | The Golden Hill Paugussett |
| | Eastern Pequot Tribal Nation |
| | Schaghticoke Tribal Nation |
| | Unkechaug Nation |
| **Local governments** | Cape Cod Commission |
| | City of Newport |
| | County of Dukes (MA) |
| | Town of Charlestown |
| | Town of East Hampton |
| | Town of Middletown |
| | Town of Nantucket |
| | Nantucket Planning & Economic Development Commission |
| | Town of Narragansett |
| | Town of North Kingstown |
| | City of Cranston |
| | City of East Providence |
| | City of Fall River |
| | City of New Bedford |
| | City New Bedford Historical Commission |
| | City of Providence |
| | City of Rehoboth |
| | City of Taunton |
| | County of Barnstable (MA) |
| | County of Bristol (MA) |
| | County of Plymouth (MA) |
| | County of Suffolk (NY) |
| | Town of Acushnet |
| | Town of Aquinnah |
| | Town of Barnstable |
| | Town of Barrington |
| | Town of Berkley |

| Participants in the Section 106 Process | Invited Consulting Parties |
|---|---|
| | Town of Bourne |
| | Town of Bristol |
| | Town of Chilmark |
| | Town of Coventry |
| | Town of Dartmouth |
| | Town of Dighton |
| | Town of East Greenwich |
| | Town of Edgartown |
| | Town of Exeter |
| | Town of Fairhaven |
| | Town of Falmouth |
| | Town of Freetown |
| | Town of Gosnold |
| | Town of Griswold |
| | Town of Groton |
| | Town of Hopkinton |
| | Town of Jamestown |
| | Town of Johnston |
| | Town of Lakeville |
| | Town of Ledyard |
| | Town of Little Compton |
| | Town of Marion |
| | Town of Mashpee |
| | Town of Mattapoisett |
| | Town of Middleborough |
| | Town of Nantucket |
| | Town of New Shoreham |
| | Town of North Stonington |
| | Town of Oak Bluffs |
| | Town of Portsmouth |
| | Town of Richmond |
| | Town of Rochester |
| | Town of Sandwich |
| | Town of Scituate |
| | Town of Seekonk |
| | Town of Somerset |
| | Town of South Kingstown |
| | Town of South Kingstown Historic District Commission |

| Participants in the Section 106 Process | Invited Consulting Parties |
|---|---|
| | Town of Southold |
| | Town of Stonington |
| | Town of Swansea |
| | Town of Tisbury |
| | Town of Tiverton |
| | Town of Tiverton Historic Preservation Advisory Board |
| | Town of Voluntown |
| | Town of Wareham |
| | Town of Warren |
| | Town of Warwick |
| | Town of West Greenwich |
| | Town of West Tisbury |
| | Town of West Tisbury Historic District Commission |
| | Town of West Warwick |
| | Town of Westerly |
| | Town of Westport |
| | Town of Westport Historical Commission |
| **Non-governmental organizations or groups** | Alliance to Protect Nantucket Sound |
| | Balfour Beatty Communities |
| | Beavertail Lighthouse Museum Association |
| | Block Island Historical Society |
| | Bristol Historical and Preservation Society |
| | Butler Flats Lighthouse (Mass Light Ltd) |
| | Clambake Club of Newport |
| | Cuttyhunk Historical Society |
| | East Greenwich Historic Preservation Society |
| | Friends of Sakonnet Light |
| | Gay Head Lighthouse Advisory Committee |
| | Martha's Vineyard Commission |
| | Montauk Historical Society |
| | Newport Historical Society |
| | Newport Restoration Foundation |
| | Norman Bird Sanctuary |
| | Preservation Massachusetts |
| | Rhode Island Historical Society |
| | Salve Regina University |
| | Southeast Lighthouse Foundation |
| | The Preservation Society of Newport County |
| | Revolution Wind, LLC (lessee) |

### Table 2. Consulting Parties Participating in Section 106 Consultation

| Participants in the Section 106 Process | Participating Consulting Parties |
|---|---|
| **SHPOs and state agencies** | Connecticut State Historic Preservation Office |
| | Connecticut Department of Economic and Community Development |
| | Rhode Island Historical Preservation & Heritage Commission |
| | New York State Division for Historic Preservation |
| | Massachusetts Historical Commission |
| | Rhode Island Department of Environmental Management |
| **Federal agencies** | NPS |
| | U.S. Army Corps of Engineers, New England District |
| | U.S. Army Corps of Engineers, New York District |
| | Office of the Deputy Assistant Secretary of the Navy for Environment (DASN(E)) |
| | Chief of Naval Operations, Installations Division |
| | Naval Facilities Engineering Systems Command Headquarters–Cultural Resources |
| | Naval History and Heritage Command – Underwater Archaeology Branch |
| | U.S. Department of Defense - Office of the Deputy Assistant Secretary of Defense (Environment), Environmental Compliance and Planning |
| | U.S. Department of Defense - Office of the Assistant Secretary of Defense for Sustainment |
| | Advisory Council on Historic Preservation |
| | U.S. Coast Guard -Sector SE New England |
| | U.S. Coast Guard - Marine Transportation Systems (CG-5PW) |
| | Bureau of Safety and Environmental Enforcement |
| | Environmental Protection Agency |
| | Federal Aviation Administration |
| **Federally recognized Tribal Nations** | Mashpee Wampanoag Tribe |
| | Shinnecock Indian Nation |
| | Mashantucket (Western) Pequot Tribal Nation |
| | Wampanoag Tribe of Gay Head (Aquinnah) |
| | Mohegan Tribe of Indians of Connecticut |
| | Narragansett Indian Tribe |
| | Delaware Tribe of Indians |
| | The Delaware Nation |
| **Non-federally recognized Tribal Nations** | Chappaquiddick Tribe of Wampanoag Nation |
| | Unkechaug Nation |
| **Local governments** | City of Newport |
| | County of Dukes (MA) |
| | Town of Charlestown |
| | Town of East Hampton |
| | Town of Little Compton |

| Participants in the Section 106 Process | Participating Consulting Parties |
|---|---|
| | Town of Middletown |
| | Town of Nantucket |
| | Nantucket Planning & Economic Development Commission |
| | Town of Narragansett |
| | Town of North Kingstown |
| | Town of New Shoreham |
| **Nongovernmental organizations or groups** | Block Island Historical Society |
| | Clambake Club of Newport |
| | Friends of Sakonnet Light |
| | Gay Head Lighthouse Advisory Committee |
| | Newport Restoration Foundation |
| | Norman Bird Sanctuary |
| | The Preservation Society of Newport County |
| | Rhode Island Historical Society |
| | Salve Regina University |
| | Southeast Lighthouse Foundation |
| | Revolution Wind, LLC (lessee) |

### Table 3. Parties Invited to Consult under Section 106 and that Did Not Participate Consultation

| Invited Parties to the Section 106 Process | Non-Participating, Invited Parties |
|---|---|
| **SHPOs and state agencies** | Massachusetts Board of Underwater Archaeological Resources |
| | Massachusetts Commissioner on Indian Affairs |
| **Federal agencies** | U.S. Fish and Wildlife Service |
| | National Oceanic and Atmospheric Administration – Habitat and Ecosystem Services Division |
| **Non-federally recognized Tribal Nations** | The Golden Hill Paugussett |
| | Eastern Pequot Tribal Nation |
| | Schaghticoke Tribal Nation |
| **Local Government** | Cape Cod Commission |
| | City of Cranston |
| | City of East Providence |
| | City of Fall River |
| | City of New Bedford and its Historical Commission |
| | City of Providence |
| | City of Rehoboth |
| | City of Taunton |
| | County of Barnstable (MA) |
| | County of Bristol (MA) |
| | County of Plymouth (MA) |
| | County of Suffolk (NY) |
| | Town of Acushnet |
| | Town of Aquinnah |
| | Town of Barnstable |

| Invited Parties to the Section 106 Process | Non-Participating, Invited Parties |
|---|---|
| | Town of Barrington |
| | Town of Berkley |
| | Town of Bourne |
| | Town of Bristol |
| | Town of Chilmark |
| | Town of Coventry |
| | Town of Dartmouth |
| | Town of Dighton |
| | Town of East Greenwich |
| | Town of Edgartown |
| | Town of Exeter |
| | Town of Fairhaven |
| | Town of Falmouth |
| | Town of Freetown |
| | Town of Gosnold |
| | Town of Griswold |
| | Town of Groton |
| | Town of Hopkinton |
| | Town of Jamestown |
| | Town of Johnston |
| | Town of Lakeville |
| | Town of Ledyard |
| | Town of Little Compton |
| | Town of Marion |
| | Town of Mashpee |
| | Town of Mattapoisett |
| | Town of Middleborough |
| | Town of North Stonington |
| | Town of Oak Bluffs |
| | Town of Portsmouth |
| | Town of Richmond |
| | Town of Rochester |
| | Town of Sandwich |
| | Town of Scituate |
| | Town of Seekonk |
| | Town of Somerset |
| | Town of South Kingstown and Historic District Commission |
| | Town of Southold |
| | Town of Stonington |
| | Town of Swansea |
| | Town of Tisbury |
| | Town of Tiverton and Historic Preservation Advisory Board |
| | Town of Voluntown |
| | Town of Wareham |
| | Town of Warren |

| Invited Parties to the Section 106 Process | Non-Participating, Invited Parties |
|---|---|
| | Town of Warwick |
| | Town of West Greenwich |
| | Town of West Tisbury and Historic District Commission |
| | Town of West Warwick |
| | Town of Westerly |
| | Town of Westport and Historical Commission |
| **Nongovernmental Organizations or Groups** | Alliance to Protect Nantucket Sound |
| | Balfour Beatty Communities |
| | Beavertail Lighthouse Museum Association |
| | Bristol Historical and Preservation Society |
| | Butler Flats Lighthouse (Mass Light Ltd) |
| | Cuttyhunk Historical Society |
| | East Greenwich Historic Preservation Society |
| | Martha's Vineyard Commission |
| | Montauk Historical Society |
| | Newport Historical Society |
| | Preservation Massachusetts |

## ATTACHMENT 5 –MITIGATION FUNDING OPTIONS PROPOSED BY SIGNATORIES AND CONSULTING PARTIES

## ATTACHMENT 5 – MITIGATION FUNDING AMOUNTS PROPOSED BY SIGNATORIES AND CONSULTING PARTIES

The mitigation measures proposed in Stipulation III have been developed by individuals who meet the qualifications specified in the SOI's Qualifications Standards for Archaeology, History, Architectural History, and/or Architecture (36 CFR 61) and are based on input from consulting parties. The proposed mitigation measures consider the nature, scope, and magnitude of adverse effects caused by the Project, the qualifying characteristics of each historic property that would be affected. The funding amounts that follow were considered by signatories, invited signatories, and consulting parties for historic properties mitigation measures based on budgets proposed by lessee for each mitigation effort. Revolution Wind would provide a total of $9,246,000 to support mitigation of adverse effects from the Project as described in the MOA, of which $3,873,000 would be placed in escrow to provide a mitigation fund as described under Stipulation III.C.6. These budgets are good-faith estimates, based on the experience of these qualified consultants with similar activities and comparable historic properties. The proposed level of funding is appropriate to accomplish the identified preservation goals and result in meaningful benefits to the affected properties, resolving adverse effects. Therefore, the funding amounts indicated here for activities required by the MOA represent the maximum amounts the Lessee is required to spend to fund these activities.

- Marine APE
    - $2,178,000 for mitigation to resolve adverse effects at the nine ASLFs (Targets 21-26 and Targets 28 through 30), including:
        - Pre-construction geoarchaeology
        - Marine Survey Vessel Tenders
        - GIS development
        - Tribal participation.

- [redacted] TCP
    - $1,300,000 to the consulting federally recognized Native American Tribes for mitigation to resolve adverse effects at the TCP, including:
        - $75,000 for [redacted]
        - $200,000 to the [redacted] and $300,000 to the [redacted] for Scholarships and Training for Tribal Resource Stewardship
        - $300,000 to the [redacted] and $300,000 to the [redacted] for Coastal Resilience and Habitat Restoration
        - $75,000 for Archaeological and Cultural Sites Data Compilation and GIS Database
    - $50,000 to the [redacted] for mitigation to resolve adverse effects at the TCP, including the public interpretation of interconnected marine cultural landscapes.

- [redacted] TCP, [redacted], MA
    - $275,000 for mitigation to resolve adverse effects at the TCP including:
        - $25,000 for a GIS database of the contributing resources to the TCP

        - $100,000 for Interpretative materials to educate the public on the TCP
        - $150,000 for Climate adaptation planning study for the TCP.

- [redacted] #1 and [redacted] #2, North Kingstown, RI
    - $390,000 for mitigation to resolve adverse effects including Phase III Data Recovery at the Sites, including Tribal participation.

- Aquinnah, MA
    - $350,000 for mitigation to resolve adverse effects to the Gay Head Light by providing a financial contribution towards the completion of physical repairs and/or restoration planned by the Gay Head Lighthouse Advisory Board.
    - $250,000 for mitigation to resolve adverse effects to the Gay Head - Aquinnah Town Center Historic District, the Edwin D. Vanderhoop Homestead, the Gay Head – Aquinnah Shops Area, 71 Moshup Trail, the Leonard Vanderhoop House, the Tom Cooper House, the Theodore Haskins House, the Stone wall boundary system, and 3 Windy Hill Drive including providing Americans with Disabilities Act (ADA) compliant access at the Gay Head – Aquinnah Shops Area and the weatherization of the Edwin D. Vanderhoop Homestead.

- Middletown, RI
    - $125,000 for the mitigation to resolve adverse effects to the Bluff/John Bancroft Estate, the Bailey Farm, the Clambake Club of Newport, the Paradise Rocks Historic District, the Sea View Villa, the St. George's School: Church of St. George, Little Chapel, and Memorial Schoolhouse, the Indian Avenue Historic District, and Whetstone including updating the existing *Historic and Architectural Resources of Middletown, Rhode Island: A Preliminary Report* and for Support of the Ongoing Maintenance and Aesthetic Improvements to the Third Beach Road and Hanging Rocks Road through Stone Wall Preservation and Observation Trails within the Paradise Rocks Historic District.

Based on consultation with RIHPHC also referred to as the Rhode Island SHPO in the MOA, the below mitigation measures to resolve adverse effects, in combination with the other mitigation measures identified in this MOA Attachment, will be funded and implemented for the following historic properties:

- Little Compton, RI
    - $60,000 for the mitigation of adverse effects to the Tunipus Goosewing Farm, the Warren's Point Historic District, the Abbott Phillips House, and the Stone House Inn through the development of National Register of Historic Places (NRHP) nominations.

- Narragansett, RI
    - $50,000 for the mitigation of adverse effects to the Fort Varnum/Camp Varnum, Narragansett Pier MRA, the Life Saving Station at Narragansett Pier, the Towers Historic District, the Towers/Entrance of Narragansett Casino, Dunmere, and the Ocean Road

Historic District through an update to the existing *Historic and Architectural Resources of Middletown, Rhode Island*.

- New Shoreham, RI
    - $200,000 for the mitigation of adverse effects to the Champlin Farm Historic District, Mitchell Farm Historic District, Beacon Hill, Lewis-Dickens Farm, Lakeside Drive and Mitchell Lane, Indian Head Neck Road, Beach Avenue, Old Town and Center Roads, Corn Neck Road, Pilot Hill Road and Seaweed Lane, and the New Shoreham Historic District through the development of NRHP nominations.

- Newport, RI
    - $100,000 for the mitigation of adverse effects to the Ochre Point - Cliffs Historic District, and the Ocean Drive Historic District NHL through the development of updates to the Ochre Point-Cliffs Historic District NRHP nomination and the Ocean Drive Historic District NHL nomination.
    - $50,000 for the mitigation of adverse effects to the Bellevue Avenue Historic District NHL through the development of an update to the Bellevue Avenue Historic District NHL nomination.

- South Kingstown, RI
    - $25,000 for the mitigation of adverse effects to the Brownings Beach Historic District through the development of architectural surveys for the Matunuck and Green Hill neighborhoods.

- Tiverton, RI
    - $20,000 for the mitigation of adverse effects to the Puncatest Neck Historic District through the development of a NRHP nomination.

In consultation with BOEM, the consulting parties recommended a mitigation fund in lieu of previously considered mitigation measures (for a description of those previous measures see Draft Environmental Impact Statement [DEIS] Appendix J draft MOA and its attached draft HPTPs). Using the previously proposed mitigation measures (outlined below and from DEIS Appendix J), or specifically revised measures based on consultation with the consulting parties as a financial basis for the mitigation fund described in Stipulation III.C.

- Chilmark, MA
    - $50,000 for mitigation to resolve adverse effects to the Capt. Samuel Hancock and the Cap.t West Mitchell House, the Russell Hancock House, the Ernest Flanders House, Shop, and Barn, the Simon Mayhew House, and Flaghole through the development of a Hazard Mitigation Plan for Historic Properties.

- Dartmouth, MA
    - $15,000 for mitigation to resolve adverse effects to Salters Point through the development of a NRHP nomination form.

- Fairhaven, MA
    - $8,000 for mitigation to resolve adverse effects to 744 Sconticut Neck Road through the development of a NRHP nomination form.

- New Bedford, MA
    - $25,000 for mitigation to resolve adverse effects to Fort Rodman and the Fort Taber Historic District through the implementation of restoration or universal access per the *Fort Taber Park Master Plan*.

- West Tisbury, MA
    - $15,000 for mitigation to resolve adverse effects to the Scrubby Neck Schoolhouse through the development of an adaptive reuse plan or a landscape vegetation plan.

- Westport, MA
    - $15,000 for mitigation to resolve adverse effects to the Gooseberry Neck Observation Towers, the Gooseneck Causeway, the Westport Harbor, the Horseneck Point Lifesaving Station, the Clam Shack Restaurant, the Westport Point Historic District, the Westport Point Revolutionary War Properties, and the Westport Point Historic District through the development of a Historic Maritime Infrastructure Survey and Adaptive Use Guidance for historic wharves, docks, and buildings within the Westport Harbor and Westport Point historic districts.

- Jamestown, RI
    - $25,000 for the mitigation of adverse effects to Horsehead/Marbella through the development of Historic Architectural Building Survey (HABS) Level II Documentation.

- Little Compton, RI
    - $75,000 for the mitigation of adverse effects to the Tunipus Goosewing Farm, the Warren's Point Historic District, the Abbott Phillips House, and the Stone House Inn through the development of Interpretive Exhibits/Signage.

- Narragansett, RI
    - $100,000 for the mitigation of adverse effects to the Fort Varnum/Camp Varnum, Narragansett Pier MRA, the Life Saving Station at Narragansett Pier, the Towers Historic District, the Towers/Entrance of Narragansett Casino, Dunmere and the Ocean Road historic District through an assessment of the Ocean Road Seawall.

- New Shoreham, RI
    - $600,000 for the mitigation of adverse effects to the Block Island Southeast Lighthouse, NHL through cyclical maintenance activity and restoration.
    - $700,000 for the mitigation of adverse effects to the Island Cemetery/Old Burial Ground, the New Shoreham Historic District, the Old Harbor Historic District, the Capt. Mark L. Potter House, the Spring Cottage, the Spring House Hotel, Spring Street, the WWII

Lookout Tower – Spring Street, the Caleb W. Dodge Jr. House, the Capt. Noah Dodge House, the Capt. Welcome Dodge Sr. House, Pilot Hill Road and Seaweed Lane, the WWII Lookout Tower at Sands Pond, the Mohegan Cottage, the Lewis-Dickens Farm, the Miss Abby E. Vaill/1 of 2 Vaill cottages, the Hon. Julius Deming Perkins/"Bayberry Lodge", West Side and Grace Cove Roads, the Peleg Champlin House, Lakeside Drive and Mitchell Lane, the African American Settlement, the Nathan Mott Park, the Champlin Farm, Old Town and Center Roads, Beacon Hill , Beach Avenue, Indian Head Neck Road, Corn Neck Road, the Hippocampus/Boy's camp/Beane Family, the Mitchell Farm, the U.S. Coast Guard Brick House, the U.S. Lifesaving Station, the U.S. Weather Bureau Station, and the Hygeia House through implementation of the Coastal Resiliency Plan, and a town-wide NRHP Nomination.

- Newport, RI
  - $650,000 for the mitigation of adverse effects to the Ochre Point - Cliffs Historic District, the Kay St.-Catherine St.-Old Beach Rd. Hist. Dist. / The Hill, and the Ocean Drive Historic District NHL through the development of a Historic Property Owner Guidebook and the development of Stormwater Drainage Improvement Plans for the Historic Districts.
  - $800,000 for the mitigation of adverse effects to the Bellevue Avenue Historic District NHL, the Marble House NHL, Rosecliff / Oelrichs (Hermann) House / Mondroe (J. Edgar) House, and the Breakers NHL through ongoing maintenance, the development of a Resiliency Plan, and Invasive Species Maintenance Plan, a Volunteer Ambassador Program, and a Mobile Application for the Cliff Walk.

- South Kingstown, RI
  - $25,000 for the mitigation of adverse effects to the Brownings Beach Historic District through the development of a historic context for summer cottage and resort development in Rhode Island.

- Tiverton, RI
  - $20,000 for the mitigation of adverse effects to the Puncatest Neck Historic District through the development of a historic context for summer cottage and resort development in Rhode Island.

- Lighthouses in RI and MA
  - $750,000 for the mitigation of adverse effects to the below lighthouses through Assessment, Planning, Restoration, and Institutional Development:
    - Sakonnet Light Station, Little Compton, RI
    - Block Island North Lighthouse, New Shoreham, RI
    - Point Judith Lighthouse, Narragansett, RI
    - Beavertail Light, Jamestown, RI
    - Tarpaulin Cove Light, Gosnold, MA
    - Clark's Point Light, New Bedford, MA
    - Butler Flats Light Station, New Bedford, MA
    - Nobska Point Lighthouse, Falmouth, MA

**ATTACHMENT 6 – HISTORIC PROPERTY TREATMENT PLAN FOR THE REVOLUTION WIND FARM ANCIENT SUBMERGED LANDFORM FEATURE, OUTER CONTINENTAL SHELF, FEDERAL AND RHODE ISLAND WATERS OF RHODE ISLAND SOUND**

REDACTED

REDACTED – Includes Archaeological Site Location Information

# Historic Property Treatment Plan

for the

# Revolution Wind Farm

## Ancient Submerged Landform Feature

## Outer Continental Shelf, Federal and Rhode Island State Waters

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:


Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
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**June** 2023

# ABSTRACT


| | |
|---|---|
| Federal Undertaking: | Revolution Wind Farm and Revolution Wind Export Cable Project |
| Location: | Outer Continental Shelf and Rhode Island State Waters |
| Federal and State Agencies: | Bureau of Ocean Energy Management<br>National Park Service<br>U.S. Army Corps of Engineers<br>Massachusetts Historical Commission<br>Rhode Island Historical Preservation & Heritage Commission<br>New York Historic Preservation Office<br>Connecticut Historic Preservation Office<br>Advisory Council on Historic Preservation |
| Regulatory Process: | National Environmental Policy Act<br>Section 106 of the National Historic Preservation Act |
| Purpose: | This Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects from the Revolution Wind Project. |
| Adverse Effect Finding for: | Ancient Submerged Landform Feature, Outer Continental Shelf and Rhode Island State Waters |
| Submitted By: | Revolution Wind, LLC |
| Date: | June 2023 |

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## LIST OF ACRONYMS

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ADLS | Aircraft Detection Lighting System |
| ASLFs | Ancient Submerged Landform Features |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| DEIS | Draft Environmental Impact Statement |
| EDR | Environmental Design and Research, D.P.C. |
| FEIS | Final Environmental Impact Statement |
| FR | Federal Register |
| HPTP | Historic Property Treatment Plan |
| MARA | Marine Archaeological Resources Assessment |
| MOA | Memorandum of Agreement |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act of 1966 |
| NRHP | National Register of Historic Places |
| OCS | Outer Continental Shelf |
| PAPE | Preliminary Area of Potential Effect |
| QMA | Qualified Marine Archaeologist |
| RFP | Request for Proposals |
| ROD | Record of Decision |
| RWEC | Revolution Wind Export Cable |
| RWF | Revolution Wind Farm |
| SOI | Secretary of the Interior |
| WTG | Wind Turbine Generator |

## 1.0 EXECUTIVE SUMMARY

This Historic Property Treatment Plan (HPTP) for Ancient Submerged Landform Features (ASLFs), which are recommended as eligible for listing on the National Register of Historic Places (NRHP), provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects identified in the *Marine Archaeological Resources Assessment* (MARA), dated February 2023 (SEARCH, 2023) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) has provided this HPTP in accordance with the Bureau of Ocean Energy Management's (BOEM) Findings of Adverse Effect (FoAE) for the Undertaking under the National Historic Preservation Act of 1966 (NHPA).

BOEM has used the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has consulted with the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, federally recognized Native American Tribes, and other NHPA Section 106 consulting parties in accordance with this process. Revolution Wind has provided this HPTP to BOEM for inclusion in the Final Environmental Impact Statement (FEIS).

This HPTP describes the mitigation measures to resolve adverse effects on historic properties, the implementation steps, and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS as well as outreach to consulting parties performed by BOEM. This HPTP document has undergone revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and other consulting parties throughout the NEPA substitution process. This HPTP is included in the Memorandum of Agreement (MOA) issued in accordance with 36 CFR §§ 800.8, 800.10.

This HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the *Marine Archaeological Resources Assessment – Revolution Wind Farm Project Construction and Operations Plan* (MARA; SEARCH, 2023) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2022) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the mitigation actions. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

- **Section 6.0, References**, is a list of works cited in this HPTP.

# 2.0 BACKGROUND INFORMATION

## 2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State waters, will connect the offshore substation to the electrical grid. Export cables will be buried below the seabed. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island.

REDACTED

**Figure 2.1-1. Project Location**

[redacted]

## 2.2 Section 106 of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of a ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking.

The measures to avoid and minimize adverse effects to identified historic properties are described in the MARA Report (SEARCH 2023). This HPTP addresses the treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect consultations among consulting parties to refine a conceptual mitigation framework proposed by Revolution Wind.

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state, and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

## 2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, pursuant to Sections 106 of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM's initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic properties and invited the following parties:

- Mashantucket Pequot Tribal Nation;
- Mohegan Tribe of Indians;
- Narragansett Indian Tribe;
- Shinnecock Indian Nation;
- Wampanoag Tribe of Gay Head (Aquinnah);
- Mashpee Wampanoag Tribe; and
- Historical Chappaquiddick Tribe of the Wampanoag Nation.

# 3.0 EXISTING CONDITIONS AND HISTORIC SIGNIFICANCE

## 3.1 Historic Properties

This HPTP involves nine historic properties, as identified in Table 3.1-1 and located on Figure 3.1-1. Revolution Wind has committed to avoidance of impacts to Target 27 and Targets 31-33 during all phases of construction and operations.

**Table 3.1-1. Historic Properties included in the ASLF HPTP**

| Name | Municipality | State | Site No. (Agency) | Ownership |
|---|---|---|---|---|
| Target 21 | N/A | RI | N/A | State waters |
| Target 22 | N/A | RI | N/A | State waters |
| Target 23 | N/A | N/A | N/A | Federal waters |
| Target 24 | N/A | N/A | N/A | Federal waters |
| Target 25 | N/A | N/A | N/A | Federal waters |
| Target 26 | N/A | N/A | N/A | Federal waters |
| Target 28 | N/A | N/A | N/A | Federal waters |
| Target 29 | N/A | RI | N/A | State waters |
| Target 30 | N/A | RI | N/A | State waters |

REDACTED

Figure 3.1-1. Historic Property Location

[redacted]

Location of ASLFs ("Geomorphic Feature of Archaeological Interest") within Preliminary Area of Potential Effect (PAPE) – Sheet 1 of 5

[redacted]

Location of ASLFs ("Geomorphic Feature of Archaeological Interest") within PAPE – Sheet 2 of 5

REDACTED

[redacted]

Location of ASLFs ("Geomorphic Feature of Archaeological Interest") within PAPE – Sheet 3 of 5

REDACTED

[redacted]

Location of ASLFs ("Geomorphic Feature of Archaeological Interest") within PAPE – Sheet 4 of 5

REDACTED

[redacted]

Location of ASLFs ("Geomorphic Feature of Archaeological Interest") within PAPE – Sheet 5 of 5

## 3.2 Ancient Submerged Landform Features (ASLFs)

### *3.2.1 Physical Description and Existing Conditions*

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

### 3.2.2 Historic Context

Based on radiocarbon data collected for the MARA and detailed reconstructions of the paleolandscapes within the PAPE, the identified ASLFs included in this treatment plan are associated with terminal Pleistocene/Early Holocene drainage systems. Many of these fluvial networks likely represent incisions of the [redacted] (Cacciopolli, 2015). The potential indigenous use of the preserved landforms would likely have been restricted to a period between approximately 15,000 and 9150 cal. B.P. roughly correlating with the archaeologically defined Paleoindian Period and extending into the earliest phases of the antecedent Early Archaic Period. The younger age limit for archaeological sites that could be preserved at each ASLF is based on marine transgression and would vary in specific timing depending on the elevation of each valley floor.

The dating program and interpretations suggest that each ASLF is associated with a stable terrestrial landform within an ancient valley that could have supported indigenous occupation or other activities. No direct evidence of human use of these locations has been recovered, but the settings of each are consistent with terrestrial locations used by indigenous peoples in the northeastern United States after 13,000 cal. B.P. Although direct evidence of indigenous settlements on the post-glacial OCS landscapes is currently lacking, paleoenvironmental reconstructions suggest the RWEC and RWF ASLFs are the types of locations where evidence of occupations might be expected. Current models for Paleoindian settlement and subsistence patterns indicate people living in the region between approximately 15,000 and 11,000 years ago were highly mobile. Reported Paleoindian site locations occur in a wide range of environmental settings, including river valleys and wetland margins comparable to those inferred at each ASLF.

It is important to note that very little is known about potential coastal adaptations during this time period. The submerged continental shelf contains the vast majority of coastal habitats that would have been available to people living in the region more than 15,000 years ago. Practical and technological challenges have limited the range of surveys that might yield direct evidence of now-submerged coastal sites. Where terminal Pleistocene or very early Holocene coastal sites have been identified elsewhere in North America, those sites have yielded different types of stone tools than typically associated with Paleoindian sites in the Northeast. As such, it is plausible that archaeological expressions of Pleistocene coastal occupations in the New England region may look quite different than their counterparts in the interior sections (now on the mainlands).

Further, each of the ASLFs is associated with a preserved element of the ancient terrestrial landscape that the consulting Native American tribes have identified as having traditional cultural significance. As shared with Revolution Wind by tribal representatives, several of the consulting tribes' traditions hold that their people have always been here. They did not migrate from ancient Asia or Europe or anywhere else. Their origins are rooted here, in the Northeast, and at the interface between the seas and lands. Important events in tribal histories occurred on the OCS and preserved elements of the ancient landscapes with which their ancestors and culture heroes interacted are important.

### *3.2.3 NRHP Criteria*

Based on prior BOEM consultations for the South Fork Wind Farm and Vineyard Wind 1 Wind Farm undertakings and Revolution Wind's assessments, the identified ASLFs are potentially eligible for listing in the NRHP under Criterion D for their potential to yield important information about the indigenous settlement of the northeastern United States and development of coastal subsistence adaptations. Each ASLF may also be eligible for listing under Criterion A for their association with and importance in maintaining the cultural identities of multiple Native American tribes.

# 4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. The conceptual mitigation measures were developed in consultation with the Participating Parties by individuals who met Secretary of the Interior (SOI) Qualifications Standards for Archeology and/or History (62 FR 33708) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, and NRHP-qualifying characteristics of each historic property that would be affected.

Based on the commitment to establish a no-anchor zone encompassing Target-31 and the location of Targets 32 and 33 beneath the vertical limits of disturbance, no adverse effects to these three ASLF are anticipated. Target 27 will be avoided due to its location on the margin of the RWF and the South Fork Wind Farm. The measures developed to resolve potential adverse effects to the remaining ASLFs are summarized below.

## 4.1 Target 21 through Target 26 and Target 28 through Target 30

### *4.1.1 Preconstruction Geoarchaeology*

#### 4.1.1.1 <u>Purpose and Intended Outcome</u>

This mitigation measure will consist of the collection of vibracores within the affected portions of each ASLF prior to Project construction. The collected cores, the locations which will be selected in consultation with Native American tribes, will be analyzed in collaboration with the tribes to provide a more detailed understanding of ancient terrestrial landscapes along the RWEC and within the RWF and how such settings may have been used by Pleistocene-age indigenous peoples. Data acquired from this effort is expected to refine the age estimates for each stable landform, the timing and character of ecological transitions evidenced in the MARA report and provide an additional opportunity to recover evidence of ancient indigenous use of each ASLF.

This measure will provide for a more detailed analysis of the stratigraphy, chronology, and evolving ecological conditions at each ancient landform. Two separate reports on the analyses and interpretations will be developed. The first will be focused on content of specific interest the consulting tribes, including a broad approach to integrating available data collected from other recent archaeological research and surveys on the Atlantic OCS. The specific content and formatting of this report will be refined in consultation with the tribes to align the work product with intended intra- and inter-tribal audiences. The second report will be geared primarily toward technical, Tribal/State Historic Preservation Officer and agency audiences.

#### 4.1.1.2 <u>Scope of Work</u>

The scope of work will consist of the following:

- Collaborative review of existing geophysical and geotechnical data with Native American tribes
- Selection of coring locations in consultation with tribes;
- Collection of two to three vibracores within each affected ASLF with a sampling focus on areas that will be disturbed by Project construction activities;

- Written verification to BOEM that the samples collected are sufficient for the planned analyses and consistent with the agreed scope of work;
- Collaborative laboratory analyses at a laboratory located in Rhode Island or Massachusetts;
- Screening of recovered sediments for debitage or micro-debitage associated with indigenous land uses;
- Third-party laboratory analyses, including micro- and macro-faunal analyses, micro- and macro-botanical analyses, radiocarbon dating of organic subsamples, and/or chemical analyses for potential indirect evidence of indigenous occupations;
- Temporary curation of archival core sections
- Draft reports for review by participating parties;
- Final reporting; and
- Public or professional presentations summarizing the results of the investigations, developed with the consent of the consulting tribes.

#### 4.1.1.3 Methodology

Revolution Wind will conduct the Preconstruction Geoarchaeology in consultation with the participating parties. The research, analyses, and interpretations are intended to be a collaborative effort with the consulting tribes. The research will be conducted in collaboration with the consulting Native American tribes, who will be invited by Revolution Wind to series of working sessions to:

- Review existing data;
- Develop specific research questions addressing the tribes' interests in the ASLF;
- Select candidate coring locations;
- Split, document, and sample recovered vibracores in the laboratory;
- Review analytic results and preliminary interpretations; and
- Review draft reporting.

Vibracores placed within the affected sections of each ASLF will extend a maximum depth of approximately 20 feet (6 meters) below the sea floor. The cores will be cut on the survey vessel into approximately 1-meter-long sections and sealed to minimize the risk of environmental contamination. The core segments will be logged on the survey vessel and a chain of custody will be maintained to ensure all samples are accounted for and that all samples are transferred to the laboratory for geoarchaeological analyses. Once the core segments are transferred to the Qualified Marine Archaeologist (QMA), Revolution Wind will invite tribal representatives to participate in the splitting, documentation, and subsampling of each core, if feasible due to COVID-19 restrictions. Each core segment will be split longitudinally into working and archival halves. Subsamples collected from working halves for specific third-party analyses will be packaged in a manner appropriate to the specific analysis for which they are intended. Archival halves will be sealed and stored horizontally on shelves or racks in a climate-controlled facility for at least one year following completion of laboratory analyses. Revolution Wind will prioritize reasonable access to archival core segments by Consulting Parties when selecting the storage facility. All samples collected from the working halves will be submitted to third party laboratories within approximately 6 months of core transfer to the QMA facilities.

As an option, both halves of the core may be consumed to extract the highest amount of quality data possible. This option will be determined through coordination with any participating tribes/tribal nations.

Revolution Wind will prepare a presentation of the preliminary results and interpretations for discussion with the Tribes (see work session schedule above). Revolution Wind will consider the Tribes' comments and suggestions when preparing the draft reports and will seek to resolve any disagreements among the parties through supplemental consultations prior to preparing the draft reports.

Revolution Wind will submit the draft reports to the participating parties for review and comment. Revolution Wind will consider all comments received when developing the final reports. Final digital copies of the completed reports will be provided to all participating parties. Hard copies of the final reports will be submitted to the State Historic Preservation Officers, tribes or other parties upon request.

Following the one-year retention period, Revolution Wind will offer transfer of the archival core segments to the Consulting Tribes, SHPOs and related state agencies, and regional research institutions with an interest in and capacity to conduct further analyses. Revolution Wind currently anticipates research institutions with potential interests/capacities to include the University of Rhode Island, University of Connecticut, and Eastern Connecticut State University. Revolution Wind will notify the Consulting Parties of its intent to transfer archival core segments to any party at least 45 days prior to initiating such transfer and will consider any comments provided by Consulting Parties before proceeding. If no external parties agree to accept the archival core segments, Revolution Wind will water-screen the retained segments to identify and collect potential physical evidence of ancient Native American activity at the ASLFs. In such circumstances, Revolution Wind will prepare a technical memorandum summarizing the results of the archival core segment processing and analyses and submit that memorandum to the Consulting Parties.

#### 4.1.1.4 Standards

The Preconstruction Geoarchaeology effort will be conducted in accordance with BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (May 2020). The QMA leading the research will meet the SOI professional qualification standards for archeology (62 FR 33708) and BOEM's standards for QMAs.

#### 4.1.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Draft Tribal Audience Report;
- Draft Technical Report;
- Final Tribal Audience Report;
- Final Technical Report; and
- Draft Public or Professional Presentations.

#### 4.1.1.6 Curation

The geoarchaeological collections associated with the ASLF investigations will be curated at the Public Archaeology Laboratory (PAL) facility at 26 Main Street, Pawtucket, Rhode Island. PAL is an approved curatorial facility under specific project permits issued by the Rhode Island RIHPHC and the Massachusetts Historical Commission (MHC) for collections originating in Rhode Island and Massachusetts. PAL currently curates multiple collections for state and federal agencies in accordance with all applicable state and federal standards. The curation section of the laboratory is inspected regularly by state and federal agencies to ensure the proper maintenance of the cultural materials entrusted to PAL's care.

PAL is an approved institution for curating cultural materials and project-related documentation according to the Code of Federal Regulations 36 CFR 79 (Curation of Federally-Owned and Administered Archeological Collections). Laboratory employees are experienced with the curation protocols of many states and federal agencies and the current standards for curation practices as set forth in the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 Federal Register 44716–44742, 1983). The Laboratory Manager is a Registered Professional Archaeologist (RPA) and follows the Code of Conduct for that organization as well as the principles of archaeological ethics specified by the Society of American Archaeology and the Society for Historical Archaeology.

#### 4.1.1.7 Funds and Accounting

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an Attachment to the MOA.

### *4.1.2 Open-Source GIS and Story Maps*

#### 4.1.2.1 Purpose and Intended Outcome

This mitigation measure will consist of the compilation and transfer of relevant geophysical, geotechnical, and geoarchaeological datasets pertaining to the ASLFs to a non-proprietary GIS system for use by Native American tribes. The datasets will include sub-bottom (seismic) data used to characterize the seabed and ASLFs, the location of all geotechnical/geoarchaeological samples collected, and the vertical and horizontal extents of the affected features or sub-features within each ASLF. The GIS will be, to the extent feasible and practicable, compatible with GIS datasets compiled for other OCS projects to assist in the tribes' on-going research and stewardship efforts. Story Maps or equivalent digital media presentations will be prepared to integrate and present the complex technical data compiled during the MARA and mitigation investigations in a manner best suited for inter- and intra-tribal audiences. Story Map content would be developed in close consultation and collaboration with the consulting Native American tribes.

Incorporation of Revolution Wind datasets into a broader GIS framework will allow the tribes to better understand and protect preserved elements of the ASLFs. The intent of this measure is to enhance the Tribes understanding of existing conditions for a range of ASLFs located in the northeastern Atlantic OCS. This knowledge would allow for more effective Government to Government consultations regarding similar features that may be affected by future federal undertakings. The value of the GIS will increase as additional datasets are acquired and incorporated. Access to the GIS will support each Tribes' capacity to pursue their own research or intra-tribal educational programs related to the OCS and traditional cultural uses of the now-submerged landscapes of their ancestors. The combined MARA and Preconstruction Geoarchaeology investigations will provide an important perspective on the preservation of ASLFs within formerly glaciated sections of the OCS and within the footprint of former glacial lakes. Integrated GIS that can accommodate datasets collected from other OCS development projects and surveys would allow for comparisons to areas south of the maximum glacial limits on the OCS to provide a more comprehensive view of the ancient landscapes within the region. Revolution Wind will provide reasonable compensation to tribal representative working with Revolution Wind on implementation of this measure. Story Maps created within the GIS will provide a flexible approach to incorporating media from a variety of sources, including geospatial data, interviews with traditional knowledge-holders, photographs, audio recordings, and archival cartography for a compelling interpretive experience. Story Maps can be tailored for specific tribal audiences and uses and would be developed in consultation with the consulting tribes.

#### 4.1.2.2 Scope of Work

The scope of work will consist of the following:

- Consultation with the Tribes to determine the appropriate open-source GIS platform;
- Review of candidate datasets and attributes for inclusion in the GIS;
- Data integration;
- Development of custom reports or queries to assist in future research or tribal maintenance of the GIS;
- Work Sessions with Tribes to develop Story Map content;
- Training session with Tribes to review GIS functionality;
- Review of Draft Story Maps with Tribes;
- Delivery of GIS to Tribes; and
- Delivery of Final Story Maps.

#### 4.1.2.3 Methodology

Revolution Wind will develop the GIS in consultation with the Participating Parties. At least one work session will be scheduled to refine specific functionality of interest to the Tribes. That session will be conducted after the preliminary data analyses for the Preconstruction Geoarchaeology effort has been completed. This will allow for a more focused walk-through of the data and options for organizing and integrating different datasets. Revolution Wind will request from the Tribes details on any existing open-source GIS systems currently in use by each Tribe to minimize any issues with data integration or interoperability. Once the work session has been conducted Revolution Wind will proceed with development of the GIS, taking into account the Tribes' comments and suggestions. The draft GIS system will be shared with the Tribes in a training session that presents the functions of the GIS and familiarizes the tribal representatives with the interfaces, data organization, and any custom features developed to enhance useability. Revolution Wind will consider any feedback from the Tribes on the draft GIS before proceeding with finalizing the system design and implementation. Revolution Wind will provide the GIS to the Tribes by physical storage media or as a secure digital file transfer, as appropriate to each Tribes IT infrastructure and preference. Revolution Wind does not intend to be responsible for the upkeep of the GIS database.

Story Map content will be developed with the consulting Tribes through one or more scheduled work sessions. Potential options for content intended for youth audiences, tribal governments, and/or general tribal membership will be discussed to refine the conceptual framework and develop draft Story Maps for review by the Tribes. Revolution Wind will consider all comments and feedback provided by the Tribes when preparing the final Story Maps.

#### 4.1.2.4 Standards

The GIS developed under this measure will be free to use and free to modify by the tribes. To the extent feasible, all data will be provided in formats that allow for interoperability with other GIS platforms that the tribes may use. All datasets incorporated in the GIS will comply with Federal Geographic Data Committee data and metadata standards.

#### 4.1.2.5 Documentation

Revolution Wind will provide draft descriptions and documentation of the GIS for review by the Participating Parties and will provide a description of the draft Story Maps to the consulting Tribes following the initial working sessions.

The following documentation is to be provided for review by Participating Parties:

- Draft Description of the GIS with appropriate schema, data organization, and custom reports/queries;
- Draft Story Map descriptions with details on content, formatting, and intended audiences; and
- Final Technical Description of the GIS with schema, data organization, and custom reports/queries.

#### 4.1.2.6 Funds and Accounting

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an Attachment to the MOA.

# 5.0 IMPLEMENTATION

## 5.1 Timeline

The timeline for implementation of the mitigation measures is identified in the MOA.

## 5.2 Organizational Responsibilities

### *5.2.1 Bureau of Ocean Energy Management (BOEM)*

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

### *5.2.2 Revolution Wind, LLC*

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

### *5.2.3 Other Parties, as Appropriate*

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

## 5.3 Participating Party Consultation

This HPTP was provided by Revolution Wind for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. Participating Parties were provided the opportunity for review and comment on the HPTP concurrent with BOEM's NEPA substitution schedule for the Project. This HPTP was further refined through informational

and consultation meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information.

## 6.0 REFERENCES


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United States Code. 2016. Title 54 - National Historic Preservation Act [as amended through December 16, 2016]. Available at https://www.achp.gov/sites/default/files/2018-06/nhpa.pdf. Accessed December 21, 2021.

**ATTACHMENT 7 – HISTORIC PROPERTY TREATMENT PLAN FOR THE REVOLUTION WIND FARM, THE [redacted] #1 AND #2 SITES, TOWN OF NORTH KINGSTOWN, WASHINGTON COUNTY, RHODE ISLAND**

**REDACTED**

# Historic Property Treatment Plan

for the

# Revolution Wind Farm

[redacted]

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

**June 2023**

# ABSTRACT


| | |
|---|---|
| Federal Undertaking: | Revolution Wind Farm and Revolution Wind Export Cable Project |
| Location: | Outer Continental Shelf and Rhode Island |
| Federal and State Agencies: | Bureau of Ocean Energy Management<br>National Park Service<br>U.S. Army Corps of Engineers<br>Massachusetts Historical Commission<br>Rhode Island Historical Preservation & Heritage Commission<br>New York Historic Preservation Office<br>Connecticut Historic Preservation Office<br>Advisory Council on Historic Preservation |
| Regulatory Process: | National Environmental Policy Act<br>Section 106 of the National Historic Preservation Act<br>Section 110(f) of the National Historic Preservation Act |
| Purpose: | This Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects from the Revolution Wind Project. |
| Adverse Physical Effect Finding for: | [redacted] |
| Submitted By: | Revolution Wind, LLC |
| Date: | June 2023 |

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## LIST OF ACRONYMS

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ADLS | Aircraft Detection Lighting System |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| cmbgs | centimeters below ground surface |
| COP | Construction and Operations Plan |
| EDR | Environmental Design and Research, D.P.C. |
| FEIS | Final Environmental Impact Statement |
| FR | Federal Register |
| HPTP | Historic Property Treatment Plan |
| MOA | Memorandum of Agreement |
| NHPA | National Historic Preservation Act of 1966 |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| QDC | Quonset Development Corporation |
| RFP | Request for Proposals |
| RIHPHC | Rhode Island Historical Preservation & Heritage Commission |
| RI SHPO | Rhode Island State Historic Preservation Officer |
| ROD | Record of Decision |
| RWF | Revolution Wind Farm |
| STP | shovel test pit |
| THPO | Tribal Historic Preservation Officer |
| USCG | United States Coast Guard |
| WTG | Wind Turbine Generator |

# 1.0 EXECUTIVE SUMMARY

This Historic Property Treatment Plan (HPTP) for two archaeological historic properties, [redacted] (the historic properties) provides background data, resource-specific information, and detailed steps that will be implemented to carry out the mitigation actions in the *Terrestrial Archaeological Resources Assessment and Site Identification Survey, Revolution Wind Farm Project, Onshore Facilities* (TARA) dated February 2023 (PAL, 2023) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind, LLC (Revolution Wind) has provided this HPTP in accordance with the Bureau of Ocean Energy Management's (BOEM) Findings of Adverse Effect (FoAE) for the Undertaking under the National Historic Preservation Act (NHPA).

BOEM has used the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has consulted with the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, federally recognized Native American Tribes, and other NHPA Section 106 consulting parties in accordance with this process. Revolution Wind has provided this HPTP to BOEM for inclusion in the Final Environmental Impact Statement (FEIS).

This HPTP describes the mitigation measures to resolve potential adverse effects on historic properties, the implementation steps, and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS as well as outreach to consulting parties performed by BOEM. This HPTP document has undergone revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and other consulting parties throughout the NEPA substitution process. This HPTP is included in the Memorandum of Agreement (MOA) issued in accordance with 36 CFR §§ 800.8, 800.10.

Pursuant to the terms and conditions of the MOA, Revolution Wind will implement these mitigation measures.

This HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the *Historic Resources Visual Effects Analysis – Revolution Wind Farm* (EDR, 2023) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2022) that guided the development of this document.

- **Section 3.0, Existing Conditions and Historic Significance**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the mitigation actions. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation.
- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.
- **Section 6.0, References**, is a list of works cited in this HPTP.
- **Attachment A,** [redacted]
- **Attachment B,** [redacted]

# 2.0 BACKGROUND INFORMATION

## 2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

**Figure 2.1-1. Onshore Facilities Regional Location**

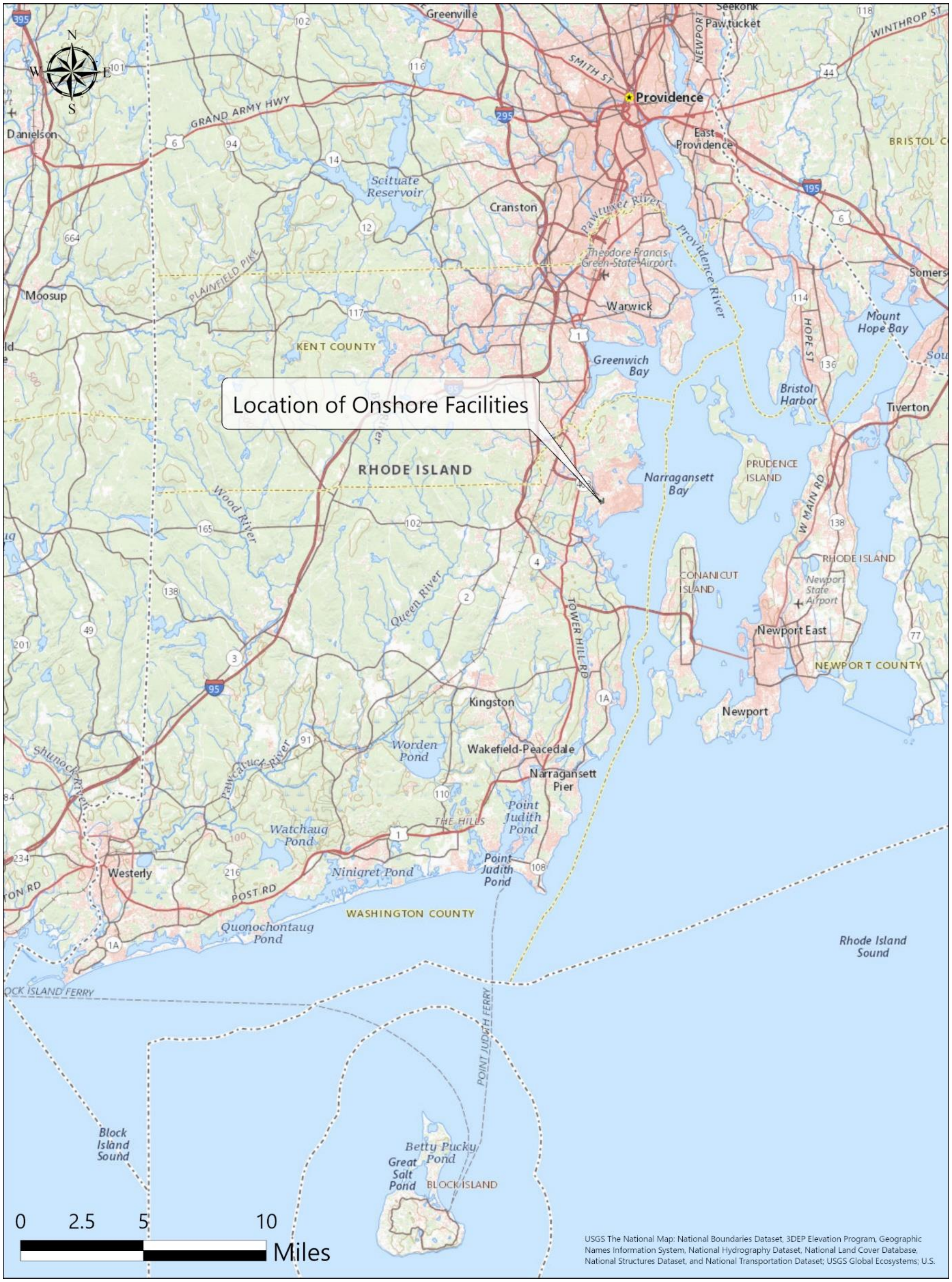
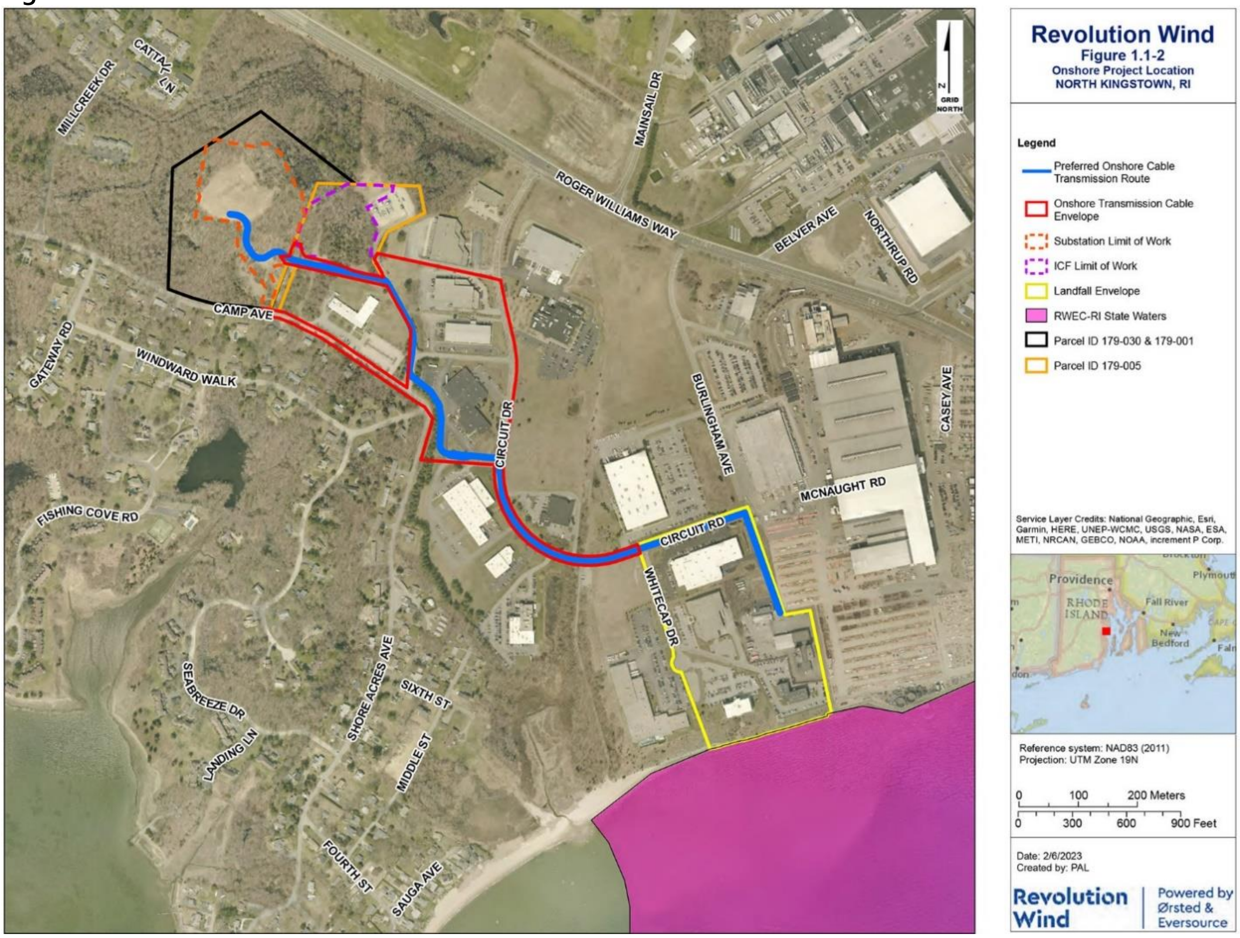


**Figure 2.1-2. Onshore Facilities Overview**




## 2.2 Section 106 and Section 110(f) of the National Historic Preservation Act

This HPTP was developed in accordance with the TARA and COP and reflects consultations conducted by BOEM with multiple consulting parties, including the Rhode Island State Historic Preservation Officer (RI SHPO), the Narragansett Indian Tribe, Wampanoag Tribe of Gay Head/Aquinnah, Mashpee Wampanoag, Shinnecock Indian Nation and Mashantucket Pequot Historic Preservation Offices (THPOs). The regulations at 36 CFR § 800.8 provide for use of the National Environmental Policy Act (NEPA) process to fulfill a Federal agency's National Historic Preservation Act (NHPA) Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of a Record of Decision (ROD) and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the National Historic Preservation Act.

The measures to avoid and minimize adverse effects to identified historic properties are described in the *Terrestrial Archaeological Resources Assessment and Site Identification Survey*.

This HPTP addresses the mitigation requirements identified by BOEM to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect consultations among consulting parties to refine a conceptual mitigation framework proposed by Revolution Wind. That framework identified the following measures as appropriate means of resolving adverse effects to [redacted]

a. Phase III Data recovery investigations to document and recover critical information regarding the ancient Native American use of the impacted sites.
    i. All excavations will be conducted under a permit issued by the Rhode Island Historical Preservation & Heritage Commission.
    ii. Excavations are intended to extend over approximately 20% of the affected section of each site.
    iii. The research design and specific research questions to be addressed through field research and laboratory analyses have been developed in consultation with the consulting Native American Tribes.
    iv. Representatives from the consulting Native American Tribes will be invited to monitor the field investigations and participate in the interpretation of data collected.
b. Technical reports for peer review and dissemination of data at professional conferences/publications will be produced at the conclusion of the field investigations.
c. An Archaeological Construction Monitoring Plan developed to ensure that impacts to the areas of the [redacted] to be protected do not occur during ground disturbing activities.
d. A Historic Property Archaeological Protection Plan to be developed following Phase III data recovery to ensure that protection measures are carried out during ongoing Operations and Maintenance of the Project.

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its Record of Decision (ROD) and with applicable state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2 – Organizational Responsibilities.

## 2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- RI SHPO;

- The Narragansett Indian Tribe THPO;
- The Wampanoag Tribe of Gay Head/Aquinnah THPO;
- The Mashpee Wampanoag Tribe THPO;
- The Mashantucket Pequot Tribal Nation THPO; and
- The Shinnecock Indian Nation THPO.

This HPTP provides details and specifications for mitigation measures to resolve the adverse effects within the APE for the [redacted]

# 3.0 EXISTING CONDITIONS AND HISTORIC SIGNIFICANCE

## 3.1 Historic Properties

The HPTP involves two historic properties, as identified in 3.1-1 and located on Figure 3.1-1.

**Table 3.1-1. Historic Resources included in the HPTP**

| Name | Municipality | State | Site No. | Property Designation | Ownership |
|---|---|---|---|---|---|
| [redacted] | [redacted] | [redacted] | | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] | | [redacted] | [redacted] |

**Figure 3.1-1.** [redacted]

[redacted]

[redacted]

4-0

In Section 3.22 and 3.33, each historic property is individually considered, described both physically and historically. Information on each historic property, relevant historic context, and potential NRHP eligibility is summarized from the *Terrestrial Archaeological Resources Assessment and Site Identification Survey* (TARA; PAL, 2021) prepared in support of the Undertaking's COP submittal to BOEM.

## 3.2 [redacted]

### *3.2.1 Physical Description and Existing Conditions*

[redacted]

[redacted]

[redacted]

**Table 3.2-1. Native American Cultural Materials by Stratum, [redacted]**

| [redacted] | [redacted] | [redacted] | | | | | | [redacted] |
|---|---|---|---|---|---|---|---|---|
| | | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | |
| [redacted] | [redacted] | [redacted] | [redacted] | | [redacted] | [redacted] | | [redacted] |
| [redacted] | [redacted] | | | | | [redacted] | | [redacted] |
| [redacted] | [redacted] | | [redacted] | | | | | [redacted] |
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| [redacted] | [redacted] | | [redacted] | | | [redacted] | | [redacted] |
| | [redacted] | [redacted] | [redacted] | [redacted] | | [redacted] | [redacted] | [redacted] |
| | [redacted] | | [redacted] | | | | | [redacted] |
| | [redacted] | | [redacted] | | | | | [redacted] |
| | [redacted] | | [redacted] | | | | | [redacted] |
| [redacted] | [redacted] | [redacted] | [redacted] | | | | | [redacted] |
| [redacted] | [redacted] | | | | [redacted] | [redacted] | | [redacted] |
| | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |

Excavation of TP TB-04 [redacted] Feature 01 was observed to be a dark grayish brown, fine silty medium sand that contrasted with the natural dark yellowish brown B horizon subsoil. The feature was semi-circular in plan in the TP's south wall and extended south beyond the limits of excavation. A moderate density of argillite chipping debris and several bivalve shell fragments were recovered from the feature before excavation was suspended (Table 3.2-1). The Public Archaeology Laboratory, Inc. (PAL), who conducted the archaeological survey, provided a preliminary interpretation that Feature 01 was a possible Native American refuse pit.

Excavation of TP TK-01 on the [redacted]

Feature 02 was observed to be a very dark grayish brown, silty coarse sand anomaly beneath apparent B horizon subsoils. Charcoal, lithic chipping debris, and shell fragments were recovered from Feature 02 before excavation was suspended. Charcoal collected from 40 to 50 cmbgs in Feature 02 yielded a radiocarbon date of 670 ± 30 radiocarbon years before present (B.P.), falling within the Late Woodland temporal period (1,000-450 B.P.). PAL provided a preliminary interpretation that Feature 02 was a Native American hearth or cook fire.

[redacted]. Thus, no Phase III Data Recovery investigations are planned around either of these two previously recorded features.

Six twentieth-century artifacts included molded glass shards, window glass, and a 1972 penny were also recovered from A horizon topsoil in  test pits excavated within [redacted]

[redacted]

### *3.2.2 Historic Context*

Based on the Small Stemmed projectile point recovered from TP TJ-1, [redacted]. The Small Stemmed archaeological tradition is one of three traditions associated with the Late Archaic, with projectile points typically made from quartz, quartzite, or argillite. Late Archaic period sites in the New England region show use of large wetland systems (Thorbahn, 1982). Shellfish exploitation also intensified during this time period. [redacted].

[redacted] Late Woodland period sites are common in the vicinity of water, including coastal environments, streams and rivers, and freshwater ponds and wetlands. Late Woodland sites are generally categorized by specialized resource exploitation sites (e.g., shell middens, hunting and processing camps, and lithic workshops), small domestic sites, and larger hamlets or villages. Artifacts commonly attributed to the Late Woodland period include Madison and Levana type projectile points and cord-pressed, stick-wrapped, and incised ceramics. [redacted]

Native American settlement and subsistence patterns established during the Late Woodland Period were disrupted beginning in the early sixteenth century by foreign cultural contact, initially with European explorers and later by settlers. Sixteenth- and seventeenth-century Native American settlements were focused within traditional coastal tribal territories that developed before and during the Late Woodland Period. Historically, Rhode Island's south coast was occupied by the Narragansett and Niantic Indian tribes. [redacted]

[redacted] Aerial photography from 1941 shows the partial clearing of the area near the [redacted], and one dirt roadway loop to the east of the Site. [redacted] may have been used to temporarily stockpile bulk materials. Remediation activities at the former landfill/dump between 1997 and 1998 removed several hundred tons of tires, asphalt, concrete, scrap metal and wood debris, and contaminated soils (VHB, 2019).

### *3.2.3 NRHP Criteria*

[redacted]

[redacted] The variety of lithic materials, range of representative artifact types, and their distribution along with the identification of two suspected Native American cultural features indicate [redacted]

## 3.3 [redacted]

### *3.3.1 Physical Description and Existing Conditions*

[redacted]

[redacted]

[redacted]

**Table 3.3-1. Native American Cultural Materials by Stratum,** [redacted]

| **Material** | **Object** | **Stratum** | | | | **Count** |
|---|---|---|---|---|---|---|
| | | **A1** | **$A_p$** | **B1** | **B2** | |
| [redacted] | [redacted] | [redacted] | | | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | | [redacted] |
| | [redacted] | [redacted] | | | | [redacted] |
| [redacted] | [redacted] | [redacted] | | [redacted] | | [redacted] |
| [redacted] | [redacted] | | | [redacted] | | [redacted] |
| | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |

A small brock fragment was also recovered from the same test pit as the projectile point (TP TH-02). No evidence of suspected Native American features was encountered during test pit excavation [redacted]

### 3.3.2 Historic Context

Based on the Wading River Small Stemmed projectile point recovered from TP TH-02, [redacted] The similarity in stone tool forms used during the Late Archaic and Early Woodland periods suggest that some Small Stemmed tradition sites may include Early Woodland components (Juli and McBride 1984). See Section 3.2.2 for a discussion of the historic context of the Late Archaic period [redacted].

The Early Woodland period (from 1,000 to 450 B.P.) is characterized by limited use of upland areas and more intensive occupation of the coastal zone. In the absence of radiocarbon dates to attribute sites to the specified time range, Early Woodland occupations in Rhode Island have been identified by the presence of associated archaeological traditions including Meadowood, Lagoon, and Rossville type projectile points and by grit-tempered, cord-marked Vinette I ceramics.

Due to the close spatial proximity of the two sites, the early sixteenth to late twentieth century historic context of the [redacted] (see Section 3.2.2).

### 3.3.3 NRHP Criteria

[redacted]. Additional archaeological investigations may contribute new information on Late/Transitional Archaic and Early Woodland Period settlement, Late Archaic exploitation of wetland resources, occupation of an interior esker, similarities and differences between Late Archaic and Early Woodland cultural materials and artifact assemblages, coastal vs. interior subsistence economy preferences during the Archaic Period, and general cultural evolution and change within southern Rhode Island's near interior and coastal zone. In the TARA (PAL, 2021), [redacted]

# 4.0 MITIGATION MEASURES

Revolution Wind recognizes the significance of the [redacted] and is committed to avoiding or minimizing impacts to these sites to the extent feasible. This HPTP addresses the mitigation requirements identified by BOEM to resolve the remaining adverse effects. The mitigation measures for the [redacted] (detailed below) reflect consultations among consulting parties to refine a conceptual mitigation framework proposed by Revolution Wind. BOEM and Revolution Wind have identified steps to implement these measures in consultation with Participating Parties, led by individuals who meet the qualifications specified in the Secretary of the Interior's Qualifications Standards for Archaeology (36 CFR 61) and have demonstrated experience in the interpretation of Precontact Period archaeological sites in the Northeast region.

## 4.1 [redacted]

### *4.1.1 Data Recovery Investigations*

#### 4.1.1.1 Purpose and Intended Outcome

This HPTP proposes to complete Phase III data recovery investigations within the affected sections of the sites to document and recover critical information regarding the ancient Native American use of the [redacted]. The intended outcome is to provide funding to Secretary of the Interior's Qualified Archaeologists (36 CFR 61) to conduct a data recovery investigation within the affected sections of the historic properties.

#### 4.1.1.2 Scope of Work

The scope of work will consist of the following:

- The Phase III Data Recovery Program specifying the scope of the proposed Phase III investigation (Attachment A);
- Field investigation of approximately 20% of the impact areas of both historic properties, including 1-x-1 and 2-x-2-meter excavation units (EUs) to document the stratigraphic integrity of the site, investigate artifact concentrations, and/or investigate potential features more precisely;
- Feature documentation and excavation; and
- Artifact recovery, processing, and analysis.

#### 4.1.1.3 Methodology

The research design and specific research questions to be addressed through field research and laboratory analyses will be developed in consultation with the RI SHPO and the Participating Parties. Representatives from the consulting Native American Tribes will be invited to monitor the field investigations and participate in the interpretation of collected data. Excavations are anticipated to include up to 20 percent of the impacted areas of the historic properties in order to provide a representative sample of cultural materials and to support detailed analyses.

#### 4.1.1.4 Standards

The archaeological data recovery investigations will comply with the following standards:

- Rhode Island Historical Preservation & Heritage Commission's (RIHPHC) Performance Standards and Guidelines for Archaeology in Rhode Island (the Guidelines, 2021); and
- Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (48 Federal Register 44716–44742, 1983).

#### 4.1.1.5 Reporting

The results of the Phase III data recovery investigations will be presented in a Phase III illustrated report. The report will include the results of the Phase III field investigations, artifact analyses, appropriate maps, photographs, and illustrations, and conclusion regarding significance. It is anticipated that the Phase III report will include the following sections:

1. Introduction: The report will describe the purpose and goals of the investigation and describe the proposed development/construction within the historic properties.
2. Project Background: The report will include a summary of the TARA (PAL, 2021), as well as a summary of correspondence with involved state and federal agencies and Participating Parties.
3. Research Design/Research Questions: The Phase III report will include the research design and specific research questions to be addressed by data recovery and analysis at each site.
4. Field Investigations: The Phase III report will include a summary of the methods and results of field investigations. This will include:
    - one or more artifact density maps,
    - representative stratigraphic profiles for test units
    - stratigraphic profiles and plan views of all investigated potential features.
5. Analyses: The report will include a complete artifact inventory, as well as a synthesis and interpretation of the artifact assemblages recovered, and features documented during the Phase I investigation described in the TARA and the proposed Phase III investigations.
6. Conclusions: The report will offer additional preservation and management recommendations and the need (if any) for additional archaeological investigations.

An electronic copy of the Phase III report will be submitted to the RI SHPO, BOEM, and THPOs for review and comment. Revolution Wind will provide two bound copies of the final report to the RI SHPO reflecting the consideration of all consulting party comments and recommendations.

#### 4.1.1.6 Curation

The archaeological collections associated with [redacted] will be curated at PAL facility at 26 Main Street, Pawtucket, Rhode Island. Curation of the collections will be in accordance with a RIHPHC-issued archaeological permit authorizing the data recovery excavations. PAL is an approved curatorial facility under specific project permits issued by the RIHPHC and the Massachusetts Historical Commission (MHC) for collections originating in Rhode Island and Massachusetts. PAL currently curates multiple collections for state and federal agencies in accordance with all applicable state and federal standards. The curation section of the laboratory is inspected regularly by state and federal agencies to ensure the proper maintenance of the cultural materials entrusted to PAL's care.

PAL is an approved institution for curating cultural materials and project-related documentation according to the Code of Federal Regulations 36 CFR 79 (*Curation of Federally-Owned and Administered Archeological Collections*). Laboratory employees are experienced with the curation protocols of many states and federal agencies and the current standards for curation practices as set forth in the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 Federal Register 44716–44742, 1983). The Laboratory Manager is a Registered Professional Archaeologist (RPA) and follows the Code of Conduct for that organization as well as the principles of archaeological ethics specified by the Society of American Archaeology and the Society for Historical Archaeology.

### *4.1.2 Archaeological Construction Monitoring Plan*

Following the completion of the data recovery field investigations an Archaeological Construction Monitoring Plan (Attachment B) will be implemented during all ground disturbing activities within and adjacent to the archaeological sites' impact areas.

### *4.1.3 Historic Property Archaeological Protection Plan*

A Historic Property Archaeological Protection Plan will be developed following the Phase III data recovery investigations in order to ensure that the areas of [redacted] that remain intact will be protected throughout ongoing Operations and Maintenance of the Project. The draft plan will be circulated to the Participating Parties for review.

### *4.1.4 Documentation*

The following documentation is to be provided for review by Participating Parties:

- [redacted];
- Draft Historic Property Archaeological Protection Plan;
- Final Historic Property Archaeological Protection Plan;
- Draft Archaeological Construction Monitoring Report;
- Final Archaeological Construction Monitoring Report;
- Draft Phase III Archaeological Data Recovery Report; and
- Final Phase III Archaeological Data Recovery Report.
- Draft Historic Property Archaeological Protection Plan
- Final Historic Property Archaeological Protection Plan

### *4.1.5 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an Attachment to the MOA.

# 5.0 IMPLEMENTATION

## 5.1 Timeline

The timeline for implementation of the mitigation measures is identified in the MOA.

## 5.2 Organizational Responsibilities

### *5.2.1 Bureau of Ocean Energy Management (BOEM)*

BOEM remains responsible for making all federal decisions and determining compliance with Section 106 of the NHPA. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

### *5.2.2 Revolution Wind, LLC*

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

### *5.2.3 Other Parties, as Appropriate*

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

## 5.3 Participating Party Consultation

This HPTP was provided by Revolution Wind for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. Participating Parties were provided the opportunity for review and comment on the HPTP concurrent with BOEM's NEPA substitution schedule for the Project. This HPTP was further refined through informational

and consultation meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information.

## 6.0 REFERENCES


Code of Federal Regulations (CFR). 2021a. 36 CFR 800 – Protection of Historic Properties [incorporating amendments effective December 15, 2021]. Available at https://www.ecfr.gov/current/title-36/chapter-VIII/part-800. Accessed December 21, 2021.

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Revolution Wind, LLC (Revolution Wind). 2022. *Construction and Operations Plan for the Revolution Wind Farm and Revolution Wind Export Cable Project.* Available at https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan. Accessed January 12, 2022.

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Thorbahn, P. 1982. *The Prehistoric Settlement Systems of Southern New England: Final Report of The Interstate 495 Archaeological Data Recovery Program, Vol. I*. Public Archaeology Laboratory, Department of Anthropology, Brown University Report. Submitted to the Massachusetts Department of Public Works, Boston, MA.

U.S. Secretary of the Interior. 1983. *Standards and Guidelines for Archeology and Historic Preservation* (48 Federal Register 44716–44742).

VHB. 2019. *Phase I Environmental Site Assessment - Revolution Wind Proposed Onshore Cable Route and Interconnection Facility: Whitecape Drive, Circuit Drive and Camp Avenue, North Kingstown, Rhode Island*. Prepared for Ørsted North America, Inc. Providence, Rhode Island.

**ATTACHMENT 8 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE [redacted] TRADITIONAL CULTURAL PROPERTY [redacted] MASSACHUSETTS & ATLANTIC OUTER CONTINENTAL SHELF**

REDACTED

REDACTED – Includes Archaeological Site Location Information

# Historic Property Treatment Plan

for the

# Revolution Wind Farm

## The Chappaquiddick Island Traditional Cultural Property
## Dukes County, Massachusetts & Atlantic Outer Continental Shelf

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

June 2023

## ABSTRACT

| | |
|---|---|
| Federal Undertaking: | Revolution Wind Farm and Revolution Wind Export Cable Project |
| Location: | Outer Continental Shelf and Rhode Island |
| Federal and State Agencies: | Bureau of Ocean Energy Management<br>National Park Service<br>U.S. Army Corps of Engineers<br>Massachusetts Historical Commission<br>Rhode Island Historical Preservation & Heritage Commission<br>New York Historic Preservation Office<br>Connecticut Historic Preservation Office<br>Advisory Council on Historic Preservation |
| Regulatory Process: | National Environmental Policy Act<br>Section 106 of the National Historic Preservation Act<br>Section 110(f) of the National Historic Preservation Act |
| Purpose: | This Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects from the Revolution Wind Project. |
| Adverse Visual Effect Finding for: | The Chappaquiddick Island Traditional Cultural Property (TCP) |
| Submitted By: | Revolution Wind, LLC |
| Date: | June 2023 |

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## LIST OF ACRONYMS

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ADLS | Aircraft Detection Lighting System |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| EDR | Environmental Design and Research, D.P.C. |
| DEIS | Draft Environmental Impact Statement |
| FEIS | Final Environmental Impact Statement |
| FR | Federal Register |
| HPTP | Historic Property Treatment Plan |
| MHC | Massachusetts Historical Commission |
| MOA | Memorandum of Agreement |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act of 1966 |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| RFP | Request for Proposals |
| ROD | Record of Decision |
| RWF | Revolution Wind Farm |
| SOI | Secretary of the Interior |

| | |
|---|---|
| TCP | Traditional Cultural Property |
| USCG | United States Coast Guard |
| WTG | Wind Turbine Generator |

## 1.0 EXECUTIVE SUMMARY

This Historic Property Treatment Plan (HPTP) for the Chappaquiddick Island Traditional Cultural Property (the historic property), which was determined eligible for listing in the National Register of Historic Places by the Bureau of Ocean Energy Management in 2021, provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects identified in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, (HRVEA; EDR, 2023) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) has provided this HPTP in accordance with the Bureau of Ocean Energy Management's (BOEM) Findings of Adverse Effect (FoAE) for the Undertaking under the National Historic Preservation Act of 1966 (NHPA).

BOEM has used the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has consulted with the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, federally recognized Native American Tribes, and other NHPA Section 106 consulting parties in accordance with this process. Revolution Wind has provided this HPTP to BOEM for inclusion in the Final Environmental Impact Statement (FEIS).

This HPTP describes the mitigation measures to resolve potential adverse effects on historic properties, the implementation steps, and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS as well as outreach to consulting parties performed by BOEM. This HPTP document has undergone revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and other consulting parties throughout the NEPA substitution process. This HPTP is included in the Memorandum of Agreement (MOA) issued in accordance with 36 CFR §§ 800.8, 800.10.

This HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.
- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2023) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2022) that guided the development of this document.
- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the mitigation actions. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

- **Section 6.0, References**, is a list of works cited in this HPTP.

# 2.0 BACKGROUND INFORMATION

## 2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

**Figure 2.1-1. Project Location**

[redacted]

## 2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP addresses the mitigation requirements identified by BOEM to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect consultations among consulting parties to refine a conceptual mitigation framework proposed by Revolution Wind.

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2 – Organizational Responsibilities.

### *2.2.1 Municipal Regulations*

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

## 2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following party:

- The historical Chappaquiddick Tribe of the Wampanoag Nation.

REDACTED

# 3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

## 3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and depicted on Figure 3.1-1.

**Table 3.1-1. Historic Property included in the HPTP**

| Name | Municipality | State | Site No. (Agency) | Ownership | Historic Property Type |
|---|---|---|---|---|---|
| The Chappaquiddick Island TCP | Edgartown | MA | N/A | Multiple | TCP |

**Figure 3.1-1. Historic Property Location**

[redacted]

In Section 3.3 the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

## 3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

## 3.3 The Chappaquiddick Island TCP

Chappaquiddick Island, [redacted] is a traditional cultural property encompassing multiple individual places associated with the traditional cultural practices of the historical Chappaquiddick Tribe of the Wampanoag Nation (BOEM, 2020).

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

### 3.3.1 *Historic Context*

The Chappaquiddick Island TCP is one of at least three inter-related Wampanoag maritime traditional cultural properties [redacted] are each distinguishable entities within a broader maritime cultural landscape associated with ancient and enduring traditional beliefs and practices of Wampanoag peoples. Each of the identified TCPs is associated with specific cultural practices and traditions related to the formation of the constituent lands and waters, the origins of the Wampanoag peoples, and the relationships among the Tribes and the worlds in which they have lived since time immemorial.

[redacted]

Traditional ceremonies honoring Chappaquiddick Wampanoag ancestors and the enduring relationships among the indigenous people of Chappaquiddick Island and the woodland, grassland, estuarine, and marine species upon which they relied are still practiced today (BOEM, 2019). Based on BOEM's previous consultations, some ceremonies and cultural connections with the physical and spiritual worlds of which the Tribe is part include activities tied to astronomical events (sunrise, sunset, and moon phases) observed from land-based vantages over the ocean's waters. Traditional cultural connections with the seas, finfish, shellfish, whales, and seals are embodied in the contributing resources to the TCP district and the ancestors buried there or lost at sea.

### *3.3.2 NRHP Criteria and the Maritime Visual Setting*

BOEM determined the Chappaquiddick Island TCP is potentially eligible for listing in the National Register of Historic Places under Criterion A for its association with and importance in maintaining the continuing cultural identity of the Chappaquiddick Tribe of the Wampanoag Nation.

[redacted]

# 4.0 MITIGATION MEASURES

Mitigation measures at these historic properties are detailed in this section. These mitigation measures were developed in consultation with the Participating Parties by individuals who met Secretary of the Interior (SOI) Qualifications Standards for Archeology, History, Architectural History and/or Architecture (62 FR 33708) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, and the NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change.

## *4.1* GIS Database of Contributing Resources to the TCP

### *4.1.1 Purpose and Intended Outcome*

Stewardship of the Chappaquiddick Island TCP is of critical importance to the Chappaquiddick Wampanoag Tribe. The historical Tribe's efforts to preserve and sustain both the physical elements of the historic property and the associated traditional practices with the landscape features, within, will be enhanced with a detailed and current GIS database based on documentation studies being conducted by others. This HPTP proposes the development of a non-proprietary spatial database of contributing resources and associated physical features to assist in prioritizing preservation efforts and ensure that accurate information is available to support local, state, and federal consideration of TCP impacts in future permitting processes.

A GIS database incorporating the results of on-going documentation of the TCP will be developed and include information on existing conditions at each contributing resource and/or significant element of the TCP district. The GIS will include simple data collection and update interfaces to enhance the Tribe's capacity to maintain the database and associated records pertaining to the TCP. The GIS will allow for overlays of other publicly available that may assist in identifying sites and places at-risk due to coastal erosion, storm surge, habitat degradation, or other climate change related threats.

### *4.1.2 Scope of Work*

The scope of work will consist of the following:

- Request for Proposals (RFP)[1];
- Proposals by qualified consultants in response to the RFP;
- Preliminary platform, schema, proposed interfaces, and database structures with associated narrative descriptions that accommodate the following mitigation measure (Section 4.2) for review by the Participating Parties;
- Final development and deployment plan for the GIS; and
- Development and delivery of the GIS with associated datasets.

[1] At the Chappaquiddick Wampanoag's discretion, the RFP for measures described in Sections 4.1 and 4.2 may be combined, provided the scoping is appropriate to encompass the separate deliverable.

Final deliverables produced by the consultant will incorporate further comments and any additional information provided by the participating parties.

#### *4.1.3 Methodology*

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input from the Participating Parties on the criteria for selection and priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

#### *4.1.4 Standards*

Documentation will be prepared by professionals meeting the qualifications specified in the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61). The GIS will be developed by professionals with demonstrated experience in the creation and organization of spatial databases of cultural resources and the relevant and specific attributes necessary for recordation and management. The GIS development will be overseen by a qualified Geographic Information Systems Professional.

#### *4.1.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft deliverables; and
- Final deliverables.

#### *4.1.6 Funds and Accounting*

**Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.**

### *4.2* Development of Interpretative Materials

#### *4.2.1 Purpose and Intended Outcome*

Development of the TCP GIS database (see Section 4.1) will allow for incorporation of other digital media pertaining to the physical and cultural elements of the historic property in a manner that enhances intra-tribal and extra-tribal appreciation. GIS story maps or comparable presentations could include relevant archival data, oral histories, news stories, video footage, and public domain datasets to help the historical

Chappaquiddick Wampanoag Tribe share the history of the TCP and its meaning to members of their community.

The intended outcome of this measure is to support the historical Chappaquiddick Wampanoag Tribe's efforts to integrate existing information from disparate sources in a compelling, flexible interpretative format that suits the needs and priorities of their community. Story maps and comparable presentations would allow the Tribe to focus on educational opportunities within their community, share important information about the TCP with tribal members who have limited physical access to the island, and tell their collective stories in a format that enhances mutual understanding and supports effective decision-making for future preservation efforts.

### *4.2.2 Scope of Work*

The scope of work will consist of the following:

- RFPs[2];
- Proposals by qualified consultants in response to the RFP;
- Community charette(s) to select topics to be addressed in story maps or other interpretive exhibits;
- Draft story maps for review and comment by participating parties; and
- Final story maps.

### *4.2.3 Methodology*

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input from the Participating Parties on the criteria for selection and priorities for the consultant team's qualifications and experience.

Revolution Wind will host a meeting with the Participating Parties to review the draft Story Maps including a walk-through of the user interface, functions and associated media content. Revolution Wind will solicit feedback on the draft work product during the meeting. No more than 30 days following the meeting, Revolution Wind will provide to BOEM and the Participating Parties a summary of the discussions, comments shared, and the steps Revolution Wind will take to incorporate comments in the final work products. Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

### *4.2.4 Standards*

The GIS media (story maps or other work products) will be developed under the supervision of a qualified Geographic Information Systems Professional. Unless otherwise agreed by the Chappaquiddick Wampanoag Tribe and Revolution Wind, the work products will be accessible by parties without access to

[2] At the Chappaquiddick Wampanoag's discretion, the RFP for measures described in Sections 4.1 and 4.2 may be combined, provided the scoping is appropriate to encompass the separate deliverable.

proprietary software and at no cost to the end-user. At the Tribe's discretion, access to sensitive content may be restricted to limited audiences where disclosure would pose a risk to the contributing resources within the TCP or other historic properties.

#### *4.2.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft deliverables; and
- Final deliverables.

#### *4.2.6 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

### 4.3 Climate Adaptation Planning Study

#### *4.3.1 Purpose and Intended Outcome*

Multiple elements of the Chappaquiddick Island TCP are threatened by coastal erosion, habitat degradation, storm impacts, invasive species and other climate change-related risks. Rates of shoreline retreat along [redacted] are among the fastest in the Commonwealth of Massachusetts (Vineyard Gazette, 2013) and future losses to coastal bluffs associated with the TCP can be expected. Breaches to [redacted] may affect the marine habitats within [redacted] that support numerous plant and animal species that form important elements of traditional subsistence patterns. Likewise, rising winter temperatures threaten the viability of cranberry propagation on Martha's Vineyard, as a whole. Archaeological sites associated with past uses of the TCP by the Chappaquiddick Wampanoag Tribe are also threatened by erosion associated with rising seas and the increased frequency and intensity of storms affecting the island. The Climate Adaptation Planning Study would assess future threats to elements of the TCP included in the integrated GIS database (see Section 4.1) and define a series of options to mitigate those threats.

The intended outcome of this measure is a Climate Adaptation Plan that is focused on the specific resources and characteristics of the Chappaquiddick Island TCP and needs of the associated traditional community. The plan and data compiled during the implementation of the other mitigation measures will assist the historical Tribe in determining the most appropriate and feasible actions to help preserve the TCP from foreseeable threats. The plan may also foster collaborative efforts among the municipal, state, and private parties to preserve the unique physical and cultural assets of Chappaquiddick Island.

### 4.3.2 Scope of Work

The scope of work will consist of the following:

- RFPs[3];
- Proposals by qualified consultants in response to the RFP;
- Community charette(s) to select priority resources and/or risks;
- Draft plan for review and comment by participating parties; and
- Final plan.

### 4.3.3 Methodology

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input from the Participating Parties on the criteria for selection and priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

### 4.3.4 Standards

The Climate Adaptation Planning Study will be conducted by qualified professionals with Global Association of Risk Professionals' Sustainability and Climate Risk certification and/or demonstrated experience in the preparation of climate change risk assessments for municipal, state, or federal governments.

### 4.3.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft Plan for review and comment by participating parties; and
- Final Plan.

### 4.3.6 Funds and Accounting

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an Attachment to the MOA.

[3] At the Chappaquiddick Wampanoag's discretion, the RFP for measures described in Sections 4.1 and 4.2 may be combined, provided the scoping is appropriate to encompass the separate deliverable.

# 5.0 IMPLEMENTATION

## 5.1 Timeline

The timeline for implementation of the mitigation measures is identified in the MOA.

## 5.2 Organizational Responsibilities

### *5.2.1 Bureau of Ocean Energy Management (BOEM)*

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

### *5.2.2 Revolution Wind, LLC*

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with tribal nations are performed by professionals who have demonstrated professional experience consulting with Native American tribes and descendant communities.

### *5.2.3 Other Parties, as Appropriate*

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

## 5.3 Participating Party Consultation

This HPTP was provided by Revolution Wind for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. Participating Parties were provided the opportunity for review and comment on the HPTP concurrent with BOEM's NEPA substitution schedule for the Project. This HPTP was further refined through informational

and consultation meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information.

## 6.0 REFERENCES

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**ATTACHMENT 9 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE [redacted] TRADITIONAL CULTURAL PROPERTY [redacted] MASSACHUSETTS & ATLANTIC OUTER CONTINENTAL SHELF - FEDERALLY-RECOGNIZED NATIVE AMERICAN TRIBES**

REDACTED

REDACTED– Includes Archaeological Site Location Information

# Historic Property Treatment Plan

for the

# Revolution Wind Farm

**The Vineyard Sound & Moshup's Bridge Traditional Cultural Property**
**Dukes County, Massachusetts & Atlantic Outer Continental Shelf**
**Federally-Recognized Native American Tribes**

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind, LLC
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Prepared by:

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**June 2023**

REDACTED

## ABSTRACT


| | |
|---|---|
| Federal Undertaking: | Revolution Wind Farm and Revolution Wind Export Cable Project |
| Location: | Outer Continental Shelf and Rhode Island |
| Federal and State Agencies: | Bureau of Ocean Energy Management<br>National Park Service<br>U.S. Army Corps of Engineers<br>Massachusetts Historical Commission<br>Rhode Island Historical Preservation & Heritage Commission<br>New York Historic Preservation Office<br>Connecticut Historic Preservation Office<br>Advisory Council on Historic Preservation |
| Regulatory Process: | National Environmental Policy Act<br>Section 106 of the National Historic Preservation Act<br>Section 110(f) of the National Historic Preservation Act |
| Purpose: | This Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects from the Revolution Wind Project. |
| Adverse Visual Effect Finding for: | The Vineyard Sound & Moshup's Bridge Traditional Cultural Property (TCP), Dukes County, Massachusetts and Atlantic Outer Continental Shelf |
| Submitted By: | Revolution Wind, LLC |
| Date: | June 2023 |

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## LIST OF ACRONYMS

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ADLS | Aircraft Detection Lighting System |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| EDR | Environmental Design and Research, D.P.C. |
| FEIS | Final Environmental Impact Statement |

| | |
|---|---|
| FR | Federal Regulation |
| HPTP | Historic Property Treatment Plan |
| MHC | Massachusetts Historical Commission |
| MOA | Memorandum of Agreement |
| NHPA | National Historic Preservation Act of 1966 |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| RFP | Request for Proposals |
| ROD | Record of Decision |
| RWF | Revolution Wind Farm |
| TCP | Traditional Cultural Property |
| WTG | Wind Turbine Generator |

## 1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the Vineyard Sound & Moshup's Bridge Traditional Cultural Property (the historic property), which was determined eligible for listing in the National Register of Historic Places by the Bureau of Ocean Energy Management in 2021, provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated May 2023 (HRVEA; EDR, 2023) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind, LLC (Revolution Wind) has provided this HPTP in accordance with the Bureau of Ocean Energy Management's (BOEM) Findings of Adverse Effect (FoAE) for the Undertaking under the National Historic Preservation Act (NHPA).

BOEM has used the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has consulted with the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, federally recognized Native American Tribes, and other NHPA Section 106 consulting parties in accordance with this process. Revolution Wind has provided this HPTP to BOEM for inclusion in the Final Environmental Impact Statement (FEIS).

This HPTP describes the mitigation measures to resolve potential adverse effects on historic properties, the implementation steps, and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS as well as outreach to consulting parties performed by BOEM. This HPTP document has undergone revision and refinement in consultation with federally-recognized Native American Tribes, the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. This HPTP is included in the Memorandum of Agreement (MOA) issued in accordance with 36 CFR §§ 800.8, 800.10.

Pursuant to the terms and conditions of the MOA, Revolution Wind will implement these mitigation measures.

This HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.
- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2023) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2022) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the mitigation actions. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

- **Section 6.0, References**, is a list of works cited in this HPTP.

# 2.0 BACKGROUND INFORMATION

## 2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

**Figure 2.1-1. Project Location**

[redacted]

## 2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB).

This HPTP describes the measures to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

### *2.2.1 Municipal Regulations*

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

### *2.2.2 Preservation Easements and Restrictions*

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The State of Massachusetts preservation restrictions are outlined in Massachusetts General Law Chapter 184, Sections 31-33. [redacted] Additional information regarding compliance with extant preservation restrictions appears in Section 5.0, Implementation.

## 2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021 pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) with Federally recognized Native American Tribes and interested consulting parties to review conceptual mitigation measures for the historic property.

# 3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

## 3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

**Table 3.1-1. Historic Property included in the HPTP**

| Name | Municipality | State | Site No. (Agency) | Ownership |
|---|---|---|---|---|
| The Vineyard Sound & Moshup's Bridge TCP | Multiple | MA | N/A | Multiple |

**Figure 3.1-1. Historic Property Location**

[redacted]

In Section 3.3, the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

## 3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

[redacted]

The maritime setting of the TCP is integral to its historical and cultural significance. [redacted]

## 3.3 The Vineyard Sound & Moshup's Bridge TCP

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

The TCP maintains a high degree of integrity despite alterations through time due to post-glacial sea-level rise, coastal erosion, grazing, bombing, clay mining, and modern development. The landforms, themselves, are associated with central events and figures in Wampanoag creation traditions. The historic property continues to support traditional cultural practices, including the sharing of stories related to the formation of the associated landforms and the importance of reciprocal relationships among the Wampanoag peoples and other beings of land, sea, and air as central elements of Wampanoag identities.

### 3.3.1 Historic Context

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

### *3.3.2 NRHP Criteria and the Maritime Visual Setting*

The Vineyard Sound and Moshup's Bridge TCP is eligible for listing in the National Register under the following criteria:

- Criterion A for its association with ancient and historic Native American exploration and settlement of Aquinnah, central events in Moshup's and the Aquinnah tribe's history, and the character of the lands within;
- Criterion B for its association with Moshup;
- Criterion C as a distinguishable and significant component of Aquinnah lifeways, cosmology, economies, traditions, beliefs, and cultural practices; and
- Criterion D for its potential to yield information through archaeology, ethnography, and ethnohistory significant to understanding the Native American settlement, economies, land use and cultural practices prior to and after the inundation of Vineyard Sound.

[redacted]

# 4.0 MITIGATION MEASURES

Mitigation measures at these historic properties are detailed in this section. This HPTP addresses the mitigation requirements identified by BOEM to resolve adverse effects to the Vineyard Sound & Moshup's Bridge TCP. BOEM and Revolution Wind have identified steps to implement these measures in consultation with Participating Parties, led by individuals who meet the qualifications specified in the Secretary of the Interior's Qualifications Standards for History, Architectural History and/or Architecture (62 FR 33708) and have demonstrated experience in the interpretation of Precontact Period archaeological sites in the Northeast region.

## 4.1 Support for Improved Tribal Connections to [redacted]

### *4.1.1 Purpose and Intended Outcome*

[redacted] The mitigation measure would help improve tribal connections to the cultural landscapes of the island for those community members who cannot currently visit through the creation of virtual interpretative or physical exhibits.

This measure is intended to support and enhance the traditional cultural connections [redacted] through the development of interpretative exhibits which may include virtual experiences of the island's existing and past conditions and Wampanoag traditions of the island's creation.

### *4.1.2 Scope of Work*

The scope of work will consist of the following:

- Identification of appropriate printed and/or digital media for interpretative exhibits;
- Archival research on the history, development, and historical/cultural significance of [redacted]
- Consultation with Participating Parties;
    - Consultation meetings and discussions including the Wampanoag Tribe of Gay Head (Aquinnah) and Mashpee Wampanoag Tribe will be bilateral with Revolution Wind unless otherwise requested and agreed upon by the federally-recognized Native American Tribes.
- Design and production of draft interpretive materials;
- Design and production of final printed and/or digital interpretive materials; and

Final deliverables produced by the consultant will incorporate further comments and any additional information provided by the Participating Parties.

#### *4.1.3 Methodology*

Revolution Wind will release a Request for Proposals (RFP) for consultant services in consultation with the Participating Parties and will seek input from the consulting Tribes on the criteria for selection and the Tribes' priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

#### *4.1.4 Standards*

Documentation will be prepared by professionals meeting the qualifications specified in the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61).

#### *4.1.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft deliverables; and
- Final deliverables.

#### *4.1.6 Funds and Accounting*

Funding amounts were determined by BOEM in consultation with the consulting parties and are identified in an Attachment to the MOA.

### 4.2 Scholarships and Training for Tribal Resource Stewardship

#### *4.2.1 Purpose and Intended Outcome*

The Aquinnah and Mashpee tribes have protected and cherished the Vineyard Sound & Moshup's Bridge TCP for generations. Development of the lands and seas within and near the TCP will continue to alter the character-defining elements of the historic property. Climate change is also threatening multiple culturally significant habitats and associated plant and animal communities upon which the Tribes have relied since time immemorial, and which are of great importance in maintaining the distinct cultural identities of the Tribes and Tribe members. Effective analyses, consultation, and decision-making within each Tribal government and to support each Tribe's consultations with external agencies require a broad range of skills and knowledge. The purpose of this measure is to enhance the capacity of each Tribe to preserve the critical physical and cultural attributes of the TCP through training and education of tribal members. Revolution Wind would fund scholarships and fees for professional training or certification programs in the fields of

Astronomy, Archaeology/Anthropology, Marine Sciences, Aquaculture, Marine Fisheries, Marine Construction, Native American Studies, Ethnohistory, History, Biology, and related fields through this measure. At the discretion of each Tribe, recipients of financial support funded through this measure may be required to perform a limited period of service in the tribal government offices related to their field of study or training.

The intended outcome of this measure is to support and strengthen the Tribes' capacity to protect and preserve the TCP and its constituent elements through education and professional development. Traditional stewardship activities, including finfishing, shellfishing, plant harvesting and tending, and respectful treatment of plant and animal communities that form critical elements of the TCP would be enhanced through incorporation of professional and academic training with traditional knowledge.

### *4.2.2 Scope of Work*

The scope of work will consist of the following:

- Development of selection criteria for qualified applicants to receive financial support for educational and training opportunities;
- Development of specific accreditation requirements for educational and training programs to which qualified tribal members may enroll;
- Establishment of the appropriate Tribal Council, Tribal Department of Education, or committees of such governing bodies or departments to select among applicants to the funding program;
- Development of fiscal control measures and annual reporting standards for all disbursements; and
- Development of a Scholarship Program Proposal for review by Revolution Wind prior to initial disbursements, with proposed administrative costs to compensate each Tribal government for administration of the program.

### *4.2.3 Methodology*

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input from the consulting Tribes on the criteria for selection and the Tribes' priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

### *4.2.4 Standards*

Documentation will be prepared by professionals with demonstrated experience in education and training program management and fiscal reporting.

### *4.2.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Executed contracts between the implementing party and selected consultants; and
- Draft Scholarship Program Proposal; and
- Final Scholarship Program Proposal.

### *4.2.6 Funds and Accounting*

Funding amounts were determined by BOEM in consultation with the consulting parties and are identified in an Attachment to the MOA.

## 4.3 Coastal Resilience and Habitat Restoration

### *4.3.1 Purpose and Intended Outcome*

Climate change poses a significant threat to archaeological, architectural, habitat, and landscape elements of the TCP. Rising seas and water temperatures, expansion of invasive species, trends towards shorter, warmer winters, and the increased frequency and intensity of coastal storms are expected to result in future losses of character defining features and contributing resources to the historic property. This measure will provide funding for planning and implementation of targeted efforts to mitigate such foreseeable losses, support economically sustainable traditional shellfishing/finfishing and plant collection practices, and documentation and/or recover of threatened elements of cultural sites associated with the TCP.

The intended outcome of this measure is to identify, and where appropriate, implement projects to preserve, recover, and enhance culturally sensitive species habitat, cultural sites, and to offset the foreseeable impacts of climate change. The structure of this measure is intended to provide for appropriate flexibility for each Tribe to respond to changing conditions over the period of funding and accounts for the unpredictability of certain future environmental conditions. The proposed funding would support phased planning and implementation of related activities. Separate funding would be provided to the Wampanoag Tribe of Gay Head (Aquinnah) and Mashpee Wampanoag Tribe to support each tribe’s priorities and needs.

### *4.3.2 Scope of Work*

The scope of work will consist of the following:

- Development of selection criteria for qualified planning and implementation activities;
- Development of specific professional qualifications for support of funded activities;
- Designation of the appropriate Tribal government body to select project proposals for funding; and
- Development of fiscal control measures, including conflict of interest provisions, and annual reporting on all funded activities.

#### 4.3.3 Methodology

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input from the consulting Tribes on the criteria for selection and the Tribes' priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

#### 4.3.4 Standards

Documentation will be prepared by professionals with demonstrated experience in archaeology, habitat restoration, coastal resilience planning program management and fiscal reporting, as appropriate to the specific funded activities.

All archaeological surveys or other subsurface terrestrial investigations on any land owned or controlled by the Commonwealth of Massachusetts, its agencies or political subdivisions or on any historical or archeological landmarks or on any lands restricted by Massachusetts General Law (MGL) c. 184, § 31 will be conducted in accordance MHC regulations (950 CMR 70). This HPTP does not require MHC permitting for activities that would not otherwise require such permitting.

#### 4.3.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft deliverables; and
  Final deliverables.

#### 4.3.6 Funds and Accounting

Funding amounts were determined by BOEM in consultation with the consulting parties and are identified in an Attachment to the MOA.

### 4.4 Archaeological and Cultural Sites Data Compilation

#### 4.4.1 Purpose and Intended Outcome

The Wampanoag Tribe of Gay Head (Aquinnah) and Mashpee Wampanoag Tribe have each identified a need for updated inventories of archaeological and cultural resource data pertaining to the TCP and the preparation of updated historic contexts for the interpretation of such resources. The measure would provide for a systematic update of existing Massachusetts Historical Commission (MHC)-maintained resource inventories for sites associated with the affected TCP. A historic context for the TCP, drawing upon a NRHP-nomination prepared by others, would be developed to integrate newly compiled information and enhance each Tribe's stewardship efforts.

The intended outcome of this measure is an updated open-source GIS inventory of archaeological/cultural sites that contribute to the significance of the Vineyard Sound & Moshup's Bridge TCP and a companion historic context that assists each Tribe in prioritizing preservation and stewardship efforts. Where feasible, the inventory will include updated information on the existing conditions of contributing resources.

### *4.4.2 Scope of Work*

The scope of work will consist of the following:

- Collection and review of existing MHC and THPO documentation of contributing resources to the Vineyard Sound & Moshup's Bridge TCP;
- Coordination with the parties preparing the NRHP nomination for the TCP to verify resource inventory;
- Field visits and photo-documentation, as feasible, to document existing conditions at contributing archaeological and cultural resources within the TCP;
    - Field visits and documentation will be coordinated with the parties preparing the NRHP nomination to avoid duplicative efforts.
- Development of one or more historic contexts for interpretation of contributing resources in alignment with the draft NRHP nomination;
- Preparation and submittal of revised MHC archaeological site forms or comparable documentation for non-archaeological resources to MHC;
- Preparation of GIS data in an open-source format suitable for incorporation in each Tribe's existing GIS infrastructure;
- Submittal of draft historic context(s) and inventory forms to Participating Parties for review and comment; and
- Submittal of final work historic context(s) and MHC inventory forms to participating parties.
    - All submittals to MHC will follow agency guidelines regarding document formatting and print size.

### *4.4.3 Methodology*

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input from the consulting Tribes on the criteria for selection and the Tribes' priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

### *4.4.4 Standards*

The updated inventory will be prepared by professionals meeting the Secretary of the Interior's professional qualification standards in archeology and/or history (36 CFR 60) and in direct consultation with the Wampanoag Tribe of Gay Head (Aquinnah) and Mashpee Wampanoag Tribe THPOs.

### *4.4.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft and Final Historic Context(s) and MHC Inventory Forms; and
- Open source GIS database will be for sole use by the Wampanoag Tribe of Gay Head (Aquinnah) and Mashpee Wampanoag Tribe or sharing with other Participating Parties at each Tribe's discretion.

### *4.4.6 Funds and Accounting*

Funding amounts were determined by BOEM in consultation with the consulting parties and are identified in an Attachment to the MOA.

## 4.5 Maritime Cultural Landscapes & Interconnected Contexts

### *4.5.1 Purpose and Intended Outcome*

The Vineyard Sound & Moshup's Bridge TCP is a distinguishable element of a broader maritime cultural landscape significant to Wampanoag peoples and other Native American Tribes in the northeastern United States (BOEM, 2021). The consulting Native American Tribes have expressed an interest in greater recognition of the maritime landscapes associated with their individual tribe's and shared traditional beliefs and practices. This measure will draw upon on-going ethnographic studies and documentation of the Vineyard Sound & Moshup's Bridge and Chappaquiddick Island TCPs, interviews with traditional knowledge holders among the consulting Tribes, and supplemental archival research to document the interconnected components of a broader maritime cultural landscape. The measure will afford opportunities for the associated Tribes to share, as appropriate and at their sole discretion, their traditional knowledge and stories relating to the formation of the lands and seas, significant events in their community's history associated with the maritime cultural landscape, and how their maritime traditions continue to support and sustain their distinctive cultural identities. The intended outcome is a publicly-available and inclusive synthesis of information and knowledge about the maritime cultural landscapes along the shores, coastal islands, and waters of southern New England and Long Island. In accordance with requests from several of the consulting Tribes, documentation and presentation of the maritime cultural landscape will incorporate traditional Wampanoag and other Tribes' names for places, people, and events associated the cultural landscape.

### 4.5.2 Scope of Work

The scope of work will consist of the following:

- Collection and review of available documentation regarding Native American traditions associated with the coastal and submerged lands and waters of the region;
- Consultations[1] with the consulting Tribes to refine the geographic extent of a potential maritime cultural landscape;
- Consultations with the Wampanoag Tribe of Gay Head (Aquinnah) and Mashpee Wampanoag Tribe to identify appropriate knowledge-holders with an interest in sharing traditions and beliefs associated with the maritime cultural landscape;
- Consultations with appropriate knowledge-holder to identify appropriate names and terms for significant elements of the cultural landscape;
- Preparation of draft mapping depicting the boundaries and sub-divisions or significant elements of the landscape;
- Interviews with traditional knowledge-holders to collect information regarding traditions and variations on traditions associated with the cultural landscape;
- Creation of GIS data layers depicting the boundaries and names of significant maritime cultural landscape elements;
    - To the extent feasible and practicable, GIS data will be formatted to be compatible with open-source platforms used by the Tribes or employed to share data generated from other offshore wind projects in the region;
- Submittal of a preliminary draft report and mapping synthesizing the information gathered;
- Review of all comments and suggestions provided by the consulting Tribes on the preliminary draft report;
- Submittal of a second draft report to Participating Parties for review and comment; and
- Submittal of final report to Participating Parties.

### 4.5.3 Methodology

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input from the consulting Tribes on the criteria for selection and the Tribes' priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

### 4.5.4 Standards

The report will be prepared by professionals meeting the Secretary of the Interior's professional qualification standards in cultural anthropology, archeology, and/or history (36 CFR 60) and in direct consultation with

[1] Consultations under this Scope of Work will be conducted separately for each federally-recognized Tribe unless requested and agreed upon by all such Tribes.

the Wampanoag Tribe of Gay Head (Aquinnah) and Mashpee Wampanoag Tribe's Tribal Historic Preservation Offices or other designated tribal representative(s).

### *4.5.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft and Final reports; and
- Open-source GIS database will be for sole use by the Wampanoag Tribe of Gay Head (Aquinnah) and the Mashpee Wampanoag Tribe or sharing with other Participating Parties at each Tribe's discretion.
- If mutually agreed by the Wampanoag Tribe of Gay Head (Aquinnah) and the Mashpee Wampanoag Tribe, a publicly-available Open-source GIS will be created for access by other Participating Parties and members of the surrounding communities.

### *4.5.6 Funds and Accounting*

Funding amounts were determined by BOEM in consultation with the consulting parties and are identified in an Attachment to the MOA.

# 5.0 IMPLEMENTATION

## 5.1 Timeline

The timeline for implementation of the mitigation measures is identified in the MOA.

## 5.2 Organizational Responsibilities

### *5.2.1 Bureau of Ocean Energy Management (BOEM)*

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.
- BOEM may, at its discretion, assist the implementing party in inter-agency coordination with USFWS and the Navy.

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

### *5.2.2 Other Parties, as Appropriate*

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

## 5.3 Participating Party Consultation

This HPTP was provided by Revolution Wind for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. Participating Parties were provided the opportunity for review and comment on the HPTP concurrent with BOEM's NEPA substitution schedule for the Project. This HPTP was further refined through informational

and consultation meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information.

## 6.0 REFERENCES

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**ATTACHMENT 10 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE [redacted] TRADITIONAL CULTURAL PROPERTY [redacted] MASSACHUSETTS & ATLANTIC OUTER CONTINENTAL SHELF – NON-FEDERALLY-RECOGNIZED NATIVE AMERICAN TRIBES**

REDACTED

REDACTED – Includes Archaeological Site Location Information

# Historic Property Treatment Plan

for the

# Revolution Wind Farm

## The Vineyard Sound & Moshup's Bridge Traditional Cultural Property
## Dukes County, Massachusetts & Atlantic Outer Continental Shelf
## Consulting Parties

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

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Syracuse, New York 13202
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June 2023

# ABSTRACT


Federal Undertaking: Revolution Wind Farm and Revolution Wind Export Cable Project

Location: Outer Continental Shelf and Rhode Island

Federal and State Agencies: Bureau of Ocean Energy Management
National Park Service
U.S. Army Corps of Engineers
Massachusetts Historical Commission
Rhode Island Historical Preservation & Heritage Commission
New York Historic Preservation Office
Connecticut Historic Preservation Office
Advisory Council on Historic Preservation

Regulatory Process: National Environmental Policy Act
Section 106 of the National Historic Preservation Act
Section 110(f) of the National Historic Preservation Act

Purpose: This Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects from the Revolution Wind Project.

Adverse Visual Effect Finding for: The Vineyard Sound & Moshup's Bridge Traditional Cultural Property (TCP), Dukes County, Massachusetts and Atlantic Outer Continental Shelf

Submitted By: Revolution Wind, LLC

Date: June 2023

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## LIST OF ACRONYMS

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ADLS | Aircraft Detection Lighting System |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| EDR | Environmental Design and Research, D.P.C. |
| FEIS | Final Environmental Impact Statement |
| FR | Federal Regulation |
| HPTP | Historic Property Treatment Plan |
| MHC | Massachusetts Historical Commission |
| MOA | Memorandum of Agreement |
| NHPA | National Historic Preservation Act of 1966 |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| RFP | Request for Proposals |
| ROD | Record of Decision |
| RWF | Revolution Wind Farm |
| TCP | Traditional Cultural Property |
| WTG | Wind Turbine Generator |

## 1.0 EXECUTIVE SUMMARY

This Historic Property Treatment Plan (HPTP) for the Vineyard Sound & Moshup's Bridge Traditional Cultural Property (the historic property), which was determined eligible for listing in the National Register of Historic Places by the Bureau of Ocean Energy Management in 2021, provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects caused by the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind, LLC (Revolution Wind) has provided this HPTP in accordance with the Bureau of Ocean Energy Management's (BOEM) Findings of Adverse Effect (FoAE) for the Undertaking under the National Historic Preservation Act (NHPA).

BOEM has used the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has consulted with the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, federally recognized Native American Tribes, and other NHPA Section 106 consulting parties in accordance with this process. Revolution Wind has provided this HPTP to BOEM for inclusion in the Final Environmental Impact Statement (FEIS).

This HPTP describes the mitigation measures to resolve adverse effects on historic properties, the implementation steps, and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS as well as outreach to consulting parties performed by BOEM. This HPTP documents has undergone revision and refinement in consultation with federally-recognized Native American Tribes, the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. This HPTP is included in the Memorandum of Agreement (MOA) issued in accordance with 36 CFR §§ 800.8, 800.10.

Pursuant to the terms and conditions of the MOA, Revolution Wind will implement these mitigation measures.

This HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2023) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2022) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the mitigation actions. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

- **Section 6.0, References**, is a list of works cited in this HPTP.

# 2.0 BACKGROUND INFORMATION

## 2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

**Figure 2.1-1. Project Location**

[redacted]

## 2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB).

This HPTP describes the measures to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

### *2.2.1 Municipal Regulations*

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

### *2.2.2 Preservation Easements and Restrictions*

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The State of Massachusetts preservation restrictions are outlined in Massachusetts General Law Chapter 184, Sections 31-33. [redacted] dditional information regarding compliance with extant preservation restrictions appears in Section 5.0, Implementation.

## 2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution

Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) with interested consulting parties to review conceptual mitigation measures for the historic property.

REDACTED

# 3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

## 3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

**Table 3.1-1. Historic Property included in the HPTP**

| Name | Municipality | State | Site No. (Agency) | Ownership |
|---|---|---|---|---|
| The Vineyard Sound & Moshup's Bridge TCP | Multiple | MA | N/A | Multiple |

**Figure 3.1-1. Historic Property Location**

[redacted]

In Section 3.3, the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

## 3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

[redacted]

The maritime setting of the TCP is integral to its historical and cultural significance. [redacted]

## 3.3 The Vineyard Sound & Moshup's Bridge TCP

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

The TCP maintains a high degree of integrity despite alterations through time due to post-glacial sea-level rise, coastal erosion, grazing, bombing, clay mining, and modern development. The landforms, themselves, are associated with central events and figures in Wampanoag creation traditions. The historic property continues to support traditional cultural practices, including the sharing of stories related to the formation of the associated landforms and the importance of reciprocal relationships among the Wampanoag peoples and other beings of land, sea, and air as central elements of Wampanoag identities.

### 3.3.1 Historic Context

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

### 3.3.2 *NRHP Criteria and the Maritime Visual Setting*

The Vineyard Sound and Moshup's Bridge TCP is eligible for listing in the National Register under the following criteria:

- Criterion A for its association with ancient and historic Native American exploration and settlement of Aquinnah, central events in Moshup's and the Aquinnah tribe's history, and the character of the lands within;
- Criterion B for its association with Moshup;
- Criterion C as a distinguishable and significant component of Aquinnah lifeways, cosmology, economies, traditions, beliefs, and cultural practices; and
- Criterion D for its potential to yield information through archaeology, ethnography, and ethnohistory significant to understanding the Native American settlement, economies, land use and cultural practices prior to and after the inundation of Vineyard Sound.

[redacted]

REDACTED

[redacted]

# 4.0 MITIGATION MEASURES

Mitigation measures at these historic properties are detailed in this section. This HPTP addresses the mitigation requirements identified by BOEM to resolve adverse effects to the Vineyard Sound & Moshup's Bridge TCP. BOEM and Revolution Wind have identified steps to implement these measures in consultation with Participating Parties, led by individuals who meet the qualifications specified in the Secretary of the Interior's Qualifications Standards for History, Architectural History and/or Architecture (62 FR 33708) and have demonstrated experience in the interpretation of Precontact Period archaeological sites in the Northeast region.

## 4.1 Public Interpretation of Interconnected Maritime Cultural Landscapes

### *4.1.1 Purpose and Intended Outcome*

The Vineyard Sound & Moshup's Bridge TCP is a distinguishable element of a broader maritime cultural landscape significant to Wampanoag peoples and other Native American Tribes in the northeastern United States (BOEM, 2021). The consulting Native American Tribes have expressed an interest in greater recognition of the maritime landscapes associated with their individual tribe's and shared traditional beliefs and practices. This measure will draw upon on-going ethnographic studies and documentation of the Vineyard Sound & Moshup's Bridge and Chappaquiddick Island TCPs, interviews with traditional knowledge holders, and supplemental archival research to document the interconnected components of a broader maritime cultural landscape. The measure will afford opportunities for consulting parties to share, as appropriate and at their sole discretion, their traditional knowledge and stories relating to the formation of the lands and seas, significant events in their community's history associated with the maritime cultural landscape, and how their maritime traditions continue to support and sustain their distinctive cultural identities. The intended outcome is a publicly-available and inclusive synthesis of information and knowledge about the maritime cultural landscapes along the shores, coastal islands, and waters of southern New England and Long Island. In accordance with requests from several of the consulting parties, documentation and presentation of the maritime cultural landscape will incorporate traditional Wampanoag and other Tribes' names for places, people, and events associated the cultural landscape.

### *4.1.2 Scope of Work*

The scope of work will consist of the following:

- Collection and review of available documentation regarding Native American traditions associated with the coastal and submerged lands and waters of the region;
- Consultations[1] with the consulting parties to refine the geographic extent of a potential maritime cultural landscape;
- Consultations with the consulting parties to identify appropriate knowledge-holders with an interest in sharing traditions and beliefs associated with the maritime cultural landscape;

[1] Consultations under this Scope of Work will be conducted separately for each consulting party unless requested and agreed upon by all consulting parties.

- Consultations with appropriate knowledge-holder to identify appropriate names and terms for significant elements of the cultural landscape;
- Preparation of draft mapping depicting the boundaries and sub-divisions or significant elements of the landscape;
- Interviews with traditional knowledge-holders to collect information regarding traditions and variations on traditions associated with the cultural landscape;
- Creation of GIS data layers depicting the boundaries and names of significant maritime cultural landscape elements;
    - To the extent feasible and practicable, GIS data will be formatted to be compatible with open-source platforms used by the consulting parties or employed to share data generated from other offshore wind projects in the region;
- Submittal of a preliminary draft report and mapping synthesizing the information gathered;
- Review of all comments and suggestions provided by the consulting parties on the preliminary draft report;
- Submittal of a second draft report to Participating Parties for review and comment; and
- Submittal of final report to Participating Parties.

### *4.1.3 Methodology*

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input from the consulting parties on the criteria for selection and the parties' priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

### *4.1.4 Standards*

The report will be prepared by professionals meeting the Secretary of the Interior's professional qualification standards in cultural anthropology, archeology, and/or history (36 CFR 60) and in direct consultation with each of the consulting Tribe's Tribal Historic Preservation Office or other designated tribal representative(s).

### *4.1.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft and Final reports; and
- Open-source GIS database will be for sole use by the Wampanoag Tribe of Gay Head (Aquinnah) and the Mashpee Wampanoag Tribe or sharing with other Participating Parties at each Tribe's discretion.

- If mutually agreed by the Wampanoag Tribe of Gay Head (Aquinnah) and the Mashpee Wampanoag Tribe, a publicly-available Open-source GIS will be created for access by other Participating Parties and members of the surrounding communities.

### *4.1.6 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

# 5.0 IMPLEMENTATION

## 5.1 Timeline

The timeline for implementation of the mitigation measures is identified in the MOA.

## 5.2 Organizational Responsibilities

### *5.2.1 Bureau of Ocean Energy Management (BOEM)*

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.
- BOEM may, at its discretion, assist the implementing party in inter-agency coordination with USFWS and the Navy.

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes, historical Tribes, and descendant communities.

### *5.2.2 Other Parties, as Appropriate*

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

## 5.3 Participating Party Consultation

This HPTP was provided by Revolution Wind for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. Participating Parties were provided the opportunity for review and comment on the HPTP concurrent with BOEM's NEPA substitution schedule for the Project. This HPTP was further refined through informational

and consultation meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information.

## 6.0 REFERENCES

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**ATTACHMENT 11 – HISTORIC PROPERTY TREATMENT PLAN FOR THE REVOLUTION WIND FARM: DOCUMENTATION OF TWENTY-SIX HISTORIC PROPERTIES IN RHODE ISLAND**

# Historic Property Treatment Plan

## for the

# Revolution Wind Farm

## Documentation of Twenty-Six Historic Properties in Rhode Island

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

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**June 2023**

## ABSTRACT

| | |
|---|---|
| Federal Undertaking: | Revolution Wind Farm and Revolution Wind Export Cable Project |
| Location: | Outer Continental Shelf and Rhode Island |
| Federal and State Agencies: | Bureau of Ocean Energy Management<br>National Park Service<br>U.S. Army Corps of Engineers<br>Massachusetts Historical Commission<br>Rhode Island Historical Preservation & Heritage Commission<br>New York Historic Preservation Office<br>Connecticut Historic Preservation Office<br>Advisory Council on Historic Preservation |
| Regulatory Process: | National Environmental Policy Act<br>Section 106 of the National Historic Preservation Act<br>Section 110(f) of the National Historic Preservation Act |
| Purpose: | This Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects from the Revolution Wind Project. |
| Adverse Visual Effect Finding for: | Abbott Phillips House, Little Compton<br>Warren Point Historic District, Little Compton<br>Tunipus Goosewing Farm, Little Compton<br>Fort Varnum/Camp Varnum, Narragansett<br>Narragansett Pier MRA, Narragansett<br>Life Saving Station at Narragansett Pier, Narragansett<br>The Towers Historic District, Narragansett<br>The Towers/Tower Entrance of Narragansett Casino, Narragansett<br>Dunmere, Narragansett<br>Ocean Road Historic District, Narragansett<br>Champlain Farm Historic District, New Shoreham<br>Mitchell Farm Historic District, New Shoreham<br>Beacon Hill Historic District, New Shoreham<br>Lewis-Dickens Farm Historic District, New Shoreham<br>Lakeside Drive and Mitchell Lane Historic District, New Shoreham<br>Indian Head Neck Road Historic District, New Shoreham<br>Beach Avenue Historic District, New Shoreham<br>Old Town and Center Roads Historic District, New Shoreham |

| | |
|---|---|
| | Corn Neck Road Historic District, New Shoreham<br>Pilot Hill Road and Seaweed Lane Historic District, New Shoreham<br>New Shoreham Historic District, New Shoreham<br>Ochre Point-Cliffs Historic District, Newport<br>Ocean Drive Historic District, Newport<br>Bellevue Avenue Historic District, Newport<br>Brownings Beach Historic District, South Kingstown<br>Puncatest Neck Historic District, Tiverton |
| Submitted By: | Revolution Wind, LLC |
| Date: | June 2023 |

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## LIST OF ACRONYMS

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ADLS | Aircraft Detection Lighting System |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| EDR | Environmental Design and Research, D.P.C. |
| DEIS | Draft Environmental Impact Statement |
| FEIS | Final Environmental Impact Statement |
| FR | Federal Register |
| HPTP | Historic Property Treatment Plan |
| MOA | Memorandum of Agreement |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act of 1966 |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| RFP | Request for Proposals |
| RIHPHC | Rhode Island Historical Preservation & Heritage Commission |
| ROD | Record of Decision |
| RWF | Revolution Wind Farm |
| USCG | United States Coast Guard |
| WTG | Wind Turbine Generator |

## 1.0 EXECUTIVE SUMMARY

This Historic Property Treatment Plan (HPTP) was developed in consultation with the Rhode Island Historical Preservation & Heritage Commission (RIHPHC). The HPTP provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm* (HRVEA; EDR, 2023) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking) for twenty-six aboveground historic properties located in Rhode Island (hereinafter, the Historic Properties).

**Table 1-1 Historic Properties included in the HPTP**

| Historic Property Name | Municipality | Property Designation |
|---|---|---|
| Abbott Phillips House | Little Compton | RIHPHC Historic Resource |
| Warren Point Historic District | Little Compton | National Register of Historic Places (NRHP)-Eligible Resource (RIHPHC-Determined) |
| Tunipus Goosewing Farm | Little Compton | NRHP-Eligible Resource (RIHPHC-Determined) |
| Fort Varnum/Camp Varnum | Narragansett | NRHP-Eligible Resource (RIHPHC-Determined) |
| Narragansett Pier MRA | Narragansett | NRHP-Listed Resource |
| Life Saving Station at Narragansett Pier | Narragansett | NRHP-Listed Resource |
| The Towers Historic District | Narragansett | NRHP-Listed Resource |
| The Towers/Tower Entrance of Narragansett Casino | Narragansett | NRHP-Listed Resource |
| Dunmere | Narragansett | NRHP-Listed Resource |
| Ocean Road Historic District | Narragansett | NRHP-Listed Resource |
| Champlain Farm Historic District | New Shoreham | NRHP-Eligible Resource (RIHPHC-Determined) |
| Mitchell Farm Historic District | New Shoreham | NRHP-Eligible Resource (RIHPHC-Determined) |
| Beacon Hill Historic District | New Shoreham | NRHP-Eligible Resource (RIHPHC-Determined) |
| Lewis-Dickens Farm Historic District | New Shoreham | NRHP-Eligible Resource (RIHPHC-Determined) |
| Lakeside Drive and Mitchell Lane Historic District | New Shoreham | NRHP-Eligible Resource (RIHPHC-Determined) |
| Indian Head Neck Road Historic District | New Shoreham | NRHP-Eligible Resource (RIHPHC-Determined) |
| Beach Avenue Historic District | New Shoreham | NRHP-Eligible Resource (RIHPHC-Determined) |
| Old Town and Center Roads Historic District | New Shoreham | NRHP-Eligible Resource (RIHPHC-Determined) |
| Corn Neck Road Historic District | New Shoreham | NRHP-Eligible Resource (RIHPHC-Determined) |
| Pilot Hill Road and Seaweed Lane Historic District | New Shoreham | NRHP-Eligible Resource (RIHPHC-Determined) |
| New Shoreham Historic District | New Shoreham | Local Historic District |
| Ochre Point-Cliffs Historic District | Newport | NRHP-Listed |

| Historic Property Name | Municipality | Property Designation |
|---|---|---|
| Ocean Drive Historic District | Newport | National Historic Landmark (NHL) |
| Bellevue Avenue Historic District | Newport | NHL |
| Brownings Beach Historic District | South Kingstown | NRHP-Listed Resource |
| Puncatest Neck H.D. | Tiverton | RIHPHC Historic Resource |

Revolution Wind LLC (Revolution Wind) has provided this HPTP in accordance with the Bureau of Ocean Energy Management's (BOEM) Findings of Adverse Effect (FoAE) for the Undertaking under the National Historic Preservation Act of 1966 (NHPA).

BOEM has used the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has consulted with the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, federally recognized Native American Tribes, and other NHPA Section 106 consulting parties in accordance with this process. Revolution Wind has provided this HPTP to BOEM for inclusion in the Final Environmental Impact Statement (FEIS).

This HPTP describes the mitigation measures to resolve potential adverse effects on historic properties, the implementation steps, and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS as well as outreach to consulting parties performed by BOEM. This HPTP document has undergone revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and other consulting parties throughout the NEPA substitution process. This HPTP is included in the Memorandum of Agreement (MOA) issued in accordance with 36 CFR §§ 800.8, 800.10.

This HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2023) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2022) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the mitigation actions. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

- **Section 6.0, References**, is a list of works cited in this HPTP.

# 2.0 BACKGROUND INFORMATION

## 2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations. The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

## 2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP addresses the mitigation requirements identified by BOEM to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect consultations among consulting parties to refine a conceptual mitigation framework proposed by Revolution Wind.

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

### *2.2.1 Municipal Regulations*

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

### *2.2.2 Preservation Easements and Restrictions*

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The MOA identifies certain preservation restrictions and easements applicable to specific properties in Stipulation III.C.1. The Rhode Island General Law Title 42, Section 42-45-9.1 established a historic preservation easement fund. The RIHPHC holds Historic Preservation Easements on the following historic properties:

- The Towers, Narragansett
- Spring House Hotel, New Shoreham
- Redwood Library, Newport
- Griswold House (Newport Art Museum), Newport
- Cushing Gallery, Newport
- The Kedge, Newport
- Harbor Court, Newport
- Touro Synagogue National Historic Site, Newport
- Bienvenue, Newport
- Ochre Court, Newport
- The Breakers, Newport
- Seaward, Newport
- Newport Casino, Newport
- Kingscote, Newport
- Chateau-sur-Mer, Newport
- Chinese Tea House at Marble House, Newport
- Faxon Lodge, Newport
- Edward King House, Newport

Any mitigation work associated with the Historic Properties will comply with the conditions of all extant historic preservation easements.

## 2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic properties and invited the following parties:

- The Town of Little Compton
- The Town of Narragansett
- The Narragansett Historic District Commission

- The Narragansett Historical Society
- The Town of New Shoreham
- The Block Island Historical Society
- The City of Newport
- The Newport Restoration Foundation
- The Newport Historic District Commission
- The Preservation Society of Newport County
- The Town of South Kingstown
- The Town of Tiverton
- The U.S. Coast Guard
- The Rhode Island Historical Preservation & Heritage Commission.

## 3.0 HISTORIC PROPERTIES

This HPTP involves twenty-six historic properties, as identified above in Table 1.1-1. In the below section, each historic property is individually considered, described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

### 3.1 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The historic properties identified in this HPTP are included within the following property types as defined in the HRVEA: "Historic Buildings and Structures," "Historic Cemeteries and Burial Grounds," "Agricultural Properties," "Recreational Properties," "Maritime Safety and Defense Facilities," "Lighthouses and Navigational Aids," and "Estates and Estate Complexes." Each property type is defined below as well as the characteristics typical of their maritime setting.

"Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the "Estates and Estate Complexes" property type (see below). These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Historic buildings and structures not fitting within the previously described types occur throughout the study area and in a variety of local contexts. Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic structures were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and Historic Buildings frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

"Historic Cemeteries and Burial Grounds" consists of cemeteries identified by federal, state, or local governmental agencies as having historic significance. These above-ground historic properties may be municipally owned cemeteries on public land, small family plots on private land, or abandoned burial grounds. Historic cemeteries are lasting memorials to the past, provide a guide to the changing values and composition of communities in the course of their historic development.

Historic cemeteries and burial grounds vary throughout the study area. Small, private, non-denominational and family cemeteries were relatively common in New England, and many have survived to present-day. Many examples of small cemeteries were associated with specific farms or families and were frequently placed within the available agricultural lands surrounding a farmstead or near multiple associated family farms. Where such burial grounds are located near the water they may be associated with ocean or other maritime viewsheds, however, ocean vistas are less likely to have been a significant consideration in the siting of such cemeteries than their larger, more formal counterparts in the region. Where cemeteries are located within districts or other historic settlements strongly associated with maritime settings, such burial grounds may be sited to maintain a visual connection to the waters in order to maintain a sense of continuity linking the departeds' final resting places with the environment in which they lived. Cemeteries in urban locations expressing such patterns may include formal design elements associated with the "rural cemetery movement" of the 19th century, which sought to create naturalistic, park-like settings to express "an appreciation of nature and a sense of the continuity of life" (Potter and Boland, 1992). Maritime views from hillside cemeteries that were intentionally incorporated or framed by landscape designs may be more sensitive to discordant modern elements than those associated with less formal burial grounds that may not have been specifically located to provide ocean views.

"Agricultural Properties" consist of historic farm buildings and landscapes which have retained a high degree of integrity and are generally no longer used for their original purpose. These above-ground historic properties feature barns, farmhouses, and large, open tracts of pastureland. Generally, these above-ground historic properties do not derive their significance in any direct way from the ocean or maritime activities.

Historic agricultural properties, including farms, farmhouses, barns and related buildings and structures are relatively common in the study area. Many of these properties were built between 1700 and 1850, after which agricultural economies in New England and New York declined sharply. The historic settings for such properties typically include open, agrarian landscapes which once may have afforded open views of the seas when sited along the shoreline or at higher elevations within the coastal interior. Few of the once expansive agrarian landscapes associated with the historic use of the region's farms survive. Some have been altered by later residential and commercial development and many have been transformed by reforestation. Despite these changes, historic agricultural properties remain an important part of the region's heritage and tangible expression of several centuries of intensive farming that transformed the landscapes throughout southern New England and eastern Long Island.

"Recreational Properties" is defined by the role these properties served in their original functions as places for the resort tourism economy of the late-nineteenth century to flourish. These above-ground historic properties feature beaches, casinos, restaurants, and other buildings and structures built to entertain seasonal vacationers. They are typically located near the shoreline or immediately adjacent to the sea, and in some cases, are the beaches themselves. The enjoyment of, and interaction with, the sea are integral features of the significance of these above-ground historic properties. In many cases, the beachfront, shoreline, and adjacent ocean waters are prominent features of the historic setting due to their close association with historic recreational activities.

The same macroeconomic trends that saw the decline of the quintessential New England farm in the mid-19th century are associated with a population shift to cities and rise in affluence for some segments of society. Summer resorts, supported by steamships, rail transportation, and eventually, automobiles were developed in numerous locations in the study area in the late 19th century. These resorts varied between properties intended to serve the rising group of "upper middle income" families living in the region's cities to estate-like developments serving a more affluent set. Seaside resorts, like many other shoreline recreational, commercial, and residential properties, were often sited to take advantage of aesthetically pleasing ocean or maritime views. Depending on location and the conformation of the local shoreline, such properties may be associated with specific bay or cove viewsheds that include limited areas of the open ocean waters. Recreational activities at resorts frequently included swimming and designated beaches where residents and visitors may have spent considerable time during the summer months. Where these features are still present and express a tangible association with the historic resort property, views from beaches may be as important as views from more formal elements of the designed landscape. Likewise, historic hotels and inns became more common elements of the region's shoreline communities in the late 19th century. Such properties were often sited near harbors, ferry landings, rail stations, and public or private beaches and may be associated with similar historic maritime settings. Views to ocean waters or the more intimate bays and coves of the region may have been an integral part of the visitor's motivation for staying in such establishments. Such considerations can be expressed through the inclusion of building and landscape features clearly intended to afford views of ocean. Older taverns and inns in the study area may be found along the working harbors and ports and were intended to serve the fishing, whaling, and related participants in maritime commerce. The design and location of these properties may not show the same influence of aesthetic considerations but will likely also retain a strong association with the waterfront and maritime environment.

"Maritime Safety and Defense Facilities" consists entirely of facilities erected by bureaus of the U.S. Department of Defense or their predecessors and share historic associations with coastal defense. These structures vary in their design and construction materials but are unified by their historic functions of rescuing and protecting maritime transportation in the area, or for coastal defense.

Historic military and maritime safety properties along the shoreline will likely be associated with maritime settings. Aesthetic considerations in the siting of such facilities may or may not be expressed in the design of buildings, structures, and landscapes depending on the age and specific functions of the property. Proximity to navigation channels, defensibility, and the presence of existing shipbuilding or repair infrastructure in a broader maritime context may have been significant considerations in the siting of naval facilities. Such factors may not demonstrate a significant association with open ocean viewsheds. The study area includes several significant examples of World War II-era defense structures, including fire control or observation towers designed to monitor specific parts of the maritime environment. Early lifesaving stations were likewise intended to provide for observation of marine waters in the vicinity of known hazards or where storms posed specific risks to sea-going or coastal vessels. Lifesaving stations were also frequently located where rescue boats or other vessels might be safely launched under treacherous conditions. These locations may have included inlets, harbors or coves adjacent to open waters where rescue and recovery efforts would likely be made.

"Lighthouses and Navigational Aids" are defined by the historic associations with water-related transportation and defense, prominent views of the sea and dominance of the surrounding landscape, and common architectural forms. These structures present themselves as prominent and iconic features on the coastal landscape, possess elevated views of the ocean horizon, and are sited specifically for those elevated views.

Lighthouses and other historic navigation aids in the study area include properties that were intended to serve mariners plying large areas of open water and other properties that served specific navigation routes through the complex and treacherous waters of the region's bays. All of these properties have an obvious association with maritime settings, but the scale of those settings will vary due to the conformation of the local landscape and seas and the design and purpose of each navigation aid.

"Estates and Estate Complexes" consists of high-style residences, or groupings of residences, typically designed by prominent architects of the nineteenth and early twentieth centuries, such as Richard Morris Hunt and McKim, Mead and White. This property type consists mainly of the mansions and summer "cottages" built by wealthy industrialist families, drawn to the vicinity of Newport, Rhode Island as it became a prominent vacation and recreation area for the emerging American elite, and to Montauk Point as a naturalistic and remote enclave.

Estates built by or for wealthy families have been part of the region's landscapes for centuries and many such properties are located along the shorelines. High style, architect-designed mansions and associated landscapes are characteristic of several areas within the study area and many such properties were sited to take advantage of ocean views. The importance of maritime settings to these properties may be apparent in the design of building features such as veranda, porches, and large windows facing the water or through landscape elements and overall designs that were intended to frame specific views towards the seas. As with many other historic property types, the conformation of local shorelines and the specific orientation of each property may be important in assessing the association with specific aspects or elements of each associated viewshed.

## 3.2 Little Compton

### *3.2.1 The Abbott Phillips House*

#### 3.2.1.1 Physical Description and Existing Conditions

The Abbott Phillips House was built circa 1926-1927 by regional architect Albert Harkness (RIHPHC, 1990). It is sited at 97 Round Pond Road on a 1.8-acre lot, just north of Mill Point, at the Atlantic Ocean. The residence is one-and-one-half stories tall, and approximately 3200 square feet. Its massing is Z-shaped with a central main block (shingled, with mansard roof and hipped dormers), two gabled wings to either side, and a round stone entrance tower where the southern sections meet. The immediate landscape around the house has been cleared but the parcel retains woodlots as well.

#### 3.2.1.2 Historic Context

Henry Tillinghast Sisson, son of industrialist David Sisson, served with distinction during the Civil War, and after his death was honored by construction of a statue to his memory in Union Cemetery, in the Town of Little Compton. He worked as a mill superintendent for A. & W. Sprague until 1873, then was elected to three terms as Rhode Island Lieutenant Governor. Returning to Little Compton in the late 1870s, Henry Sisson planned a seaside summer resort just north of Mill Point, featuring curving avenues and house lots. The project was never realized and only Round Pond Road itself remains as a remnant of his plans (RIHPHC, 1990).

Architect Albert Harkness of Providence designed the house at 97 Round Pond Road for Abbott Phillips, also of Providence, and a lawyer at the firm of Hinckley, Allen, Phillips & Wheeler. Phillips lived there with his wife and their four children (Little Compton Historical Society, 2020). It remains in use today as a private residence.

#### 3.2.1.3 NRHP Criteria and the Maritime Visual Setting

The Abbott Phillips House is significant under NRHP Criterion C for Architecture. An architectural survey of the building noted "the design of this house draws on sources in French provincial vernacular architecture; the image of picturesque domesticity that it creates was popular in the 1920s and 1930s" (RIHPHC, 1990).

Located on the southern coast of Little Compton, the Abbott Phillips house was designed intentionally with views toward the Atlantic Ocean. Though its significance is derived from the architectural merit of the residence, the location affords unobstructed maritime views from both the house and grounds.

### *3.2.2 The Stone House Inn*

#### 3.2.2.1 Physical Description and Existing Conditions

The NRHP-listed Stone House Inn (also known as the David Sisson House) was built circa 1854 at 122 Sakonnet Point Road in the Town of Little Compton. It is sited on a nearly 3-acre lot, facing south and overlooking Round Pond. The imposing stone residence is three-and-one-half stories tall and has an associated circa 1886 barn. The residence is seven bays wide and three bays deep, with a rectangular footprint. Modern replacement windows occupy each bay. A hipped slate roof features two dormers with paired arched windows. Between them is a large octagonal belvedere. An ornate, wood-framed, two-story wraparound porch is located at the south and west sides. Multiple wings extend from the rear of the building.

#### 3.2.2.2 Historic Context

Providence-based industrialist David Sisson of the Fall River Ironworks commissioned a home at 122 Sakonnet Point Road (architect unknown) which was at the time the largest residence in Little Compton, and the only one constructed of stone (Connors, 2008). The house was passed to his son Henry and following his Lieutenant Governorship, his family used the Stone House as their primary residence. Financial difficulties resulted in the auctioning of the home in 1902 which marks the change of its use from single-family to inn, and interior renovations and stylistic updates occurred regularly over the past 170 years. An exception to its continual operation was a two-decade closure due to flooding resulting from the Hurricane of 1938 (Connors, 2008).

#### 3.2.2.3 NRHP Criteria and the Maritime Visual Setting

The Stone House Inn is listed on the NRHP and is significant under NRHP Criterion C for Architecture. It was the largest single-family dwelling in Little Compton at the time of its construction, and the only one built of fieldstone. In addition, it derives significance from its use as an inn for the past century, the "only public accommodation for travelers in this intensely private seaside community almost exclusively dominated by single-family houses" (Connors, 2008). The Stone House Inn is sited 10 feet above sea level, at an inland location, with interior views of nearby Round Pond. However, the rooftop belvedere was a unique feature designed that affords farther views to the Atlantic Ocean.

### *3.2.3 The Warren's Point Historic District*

#### 3.2.3.1 Physical Description and Existing Conditions

The Warren's Point Historic District is located on Warren Point, in the southern portion of the Town of Little Compton east of Sakonnet Point, on the southeastern tip of an elevated, rocky peninsula. The point is bordered by the Atlantic Ocean to the east and south and Long Pond on the west. The district includes approximately 155 acres centered along Warren Point Road, which runs north-to-south and serves as a central axis for residential development. The area is characterized by large, affluent residences set on large lots, which are for the most open lawns, oriented to afford views of the adjacent waterbodies.

#### 3.2.3.2 Historic Context

Warren's Point is located east of Sakonnet Point and Long Pond, first colonized by Nathaniel Warren in the seventeenth century. Developed as the Town of Little Compton's first summer resort colony in the 1880s, its picturesque homes were built by wealthy families from the northeast and Midwest, on land subdivided from the former Kempton Farm (RIHPHC, 1990). Presenting a cohesive aesthetic, the picturesque shingle-sided houses all shared views to the Atlantic Ocean. As time moved forward, so did architectural styles. New buildings of the Cape Cod and Modernist designs were added to the collection of residences at Warren's Point through the first half of the twentieth century. Regardless of architectural style, most buildings shared similar landscapes that included manicured lawns and stone walls. The neighborhood was designed as a quiet enclave for the enjoyment of idyllic ocean views. Public access was limited by privatizing streets which continue to operate in this manner.

#### 3.2.3.3 NRHP Criteria and the Maritime Visual Setting

The Warren's Point Historic District has been determined by RIHPHC to be eligible for listing in the NRHP under Criterion A for its association with the establishment of summer coastal resorts in Rhode Island, and under Criterion C for architecture, including residences that span a wide variety of architectural styles, constructed between 1880 and 1970 and retaining a high degree of integrity. The district is recommended as an appropriate candidate for nomination to the NRHP (RIHPC, 1990) and the *Town of Little Compton Comprehensive Plan* identifies the establishment of a voluntary historic district at Warren Point as a goal for the town relative to historic preservation (Town of Little Compton, 2018a:37).

By deed restriction, early purchasers of the property in Warren's Point were guaranteed overland access to Warren's Point Beach, ensuring a quiet, residential summer colony (Connors, 2008). It was this access and isolation that made Warren's Point a desirable oceanside retreat. Its visual and physical connection to the Atlantic Ocean is at the center of the significance of the district.

### *3.2.4 Tunipus Goosewing Farm*

#### 3.2.4.1 Physical Description and Existing Conditions

The Tunipus Goosewing Farm is located at 540 Long Highway on a peninsula an approximate 60-acre property between Quicksand Pond to the east, Tunipus Pond to the west, and the Atlantic Ocean to the south. According to the property card, the property currently contains a circa 1894 2-story, irregular-shaped house; two one-story circa 1999 guest houses, two one-and-a-half-story guest houses constructed circa 1815; and a circa 1850 two-story limestone, gambrel roof barn with an attached silo (Vision Appraisal, 2022). The property has been recently restored by the current owners (Morgan, 2016).

#### 3.2.4.2 Historic Context

The Tunipus Goosewing Farm was constructed for the Sisson family, who moved to Little Compton from Newport in 1816 (RIHPHC, 1990). The property has remained an active farm since the eighteenth century. According to the *Historic and Architectural Resources of Little Compton, Rhode Island,* Lemuel Sisson raised cows on the property during the nineteenth century (RIHPHC, 1990).

#### 3.2.4.3 NRHP Criteria and the Maritime Visual Setting

The Tunipus Goosewing Farm is located on a peninsula overlooking Quicksand Pond, Tunipus Pond, and the Atlantic Ocean. The property also provides the only access to the town-owned Goosewing Beach. The farm has a strong maritime setting with views across the open agricultural fields to the water in three directions. The relationship of the fields, buildings, and structures on an elevated ridge to the surrounding waters is an integral part of the historic setting. The Tunipus Goosewing Farm is eligible for listing on the NRHP under Criterion A and C for its architecture and its association with the Sisson family and farming in Little Compton.

## 3.3 Narragansett

### *3.3.1 Dunmere*

#### 3.3.1.1 Physical Description and Existing Conditions

Dunmere, also known as Dunmere Gardener's Cottage, Gate, and Garden, is a 3.4-acre estate located at 560 Ocean Road in Narragansett, Rhode Island, approximately 600 feet from the coastline of Narragansett Bay. The property consists of the original Gardener's Cottage, entrance gate, and associated garden landscape. The Gardener's Cottage is a two-story building featuring granite masonry and wood construction. A three-story conical tower on the south elevation rises above the multi-gabled roof and a massive granite chimney rises from a central point in the roof. Fenestration is varied, with examples of Queen Anne and Eastlake-style windows, including single, fixed-pane and one-over-one, double-hung sash windows, some with colored geometric lights and delicate wood mullions and muntins (Youngken et al., 2005).

The entrance gate is of rough-cut granite construction and features an elliptical arch which appears to emerge from the natural rocky outcrops at the north side of the arch. A two-story conical tower on the south side of the arch features a small rectangular open window. A small, hipped roof projects from the base of the turret over a stone patio. The word "Dunmere" is legible within the design on a pair of decorative wrought-iron gates. Although much of the historic landscape has been removed or destroyed over time, the extant landscape architecture associated with the historic Dunmere estate include some garden terraces, fountains, a man-made pond, stone-arched bridge and stone retaining walls (Youngken et al., 2005).

#### 3.3.1.2 Historic Context

The Dunmere estate was designed by John M. Merrick and constructed in 1883 for investor and financial pioneer Robert G. Dun. Dun began developing his estate after the expansion of Ocean Road and the growth of Narragansett as a recreational resort. Spanning over ten years, the construction at Dunmere included a three-and-one-half-story Queen Anne-style mansion on a rocky outcropping near the sea, a water tower, and a windmill. The landscape design was developed under the direction of the landscape architect Nathan Franklin Barrett, and eventually expended to encompass over 13 acres. The water tower was expanded and renovated to become the present Gardener's Cottage. Several of the estate buildings, including the main house, have been lost over the years to fire and demolition, and the original estate boundaries have been subdivided (Youngken et al., 2005).

#### 3.3.1.3 NRHP Criteria and the Maritime Visual Setting

Dunmere is listed on the NRHP and meets NRHP Criteria A and C for its associations with seasonal maritime recreation in late nineteenth-century New England and for its importance as an example of a seasonal estate complex with Gilded Age landscape design (Youngken et al., 2005). The location of the original mansion near the ocean speaks to the property's historic association with views to and enjoyment of the seascape. The historic properties have views of the open ocean to the east. The remaining buildings are significant due to their importance as elements of a late-nineteenth century seaside estate complex. Dunmere was listed in the NRHP in 2005.

### *3.3.2 The Ocean Road Historic District*

#### 3.3.2.1 Physical Description and Existing Conditions

The Ocean Road Historic District is an approximately 92-acre historic district located in Narragansett, Rhode Island, and includes 45 residences situated on portions of Ocean and Wildfield Farm Roads and Hazard and Newton Avenues. This district consists of various examples of Shingle-style houses and estates situated along the coastline that exhibit a range of expressions of the style. Among the most striking examples of architecture within the district is the unique two-and-one-half-story stone Hazard Castle with a 105-foot-tall tower, the Suwanee Villa Carriage House designed by James H. Taft with its conical tower, and the Colonial Revival-style Rose Lea designed by Willard Kent (Roise, 1981).

#### 3.3.2.2 Historic Context

The history of the Ocean Road Historic District began with the acquisition of the land now encompassing the district boundaries by Joseph P. Hazard. Hazard's initial construction efforts included the Hazard Castle, which took nearly 40 years to complete, but which influenced the style and setting of the surrounding area. Based on Hazard's interpretation of English castles and informed by his spiritualist beliefs, Hazard Castle became the touchstone from which the eclectic slant of the Shingle style was expressed through subsequent development of the seaside resort town. In addition, Hazard began planting trees along the bluffs, ancestors of the trees that make up the wooded area in and around the district today. In addition, many of the residences were designed by prominent architects of the late nineteenth century, such as McKim, Mead, and White, and William Gibbons (Roise, 1981). The district was listed in the NRHP in 1982.

#### 3.3.2.3 NRHP Criteria and the Maritime Visual Setting

The NRHP-listed Ocean Road Historic District meets Criterion C for high-style seasonal residences of the wealthy and famous of the Gilded Age. Most of the contributing properties "stand on dramatic sites overlooking the rocky shoreline and are oriented to the ocean" (NPS, 1982). The district also meets NRHP Criterion A for its association with the maritime resort community that developed around Narragansett Pier. Situated along the coastline, its relationship to the water is central to the significance of the district. Many of the contributing properties within the district enjoy expansive views of the Atlantic Ocean and were sited to take advantage of those vistas.

### *3.3.3 The Towers Historic District*

#### 3.3.3.1 Physical Description and Existing Conditions

The Towers Historic District is an approximately 10-acre district bounded by Exchange Place, Mathewson Street, Taylor Street, and the Atlantic Ocean in the unincorporated village of Narragansett Pier. The district is comprised of 13 contributing resources including the Towers, the Life Saving Station at Narragansett Pier, a town park, and 10 private residences. Additionally, there is one non-contributing resource within the district, a residence built circa 2006 (Town of Narragansett, 2022).

The Towers and the Life Saving Station at Narragansett Pier are substantial Romanesque Revival-style stone buildings. The Towers span Ocean Road, while the Life Saving Station is sited between Ocean Road and the Atlantic Ocean. North and west of the Towers, Memorial Park occupies approximately 1.6 acres. It consists primarily of open lawn, with a memorial fountain set within a paved plaza at the northeast corner and a group of war memorial monuments at the northwest corner (Roise, 1981).

The remaining contributing resources within the district are residences constructed between circa 1822 and 1900 in popular nineteenth-century styles including the Federal, Italianate, Second Empire, Colonial Revival, and Shingle styles. All of the residences feature wood clapboard or shingle siding and retain a generally high degree of integrity. Three of the residences are sited on Ocean Road facing east to the Atlantic Ocean (Roise, 1981).

#### 3.3.3.2 Historic Context

The Town of Narragansett is named for the Narragansett Indian Tribe, the indigenous people of Rhode Island. The town was primarily agricultural in character from the late seventeenth century through the mid-nineteenth century (RIHPHC, 1991a). Piers and wharves constructed along the shore during this time contributed to a diversified economy based on fishing, shipbuilding, and the export of agricultural products. A pier built in the late eighteenth century near the present site of the Towers gave the village of Narragansett Pier its name. One of the contributing resources within the Towers Historic District, the residence at 16 Mathewson Street, was built during this period, circa 1822 (Roise, 1981).

The transformation of Narragansett Pier from a working port village to a tourist destination began in the 1840s, when the first visitors began to spend the summer season as boarders in private homes. The village's first hotel was built in 1856 and by 1871 ten additional hotels were built to serve guests from throughout the Northeast, Mid-Atlantic, and Midwest. The construction of private summer residences and rental cottages soon followed, and Narragansett Pier became a fashionable resort town popular with businesspeople, industrialists, and members of the professional class. The residences within the Towers Historic District were primarily built during this period, as either private residences or rental properties. The Narragansett Casino and the Life Saving Station at Narragansett Pier were both designed by McKim, Mead and White, and constructed in the 1880s (Roise, 1981; RIHPHC, 1991a).

In 1900 a catastrophic fire destroyed most of the Narragansett Casino, along with the Rockingham Hotel and neighboring commercial buildings. Several of the large nineteenth-century hotels also burned in the early decades of the twentieth century. During this period, Narragansett Pier's tourism economy began to shift away from long-term renters towards day-trippers and short-term guests. Other physical changes included damage or destruction of many buildings in the area by hurricanes in 1938, 1954, and 1991. In the post-World War II era, the year-round population of the village and town increased, further altering the Pier's character as a seasonal resort community. Urban renewal activity in the 1970s resulted in the clearance of nineteenth-century buildings from a 28-acre area northwest of the Towers Historic District. The site of the former Narragansett Hotel was purchased by the Town of Narragansett in 1931 and developed as Memorial Park (Roise, 1981; RIHPHC, 1991a). The Towers Historic District was listed in the NRHP in 1982.

#### 3.3.3.3 NRHP Criteria and the Maritime Visual Setting

The Towers Historic District meets National Register Criteria A and C for its relationship to the development of seaside tourism in Narragansett Pier and as a collection of intact nineteenth-century buildings which directly relate to tourism and maritime activity. The district's period of significance is 1850 to 1924 (Roise, 1981). The district as a whole derives historic significance from its seaside location and maritime visual setting. The siting of the Towers and several of the district's residences, in particular, provide expansive views of the ocean, while the Life Saving Station at Narragansett Pier was sited especially close to the ocean in order to facilitate the launch of lifeboats.

### *3.3.4 The Towers*

#### 3.3.4.1 Physical Description and Existing Conditions

The Towers is a multistory stone building with a roughly I-shaped plan formed by two pairs of engaged round towers connected by a massive east-west segmental arch spanning Ocean Road. The building has a steeply pitched main gable roof with multiple dormers while the towers have conical dormered roofs. A wing to the west has dormered hipped roofs. The exterior is of rock faced granite and the roofs are clad in wood shingles. Windows are primarily six-over-one or nine-over-one double hung sash. Primary entrances to the east and west tower sections are located within arched openings below the main arched volume. A small octagonal cupola and lantern are located at the center of the main gable roof. The Towers currently serves as a public event venue and is owned by the Town of Narragansett (Roise 1981; RIHPHC, 1991a).

#### 3.3.4.2 Historic Context

The village of Narragansett Pier was a leading seaside resort town during the last quarter of the nineteenth century. Several grand hotels and numerous private residences and rental cottages were constructed during this period. The Narragansett Casino was built between 1883 and 1886, serving as the center of social activity during the summer season. The rambling casino was designed by McKim, Mead & White, the nationally prominent firm that had designed the Newport Casino just a few years earlier. The stone Towers served as a grand entrance linking the casino to the shore over Ocean Road, while the bulk of the building, consisting of guest rooms, card rooms, and dining rooms, was built of wood. A massive fire on September 12, 1900, destroyed the wood portions of the casino, including the roofs of the Towers, leaving only the stone portions of the Towers standing. The roofs of the Towers were subsequently rebuilt, and the building was acquired by the Town of Narragansett and renovated for use as a town hall. The Towers was individually listed in the NRHP in 1969 and was included as a contributing resource to the Towers Historic District, listed in the NRHP in 1982. Today, the building is utilized as an event venue (Roise, 1981; RIHPHC, 1991a). A major exterior and interior restoration was completed in 2017.

#### 3.3.4.3 NRHP Criteria and the Maritime Visual Setting

The Towers is an iconic building in the village of Narragansett Pier and is the sole remnant of the community's many Gilded Age hotels. The building meets National Register Criteria A and C for its relationship to the development of seaside tourism in Narragansett Pier, as a notable example of seaside recreational architecture in the Romanesque Revival style, and as the work of McKim, Mead & White. The

Narragansett Casino's oceanfront location and orientation provide expansive ocean vistas. This maritime visual setting is a key component of the Towers' historic significance.

### *3.3.5 The Life Saving Station at Narragansett Pier*

#### 3.3.5.1 Physical Description and Existing Conditions

The Life Saving Station at Narragansett Pier, also known as the Coast Guard House, is a two-story stone building located about 50 feet from the Atlantic Ocean on the east side of Ocean Road. The north end of the building is semicircular in plan while the south end is rectangular. The exterior is of rock faced granite ashlar and the gable-conical roof is clad in asphalt shingle. Multiple additions to the north, east, and south, dating from the late twentieth and early-twenty-first centuries, are primarily constructed of wood. The west elevation of the main volume features Roman arch openings which continue along the apsidal north end of the building. A bas-relief sculpture of a ship anchor decorates the parapeted gable end of the south elevation. Three rectangular window openings on this elevation are now obscured by later additions (Jones, 1976).

#### 3.3.5.2 Historic Context

The United States Life-Saving Service was founded in 1848 as a volunteer organization providing rescue services along the New England and Mid-Atlantic coast. Early lifesaving stations consisted of utilitarian structures housing lifeboats and other equipment, often located near dangerous shoals and rocks. The service was nationalized by Congress in 1871, and funding provided for full-time crews to staff lifesaving stations. Congress authorized the construction of two initial stations in Rhode Island in the early 1870s, one on Block Island and the other at Narragansett Pier. This first lifesaving station at Narragansett Pier was a wood structure completed by 1873 north of the public beach (Jones, 1976).

The current Life Saving Station was built in 1888. It was designed by the nationally prominent architecture firm of McKim, Mead & White, which had completed the neighboring Narragansett Casino two years prior. The form and materials of the Life Saving Station complemented those of the casino. The Life Saving Station's ground floor served as a boathouse and had a sloping floor which allowed lifeboats to be launched through the arched openings, while the second floor served as the living quarters for the life station crew (Jones, 1976).

The Life-Saving Service was merged with the Revenue Cutter Service in 1915 to become the United States Coast Guard, which began consolidating lifesaving stations in the 1920s. The Life Saving Station at Narragansett Pier, then known as the Coast Guard House, was closed in 1946. It was subsequently converted into a dining establishment and continues in that function today, having survived damage from Hurricane Carol in 1954 and Hurricane Bob in 1991, as well as a fire shortly before it was listed in the NRHP in 1976. It was included as a contributing resource to the Towers Historic District, listed in the NRHP in 1982 (Jones, 1976; Roise, 1981).

#### 3.3.5.3 NRHP Criteria and the Maritime Visual Setting

The Life Saving Station at Narragansett Pier meets National Register Criteria A and C for its association with the U.S. Life Saving Service and the early development of the U.S. Coast Guard, as a rare surviving example of a nineteenth-century lifesaving station, and as the work of McKim, Mead & White. The building's use as a boat launch necessitated its siting very close to the water on the ocean side of Ocean Road. This maritime visual setting is a key component of the Life Saving Station's historic significance.

### *3.3.6 Fort Varnum/Camp Varnum*

#### 3.3.6.1 Physical Description and Existing Conditions

Fort Varnum/Camp Varnum is currently an Army National Guard training facility located off Cormorant Road on Cormorant Point in Narragansett overlooking Narragansett Bay and the Atlantic Ocean. According to property records, the property currently consists of over 41 acres. Per review of aerial mapping, there are currently approximately 25 buildings on the property, the majority of which were constructed prior to 1963.

#### 3.3.6.2 Historic Context

Fort Varnum/Camp Varnum was established in 1942 at the beginning of World War II as part of the United States military defense of Narragansett Bay. The fort was built to protect the west passage of Narragansett Bay and named after Revolutionary War Brigadier General James Mitchell Varnum (Sevigny, 2012). The original fort consisted of barracks, a mess hall, classrooms, and fire control towers, as well as other buildings (RIHPHC, 1991a). The fort was transferred to the Rhode Island National Guard in 1957 and renamed Camp Varnum (Sevigny, 2012).

#### 3.3.6.3 NRHP Criteria and the Maritime Visual Setting

Fort Varnum/Camp Varnum was constructed to defend Narragansett Bay. Its location on the coast with views of the Bay and the Atlantic Ocean were necessary for the army to defend the coast.

### *3.3.7 Narragansett Pier MRA*

#### 3.3.7.1 Physical Description and Existing Conditions

The Narragansett Pier MRA is located along the coastline of Narragansett Bay and the Atlantic Ocean and consists of residences, resort-related buildings, hotels, religious buildings, the Towers and other buildings dating from circa 1840 to the mid-twentieth century (Roise, 1978).

#### 3.3.7.2 Historic Context

In the late nineteenth century, Narragansett, along with many other coastal New England towns, transformed from a predominately agricultural community to a summer destination. Hotels, summer cottages, and resorts were constructed along the shorelines for the upper-middle- and upper-class residents of nearby New York, Boston and Philadelphia. The first hotel, the Narragansett House was built in 1856 and by 1871, ten hotels existed at the Pier (RIHPHC, 1991a). The Narragansett Casino was designed by McKim, Mead, and White and was constructed between 1883 and 1860. A fire destroyed the complex and other buildings in the vicinity in 1900, leaving only the Towers.

#### 3.3.7.3 NRHP Criteria and the Maritime Visual Setting

The Narragansett Pier MRA is significant under Criterion A for its association with the transformation of Narragansett from a rural, farming community to a summer resort as well as under Criterion C for its architecture. Many buildings within the MRA were designed by some of the most prominent architects of the time in a variety of styles including Italianate, Second Empire, Stick, Shingle, Queen Anne and Second Empire (Roise, 1978).

The MRA's location along Narragansett Bay as well as its history and existence as a summer resort colony are intrinsic to its maritime setting. Buildings were sited on the water or to have views of the water and were designed for people wanting to escape the heat of the city and be on the water. The most architecturally significant properties are located on the coast, including the Towers and the Life Saving Station.

### *3.3.8 The Dunes Club*

#### 3.3.8.1 Physical Description and Existing Conditions

The Dunes Club is addressed as 137 Boston Neck Road. The property is located on 32.16 acres on Little Neck, off Boston Neck Road, on Beach Street, between the road, of Narragansett Bay and the Atlantic Ocean, and the Pettaquamscutt River, also known as the Narrow River (Town of Narragansett, 2022).

There are six resources that contribute to the Dunes Club, the property also has seven noncontributing buildings and structures. The clubhouse is a one-and-a-half-story building with a lantern cupola constructed in 1939 in the colonial revival style. Connected by a wood deck to the east of the clubhouse are a pool constructed in 1928 and one-story bathhouses constructed in 1939. Further east are three U-shaped cabana buildings constructed in 1939. A one-story, gable-roofed staff house constructed in 1939 is located to the north of the clubhouse. The staff house complex is four buildings connected around a central courtyard. The gatehouse is located at the entrance of the property at the intersection of Beach Street and Boston Neck Road. The gatehouse is a hipped-roof turreted building constructed in 1928. All of the buildings, except the gatehouse, have sustained damage in multiple hurricanes and have had alterations and/or partial reconstructions (Youngken, 2015).

#### 3.3.8.2 Historic Context

With the ease of travel by train and ferry, during the mid-to-late nineteenth century, wealthy families from New York, Philadelphia, and Boston began frequenting the southern New England coast in the summer to get away from the heat of the cities. Resort hotels and summer homes were constructed, and summer colonies and resorts were developed.

In the 1920s the Dunes Club was founded by wealthy summer residents of Narragansett to establish a private club after the casino was destroyed by fire in 1900. The original Dunes Club was constructed between

1928 and 1929. Kenneth Murchison, Jr., an architect from New York, was the original architect and designed the club in the Mediterranean Revival style, which was the popular style for these types of clubs at the time (North Carolina Architects and Builders, 2022; RIHPHC. 1991). The complex was destroyed in the hurricane of 1938, and only the gatehouse and pool remain from the original club (Youngken, 2015).

In 1938-1939 the Dunes Club was reconstructed. The new complex was designed by Thomas Pym Cope, an architect from Philadelphia. Cope designed the clubhouse, bathhouses, cabanas, and staff housing complex as part of the original plan for the club (Youngken, 2015).

#### 3.3.8.3 NRHP Criteria and the Maritime Visual Setting

The Dunes Club is listed on the NRHP as an "excellent example of the private American beach club facility of the early-to-mid-20th century." The club is significant under Criterion A for its association with coastal Rhode Island, and in particular Narragansett, becoming a summer destination. The Dunes Club was established as a members-only club by summer residents from Philadelphia and New York. The Dunes Club is also significant under Criterion C for its architecture. As stated above, Thomas Pym Cope designed the original Dunes Club complex including the clubhouse, gatehouse, bathhouses, cabanas and staff housing complex (Youngken, 2015).

The Dunes Club is located on Little Neck, between the Atlantic Ocean, and the Pettaquamscutt River. As a private beach club, this historic property has a clear maritime setting with access and views of Narragansett Bay and the Atlantic Ocean.

## 3.4 New Shoreham

### *3.4.1 Historic Context of New Shoreham*

Block Island was home to Native Americans for thousands of years prior to its initial "discovery" by European explorers. Archaeological studies indicate indigenous people were visiting or living on the island at least 7,000 years ago. Giovanni da Verrazzano is credited with discovering and describing the inhabited island during a 1524 voyage to the New World. Sixteen families moved to Block Island in 1662, representing the first permanent European settlement in present-day New Shoreham. For the next two centuries the island's residents developed a significant fishing and processing industry for fish products. Enslaved Africans were among the island's earliest post-Contact Period inhabitants. A National Harbor was established early in the Island's history, and seasonal tourism began in the early-to-mid nineteenth century. Block Island's proximity to major northeastern cities, as well as its natural scenic landscape and charm led to its development as a summer destination. Development of inns, hotels, and other amenities increased around the harbor in the mid-nineteenth century, with the first public house built in 1842 (Gibbs, 1974). As transportation to the island improved with the first recreational steamboat in 1858, the development of summer beach cottages increased. By the mid-nineteenth century it became known as the "Bermuda of the North." The present harbor was constructed between 1870 and 1876 consisting of two rip-rap granite breakwaters that remain relatively unchanged to this day. Although many tourists stayed in boarding houses, inns, and hotels, seasonal summer cottages were being constructed in large numbers by the mid-1880s. It was well-established as a recreation destination for the regional elite by 1890 (Scofield and Adams, 2012).

The resort economy had declined in the first half of the twentieth century but rebounded with the construction of an airport in 1950 (Gibbs, 1974). By the early 1970s, pressure from new development spurred the creation of the Block Island Conservancy. This effort has contributed to the preservation of open rural spaces on the island and the historic fabric of much of the island's-built environment (PAL, 2012).

### *3.4.2 New Shoreham Historic District*

#### 3.4.2.1 Physical Description and Existing Conditions

The New Shoreham Historic District is a local historic district/historic district overlay (Town of New Shoreham Historic District Commission, 2022a). The historic district is located along Spring, Water, and Ocean Avenues and Corn Neck Road roughly bounded to the southeast by Amy Dodge Lane; to the northeast by Trims Pond; to the north by Great Salt Pond; and to the west at the intersection of West Side and Champlin Roads (Town of New Shoreham GIS, 2022). There are 321 parcels located within the boundaries of the district including the Old Harbor Historic District, residences, commercial buildings, town-owned properties, and vacant land (Town of New Shoreham Historic District Commission, 2022b).

The topography within the district is that of relatively low and gently rolling hills, with some slightly higher elevations around the periphery, such as along Old Town Road to the west and Spring Street to the south. The buildings within the district include three-and-one-half- and four-and-one-half-story hotels and inns facing the ocean along Water Street, and smaller one-and-one-half- and two-and-one-half-story residences inland and just outside of the village center. The extant historic buildings feature architectural styles of the mid- to late-nineteenth century, such as Gothic Revival, Second Empire, and Queen Anne. Many recently constructed buildings feature matching forms and materials evocative of this period, helping to maintain the historic feeling and association with the district's period of significance. Mansard roofs are common, especially on the hotels and inn buildings, while the residences typically feature gables. Powerful storm surges attributed to global climate change have increased in recent years, leading to damage to both man-made and natural resources within the district (Kelly, 2021). This situation has increased the need for major planning and conservation efforts on Block Island.

### *3.4.3 Corn Neck Road Historic District*

#### 3.4.3.1 Physical Description and Existing Conditions

The Corn Neck Road Historic District is a cultural landscape that encompasses the entire northern tip of Block Island, surrounded by the Atlantic Ocean on three sides and bounded by Mansion Road to the south. The district includes 29 contributing buildings dating back to the eighteenth century, including the NRHP-listed Block Island North Light (74000008). The landscape features bucolic settings, open fields, forested areas, stone walls, and historic farmsteads. It was determined eligible for listing on the NRHP in 2012 (PAL, 2012).

### *3.4.4 Indian Head Neck Road Historic District*

#### 3.4.4.1 Physical Description and Existing Conditions

The Indian Head Neck Road Historic District is located along a peninsula between Corn Neck Road and great Salt Pond on Block Island. The district consists of five one-and-one-half-story summer cottages with wrap-around porches on large parcels. These cottages were built during the late nineteenth century for seasonal tourists and later for year-round residences. The district has clear views of the ocean and was determined eligible for listing on the NRHP in 2012 (PAL, 2012).

### *3.4.5 The Mitchell Farm Historic District*

#### 3.4.5.1 Physical Description and Existing Conditions

The Mitchell Farm Historic District is an historic district located along Corn Neck Road on the narrow isthmus between Great Slat Pond and Rhode Island Sound on Block Island. It includes fifteen contributing properties dating from the mid-eighteenth to the mid-twentieth century. Small, forested areas and open fields are delineated by stone walls. It was determined eligible for listing on the NRHP in 2012 (PAL, 2012).

### *3.4.6 The Beach Avenue Historic District*

#### 3.4.6.1 Physical Description and Existing Conditions

The Beach Avenue Historic District is a small, compact neighborhood on a narrow spit separating Trims Pond and Harbor Pond. The district encompasses residential and inn properties built in the late nineteenth to early twentieth centuries. The U.S. Weather Bureau Station and Hygeia House properties, both listed on the NRHP, are contributing resources to the historic district. Well-preserved examples of several architectural styles are included, ranging from Second Empire to Gothic Revival to Neoclassical (PAL, 2012). Although eclectic, the district retains its essential cohesiveness and distinction among the compact developments of Block Island.

### *3.4.7 The Lakeside Drive and Mitchell Lane Historic District*

#### 3.4.7.1 Physical Description and Existing Conditions

The Lakeside Drive and Mitchell Lane Historic District is an historic district located between Lakeside Drive and Cooneymus Road, just south of the Block Island airport. The district includes Fresh Pond and thirteen contributing buildings. The buildings within the district date from the mid-eighteenth to the mid-twentieth century. The landscape is a significant element of this district, featuring gently rolling topography, stone walls, open fields, and modest homestead which characterize the historic lifeways of Block Island. The district was determined eligible for listing on the NRHP in 2012 (PAL, 2012).

### *3.4.8 The Champlin Farm Historic District*

#### 3.4.8.1 Physical Description and Existing Conditions

The Champlin Farm Historic District is an historic farmstead located on approximately 16.6 acres of land along Coast Guard Road on Block Island. The farm complex consists of a two- and-one-half-story frame residence, two frame barns, and four sheds. The farm is associated with the Champlin family, who have been farmers on Block Island since the late eighteenth century. The property was determined eligible for listing on the NRHP in 2012 (PAL, 2012).

### *3.4.9 The Old Town and Center Roads Historic District*

#### 3.4.9.1 Physical Description and Existing Conditions

The Old Town and Center Roads Historic District is an historic district located in the center of Block Island consisting of what was once the original town center, from the west boundary of the Old Harbor Historic District to Center Road. The district includes 48 contributing properties that date from the late-seventeenth to the mid-twentieth century. Historic markers denote the locations of non-extant mills and structures. The oldest structure in the district is the Samuel Ball house, constructed in 1680. The district represents the traditional architecture and development of early Block Island and was determined eligible for listing on the NRHP in 2012 (PAL, 2012).

### *3.4.10 The Beacon Hill Historic District*

#### 3.4.10.1 Physical Description and Existing Conditions

The Beacon Hill Historic District is an historic district located west of the Block Island airport from Beacon hill Road to Old Mill Road in the south. It is representative of residential, agricultural, and military development on Block Island and was determined eligible for listing on the NRHP in 2012 (PAL, 2012).

### *3.4.11 Lewis-Dickens Farm*

#### 3.4.11.1 Physical Description and Existing Conditions

The Lewis Farm and Dickens Farm Road Historic District is an historic agricultural landscape district encompassing most of the southeast corner of Block Island from Cooneymus Road to the Atlantic Ocean. It consists of thirteen contributing properties dating from the mid-eighteenth to the mid-twentieth century. Landscape features such as stone walls and open fields enhance the pastoral setting of the district. It was determined eligible for listing on the NRHP in 2012 (PAL, 2012).

### *3.4.12 The Pilot Hill Road and Seaweed Lane Historic District*

#### 3.4.12.1 Physical Description and Existing Conditions

The Pilot Hill Road and Seaweed Lane Historic District is an historic district located along Pilot hill Road between Payne Road and Mohegan trail at the southeast corner of Block Island. It includes ten properties that date from the mid-eighteenth to the mid-twentieth century and is also characterized by stone walls and open agricultural fields that give a pastoral setting to the district. The district represents both the residential development and the seasonal tourism of Block Island and was determined eligible for listing on the NRHP in 2012 (PAL, 2012).

## 3.5 Newport

### *3.5.1 The Ochre Point – Cliffs Historic District*

#### 3.5.1.1 Physical Description and Existing Conditions

The Ochre Point – Cliffs Historic District is located in the eastern portion of Newport and is roughly bounded to the north by Memorial Boulevard, to the east by Easton Bay, to the south by Marine Avenue and to the west Bellevue Avenue. Seventy-one contributing resources are identified in the National Register Nomination Form. The Cliff Walk, which is a 3.5-mile, National Recreational Trail, that runs from First/Easton's Beach to Baileys Beach, is also a contributing resource to the Ochre Point – Cliffs Historic District.

#### 3.5.1.2 Historic Context

Like many coastal New England cities and towns, Newport became a summer resort destination in the mid-nineteenth century. Properties along and adjacent to Bellevue Avenue were chosen as prime locations for some of the wealthiest Americans to build summer cottages due to their locations on the cliff and views to the water. Most of the properties also had designed landscapes surrounding the buildings.

#### 3.5.1.3 NRHP/NHL Criteria and the Maritime Visual Setting

The Ochre Point – Cliffs Historic District is significant under Criterion A for its contribution to Newport becoming a summer resort and the social history of its summer residents and Criterion C for its architecture and designed landscapes.

As stated above, contributing resources of the Ochre Point – Cliffs Historic District were constructed on or nearby Bellevue Avenue to take advantage of the views of Easton Bay and the Atlantic Ocean. The landscapes surrounding many of the properties were also designed to take advantage of the views. The Cliff Walk features expansive views of the Atlantic Ocean, which are integral to the visual and maritime setting of the trail.

### *3.5.2 The Ocean Drive Historic District, National Historic Landmark*

#### 3.5.2.1 Physical Description and Existing Conditions

The Ocean Drive Historic District is both listed on the NRHP and was designated as an NHL district on May 11, 1976 (Longstreth, 1976; Pitts, 1976). The Ocean Drive Historic District is made up of 45 contributing properties located in a 1,509-acre suburban/rural setting encompassing most of the Newport Neck peninsula southwest of the City of Newport, Rhode Island. The summer homes in this district feature great variety in style and opulence, ranging from Neoclassical-style residences to early nineteenth-century farms. The coastline features promontories and jetty-like rock formations.

#### 3.5.2.2 Historic Context

The first European to occupy Newport Neck was William Brenton, who was an important founding figure in the history of Newport. Brenton and his descendants worked to develop the landscape for agriculture, erected the first buildings, and cut trails for the frequent visitors to the land. The area became a seasonal retreat for the wealthy even prior to the Revolutionary War. After being destroyed by the British during the Revolutionary War, Newport Neck remained rural for decades. By the mid-nineteenth century the community in Newport and along Bellevue Avenue to the north and east of the present-day Ocean Drive Historic District grew and the elite citizens utilized Newport Neck for daytime excursions to enjoy the pastoral setting. By the turn of the twentieth century, overland transportation had improved, and the building of large estates began. Landscape development was carried out by the well-known landscape architect Frederick Law Olmsted and his firm. In the late twentieth century, several of the large estate houses were demolished, but the rural character of the district was cultivated and maintained (Longstreth, 1976).

#### 3.5.2.3 NRHP/NHL Criteria and the Maritime Visual Setting

The summer homes in the Ocean Drive Historic District feature great variety in style and opulence, ranging from Neoclassical-style mansions to early nineteenth-century farms. In contrast to the adjacent Bellevue Avenue Historic District, however, Ocean Drive (aka Ocean Avenue) is decidedly more bucolic and rural, with greater expanses between structures accentuated by natural and designed landscapes. The national significance of the Ocean Drive Historic District is derived from its architecture, which includes works from McKim, Mead and White, John Russell Pope, and landscape architecture by Frederick Law Olmstead (Pitts, 1976). In 2012 an updated statement of significance was appended to the NHL nomination which elaborated and expanded upon the initial areas of Criterion C significance such as architecture and landscape design. The update also addressed additional Criterion A areas of significance such as planning, and engineering related to maritime views and design features purposefully built to interact with the shoreline and the ocean. The updated nomination materials also included a detailed account of the evolution of Ocean Drive as a "pleasure drive" to accompany the development of the inland areas as an upper-income resort suburb. In addition, the landscape architecture firm of Frederick Law Olmstead was involved in at least two subdivisions and 15 private contract designs within the district. These designs include properties situated on dramatic overlooks, and along Ocean Drive. Clearly this roadway was specifically constructed to take advantage of ocean views.

### *3.5.3 Bellevue Avenue Historic District National Historic Landmark*

#### 3.5.3.1 Physical Description and Existing Conditions

The Bellevue Avenue Historic District National Historic Landmark is approximately two miles long and consists of 87 contributing properties in a 606-acre district occupying several blocks along Bellevue Avenue, from Memorial Boulevard in the north, to Block Island Sound in the south, in the City of Newport. Spring Street and Cogshell Avenue form the western boundary of the district, while Narragansett Bay forms the eastern boundary. From north to south, this district features two miles of commercial blocks and villas, notably ending in the south with the grand and palatial nineteenth-century estates of wealthy summer residents.

The Cliff Walk is a contributing resource to the Ochre Point-Cliffs Historic District, which is part of the Bellevue Avenue Historic District, and designated a National Recreational Trail. The Cliff Walk extends approximately 3.5 miles along the eastern coastline of Aquidneck Island and the Bellevue Avenue Historic District, situated on the rocky outcrops of the shore and featuring expansive views of Easton Bay and the Atlantic Ocean. The Cliff Walk is part of the typical experience for visitors to the Newport mansions, is open to the public, and has been described as "Rhode Island's #1 tourist destination" with (reportedly) over 1.2 million visitors per year (Winthrop, 2021). Portions of the Cliff Walk were washed away in Hurricane Sandy and were recently restored/rebuilt with grant funds from the RIHPHC and National Park Service (RIHPHC, 2019b).

#### 3.5.3.2 Historic Context

During its early decades and up to the mid-nineteenth century, Newport primarily grew around the downtown area to the north of Bellevue Avenue. The notable historic properties within the National Historic Landmark district were built during the Gilded Age, when some of the wealthiest Americans engaged in massive high-style residences for use as summer homes. Many of the estates in this district were designed by world-renowned master architects, including Richard Upjohn, Richard Morris Hunt, and McKim, Mead, and White. The district possesses many distinctive examples of high-style architecture. The district was listed as a National Historic Landmark on May 11, 1976.

#### 3.5.3.3 NRHP/NHL Criteria and the Maritime Visual Setting

The significance by which the district was originally listed is primarily focused on architecture, commerce, and landscape architecture. While the significance attributed to the district does not explicitly reference the ocean, the estates were sited to take advantage of the ocean views. For example, property names such as "Sea View Terrace" and "Ocean View" imply that maritime views are essential to the district's identity. In addition, the NRHP nomination form for the Ochre Point-Cliffs Historic District (a contributing property to the Bellevue Avenue Historic District NHL), contains the following reference:

> *[The Ochre Point-Cliffs Historic District] has a fine, elevated north-easterly view over the lower, Easton's Beach, part of Newport, and, easterly out past Middletown's hill and on towards Sakonnet, Westport and Cape Cod, far out into the Atlantic horizon. This high, grassed promontory had its obviously desirable features even though Bellevue Avenue was the first fashionable allee* (Harrington, 1974).

A major focus of the Ochre Point-Cliffs Historic District portion of the Bellevue Avenue Historic District is the Cliff Walk. The Cliff Walk was designed specifically to afford maritime views, as illustrated in the following excerpt from the nomination document:

*The [Cliff]Walk provides spectacular views at every point, as it winds near many mansions and occasionally dips down to the shore. Originally a fishermen's trail, the Cliff Walk was at one time the subject of a court battle between the owners of the estates bordering the walk-way and the public. The estate-owners wished to prevent public access and viewing across their properties and erected gates and other barriers to close the Walk and prevent such nuisance. Such action outraged the native Newporters, who went to court and won a decision which re-asserted the right of the public to an unobstructed foot-way around the island. Thus, the barriers were removed, and the present foot-path was laid out, with much use ever since, with maintenance undertaken first by the Works Progress Administration in the 1930's-1940's, and by the municipality in more recent years* (Harrington, 1974).

## 3.6 South Kingstown

### *3.6.1 Browning's Beach Historic District*

#### 3.6.1.1 Physical Description and Existing Conditions

The Browning's Beach Historic District is an NRHP-listed district located in South Kingstown along a private drive extending south of Cards Pond Road (also referred to as Card Ponds Road). The district encompasses approximately 20 acres and includes single family residences constructed in the late nineteenth and early twentieth century as part of a residential complex (Youngken, 1997). The district boundaries stretch south from Cards Pond Road, include a small peninsula extending west into Cards Pond and continues south to the barrier beach facing the Atlantic Ocean.

Review of modern aerial photography reveals that only five of the contributing resources are currently extant, including three buildings on the barrier beach, one building on the peninsula in Cards Pond, and one building on the east side of the private drive between the peninsula and the barrier beach. The buildings appear to have been removed or demolished between 2012 and 2014 (Google Earth, 2022).

#### 3.6.1.2 Historic Context

The collection of residences constituting the Browning's Beach Historic District were constructed between circa 1895 and circa 1905 as a coastal Rhode Island summer colony, a popular trend at this time throughout coastal Rhode Island. It originated as a private enclave for a group of prominent Rhode Island families including the Knight, Webster, Lapham-Treat, and Noyes families. The complex was designed to take advantage of the recreation offered by the seaside location. There was a communal boardwalk traversing the ocean dunes, a beach cabana which housed changing rooms for bathing, as well as a tennis court, a large stable, shared water system, and shared private drive providing access to the residences (Youngken, 1997).

The district was listed in the NRHP in 1997 and consisted of 10 contributing buildings and one non-contributing building. The contributing buildings consisted of single dwellings representing Queen Anne, Shingle, and Craftsman/Bungalow-style residences constructed between circa 1895 and circa 1905. The district featured wood-framed, one-story to two-and-one-half-story houses. A variety of roofing forms were found in the district, including gabled, gambrel, and gable-on-hip roofs. These houses were typically sheathed in wood shingles, but board-and-batten siding was also present. The private drive providing access to the residences was narrow and graveled (Youngken, 1997).

#### 3.6.1.3 NRHP Criteria and the Maritime Visual Setting

The Browning's Beach Historic District meets NRHP Criterion C as a collection of late-nineteenth and early-twentieth century residences constructed as a summer colony in coastal Rhode Island. The district derives its significance from its maritime location on the coast, representing the significant trend of summer colonies in Rhode Island. The beach provided recreation for the residents, and by extension the view and setting of the Atlantic Ocean is a significant element to the historic district.

## 3.7 Tiverton

### *3.7.1 Puncatest Neck Historic District*

#### 3.7.1.1 Physical Description and Existing Conditions

Puncatest Neck is located in the southwestern portion of Tiverton between Nonquit Pond and the Sakonnet River. The 1979 RIHPHC report entitled *Historic and Architectural Resources of Tiverton, Rhode Island: A Preliminary Report,* identified 18 resources within the potential historic district as well as a ferry landing site, three former wharves, and the King Philip's War Battle Site (RIHPHC, 1979c). Of the 18 historic homes identified, it appears 17 are extant. The district runs along Puncatest Neck Road with the northern boundary approximately where Puncatest Neck Road takes a sharp, ninety-degree turn, to the southern end of the road, and along Fogland Road and includes Fogland Point.

While many of the properties have additions, seventeen of the residences appear to retain the integrity and significance to be eligible for listing on the NRHP. One of which, the Cook-Bateman Farm, is individually listed on the NRHP and one, the William Almy Farm/Fogland Farm/Puncatessett at 435 Puncatest Neck Road has been demolished. The former sites of the wharves, ferry land and the King Philip's War Battle Site would also be contributing resources to this historic district. The contributing resources are as follows:

- Cook Almy House – 58 Fogland Road
- Almy House – 103 Fogland Road
- John Almy House – 148 Fogland Road
- Former Site of Almy's Ferry Landing – Fogland Point
- Former Site of Almy's Wharf – Fogland Road
- Captain Gideon Wilcos House – 425 Puncatest Neck Road
- A. Wilcoc House – 481 Puncatest Neck Road
- Captain Fernando Wilcox House – 488 Puncatest Neck Road
- Peleg Cory House – 531 Puncatest Neck Road
- J. Piece House – 532 Puncatest Neck Road
- Captain George Gray House – 560 Puncatest Neck Road
- Isaac G. White House – 563 Puncatest Neck Road

- Robert Gray House – 630 Puncatest Neck Road
- Stephen Grinnell House  – 677 Puncatest Neck Road
- Otis Almy House/Heathersfield – 737 Puncatest Neck Road
- Horace Almy House/Nanquit Farm – 807 Puncatest Neck Road
- Samuel E. Almy House – 494 Puncatest Neck Road
- Cook-Bateman Farm – 958 Puncatest Neck Road
- Ferol Bink Farm – 993 Puncatest Neck Road
- King Philip's Battle Site– Fogland Road
- Cory's Wharf/White's Wharf – Fogland Point
- Pierce's Wharf – Fogland Point

#### 3.7.1.2 Historic Context

In 1659, Puncatest Neck was granted to 75 freeman of Plymouth Colony and 36 lots were defined, although no "substantial structures" were built. On July 8, 1675, one of the battles of King Philip's War was fought on Puncatest Neck. The first known structures were constructed around 1680 by the Church and Almy families. During the seventeenth and eighteenth centuries, Puncatest Neck was primarily agricultural. In the early eighteenth century a ferry was established on Fogland Point connecting Tiverton to Dartmouth and Newport and in the early nineteenth century the first wharf was established, shifting the economy of Puncatest Neck toward maritime related industries including fishing, oystering, and whaling. The wharf was expanded circa 1863 and in 1870 a second wharf was constructed.  As industry increased, new residences were constructed, both modest and more opulent and in the late nineteenth century and through the twentieth century, additional residences were constructed to be used as summer residences (RIHPHC, 1979c).

#### 3.7.1.3 NRHP Criteria and the Maritime Visual Setting

The Puncatest Neck Historic District is eligible for listing under Criterion A for its association with the history of Tiverton, including farming, maritime, and summer colony development as well as the architecture of the contributing resources.

Similar to other coastal communities in the region, in the late nineteenth century and through the twentieth century, summer cottages, resorts, and summer colonies began to develop in Tiverton particularly on Puncatest Neck and Nannaquaket Neck (RIHPHC, 1979).  These areas were attractive to the upper class for their proximity to Boston and New York and their locations on the water. As stated above, Puncatest Neck is located between Nonquit Pond to the east and Sakonnet River to the east and Nannaquaket Pond is located on the eastern side of Nannaquaket Neck and the Sakonnet River is located to the west.

# 4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. These mitigation measures were developed in consultation with the RIHPHC and consulting parties.

## 4.1 NRHP Nominations for the Abbott Phillips House, the Warren Point Historic District, and the Tunipus Goosewing Farm

### *4.1.1 Purpose and Intended Outcome*

The purpose of this mitigation measure is to recognize and document the historic and cultural significance of the Abbott Phillips House, the Warren Point Historic District, and the Tunipus Goosewing Farm by completing NRHP Nomination Forms for each property. Listing properties on the NRHP not only documents the history of the area and specific properties but can help build community knowledge and pride. Nomination Forms can be used as educational tools for both the owners of the properties and the community as a whole and can help guide the future restoration and rehabilitation of the buildings. NRHP listing also allows properties to be eligible for state and federal grant funding and historic tax credit programs. NRHP listing does not place any restrictions on a property, nor does it prevent the remodeling or demolition of the building or allow for public access to the building. It does not in any way restrict the rights of the private property owner.

### *4.1.2 Scope of Work*

This work is anticipated to consist of the following:

- Consulting with the Participating Parties and property owners;
- Research of available historic sources and documentation;
- Field survey and conditions assessments;
- Annotated photographs;
- Drafting of the NRHP listing document;
- Submitting the preliminary draft NRHP Nomination for review and comment to the Participating Parties;
- Developing a final draft NRHP Nomination to be provided to the Participating Parties; and
- If the NRHP nomination is formally reviewed by the RIHPHC's State Review Board, then the consultants who prepared the nomination will be available to present the nomination.

### *4.1.3 Methodology*

Revolution Wind will release a request for proposals (RFP) to hire a SOI Qualified Professional consultant to perform the scope of work listed in Section 4.1.2. The consultant selected will prepare a draft nomination form, prepared in accordance with applicable NPS and RIHPHC guidance. The draft document will include a historic context and statement of significance, identification, photographs, and descriptions of all contributing resources, and all maps and photographs required by NPS guidance. A final draft will be produced by the consultant that incorporates comments and additional information provided by the Participating Parties.

### 4.1.4 Standards

The mitigation measure will comply with following standards:

- The SOI's Guidance on the *Identification of Historic Properties* (36 CFR 800.4);
- The SOI's *Professional Qualifications Standards* (36 CFR Part 61);
- The NPS *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation,* as applicable (NPS, 1997a);
- *National Register Bulletin 16a: How to Complete the National Register Registration Form* (NPS, 1997b); and
- RIHPHC guidance.

### 4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Preliminary Draft of the NRHP Nomination Forms; and
- Revised draft of the NRHP Nomination Forms.

### 4.1.6 Funds and Accounting

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

## 4.2 Update the Existing *Historic and Architectural Resources of Narragansett, Rhode Island*

### 4.2.1 Purpose and Intended Outcome

The purpose of this mitigation measure is to revise and update the 1991 Historic and Architectural Resources of Narragansett, Rhode Island survey to reflect existing conditions within the Town of Narragansett and to identify cultural landscapes and other types of cultural resources that may have been under-emphasized in prior surveys. The survey results will assist the Town of Narragansett, the State of Rhode Island, and members of the public in planning and prioritizing efforts to preserve significant elements of the Town's architectural and historical heritage for future generations. This measure aligns with the key priorities and objectives of *Comprehensive Statewide Historic Preservation Plan for Rhode Island, 2021-2027* to ensure current, accessible information on the full range of historic and heritage resources are available in all Rhode Island communities (RIHPHC, 2021: "Goal One"). The survey will also provide substantive support to the Town of Narragansett and its citizens in meeting the standards established by the Rhode Island Comprehensive Planning Advisory Committee (*The Rhode Island Comprehensive Planning Standards Guidance Handbook Series Guidance Handbook #4*: Standard 4.1)

### *4.2.2 Scope of Work*

The scope of work will consist of the following:

- Research of available historical archival sources and existing documentation, including surveys and assessments conducted in compliance with local, state and federal preservation regulations and ordinances;
- Consultation with the Town of Narragansett, local and state preservation organizations, and other knowledgeable parties to identify and prioritize types of historic architectural or landscape resources under-represented in existing survey data;
- Field survey, annotated photographs, and mapping;
- Drafting of a Survey Report to be distributed to the Participating Parties for review and comment;
- Development of a final Survey Report which addresses comments from the Participating Parties; and
- Distribution of the final Survey Report to the Participating Parties.

### *4.2.3 Methodology*

Revolution Wind will release a RFP for consultant services and select a consultant to perform the scope of work listed in Section 4.2.2. The consultant selected will prepare a draft survey, prepared in accordance with applicable National Park Service and RIHPHC guidance. The draft document will include a methodology, an updated historic context and history of Narragansett, associated maps, photographs, building descriptions, and inventory forms as required by RIHPHC. The draft survey will be distributed to the Participating Parties for review and comment. A final draft will be produced by the consultant that incorporates comments and additional information provided by the Participating Parties.

### *4.2.4 Standards*

The project will comply with the following standards:

- The *Secretary of the Interior's Guidance on the Identification of Historic Properties* (36 CFR 800.4);
- The *Secretary of the Interior's Standards and Guidelines – Professional Qualifications Standards, for Archaeology, History, Architectural History and/or Architecture* (62 FR 33708);
- National Park Service's *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*;
- *National Register Bulletin 16a: How to Complete the National Register Registration Form* (NPS, 1997b); and
- RIHPHC guidance.

### *4.2.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;

- Proposals by qualified consultants in response to the RFP;
- Preliminary Draft of the Survey Report; and
- Final Survey Report.

#### *4.2.6 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

### 4.3 NRHP Nominations for the following NRHP-eligible historic properties: Champlin Farm Historic District, Mitchell Farm Historic District, Beacon Hill, Lewis-Dickens Farm, Lakeside Drive and Mitchell Lane, Indian Head Neck Road, Beach Avenue, Old Town and Center Roads, Corn Neck Road, Pilot Hill Road and Seaweed Lane, and the New Shoreham Historic District

#### *4.3.1 Purpose and Intended Outcome*

The purpose of this mitigation measure is to complete NRHP Nomination Forms to recognize and document the historic and cultural significance of each of the following NRHP-eligible historic districts: Mitchell Farm Historic District, Champlain Farm Historic District, Beacon Hill, Lewis-Dickens Farm, Lakeside Drive and Mitchell Lane, Indian Head Neck Road, Beach Avenue, Old Town and Center Roads, Corn Neck Road, Pilot Hill Road and Seaweed Lane, and the New Shoreham Historic District. This measure aligns with the key goals and objectives of the Rhode Island State Preservation Plan (RIHPHC, 2021) and the Town of New Shoreham's Comprehensive Plan (2016) to recognize and protect historic and heritage assets. The development of the revised nomination would afford multiple opportunities for the Town, and residents to consider the existing, somewhat arbitrary, boundary of the historic district and, in consultation with the RIHPHC, assess whether additional properties in the vicinity contribute to the significance of the district, as a whole.

Listing properties on the NRHP not only documents the history of the area and specific properties but can help build community knowledge and pride. Nomination Forms can be used as educational tools for both the owners of the properties and the community as a whole and can help guide the future restoration and rehabilitation of the buildings. NRHP listing also allows properties to be eligible for state and federal grant funding and historic tax credit programs. NRHP listing does not place any restrictions on a property, nor does it prevent the remodeling or demolition of the building or allow for public access to the building. It does not in any way restrict the rights of the private property owner.

#### *4.3.2 Scope of Work*

This work is anticipated to consist of the following:

- Consulting with the Participating Parties and property owners;
- Research of available historic sources and documentation;
- Field survey and conditions assessments;

- Annotated photographs;
- Drafting of the NRHP listing document;
- Submitting the preliminary draft NRHP Nomination for review and comment to the Participating Parties;
- Developing a final draft NRHP Nomination to be provided to the Participating Parties; and
- If the NRHP nomination is formally reviewed by the RIHPHC's State Review Board, then the consultants who prepared the nomination will be available to present the nomination.

### *4.3.3 Methodology*

Revolution Wind will release a RFP for consultant to perform the scope of work listed in Section 4.3.2. The consultant selected will prepare a draft nomination form, prepared in accordance with applicable NPS and RIHPHC guidance. The draft document will include a historic context and statement of significance, identification, photographs, and descriptions of all contributing resources, and all maps and photographs required by NPS guidance. A final draft will be produced by the consultant that incorporates comments and additional information provided by the Participating Parties.

### *4.3.4 Standards*

The project will comply with following standards:

- The SOI's Guidance on the *Identification of Historic Properties* (36 CFR 800.4);
- The SOI's *Professional Qualifications Standards* (36 CFR Part 61);
- The National Park Service's (NPS) *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation,* as applicable (NPS, 1997a);
- *National Register Bulletin 16a: How to Complete the National Register Registration Form* (NPS, 1997b); and
- RIHPHC guidance.

### *4.3.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Preliminary Draft of the NRHP Nomination Forms; and
- Revised draft of the NRHP Nomination Forms.

### *4.3.6 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

## 4.4 Update the NRHP Nomination for the Ochre Point – Cliffs Historic District

### *4.4.1 Purpose and Intended Outcome*

The purpose of this mitigation measure is to provide funding to hire a SOI qualified professional to update the existing form. The Ochre Point – Cliffs Historic District NRHP nomination form was completed in 1975. The Ochre Point – Cliffs Historic District is located in the eastern portion of Newport and is significant for its architecture as well as the development of the City of Newport. The intent of this measure is to document the current conditions of the district, confirm the boundaries, and identify and document the contributing and non-contributing resources.

Properties on the NRHP not only document the history of the area and specific properties but can help build community knowledge and pride. Nomination Forms can be used as educational tools for both the owners of the properties and the community as a whole and can help guide the future restoration and rehabilitation of the buildings. NRHP listing also allows properties to be eligible for state and federal grant funding and historic tax credit programs. NRHP listing does not place any restrictions on a property, nor does it prevent the remodeling or demolition of the building or allow for public access to the building. It does not in any way restrict the rights of the private property owner.

### *4.4.2 Scope of Work*

This work is anticipated to consist of the following:

- Consulting with the Participating Parties and property owners;
- Research of available historic sources and documentation;
- Field survey and conditions assessments;
- Annotated photographs;
- Drafting of the NRHP listing document;
- Submitting the preliminary draft NRHP Nomination for review and comment to the Participating Parties;
- Developing a final draft NRHP Nomination to be provided to the Participating Parties; and
- If the NRHP nomination is formally reviewed by the RIHPHC's State Review Board, then the consultants who prepared the nomination will be available to present the nomination.

### *4.4.3 Methodology*

Revolution Wind will release a RFP for consultant to perform the scope of work listed in Section 4.4.2. The consultant selected will prepare a draft updated nomination form, prepared in accordance with applicable NPS and RIHPHC guidance. The draft document will include a historic context and statement of significance, identification, photographs, and descriptions of all contributing resources, and all maps and photographs required by NPS guidance. A final draft will be produced by the consultant that incorporates comments and additional information provided by the Participating Parties.

### *4.4.4 Standards*

The project will comply with following standards:

- The SOI's Guidance on the *Identification of Historic Properties* (36 CFR 800.4);
- The SOI's *Professional Qualifications Standards* (36 CFR Part 61);
- The National Park Service's (NPS) *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation,* as applicable (NPS, 1997a);
- *National Register Bulletin 16a: How to Complete the National Register Registration Form* (NPS, 1997b); and
- RIHPHC guidance.

### *4.4.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Preliminary Draft of the NRHP Nomination Form; and
- Revised draft of the NRHP Nomination Form.

### *4.4.6 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

## 4.5 NHL Nomination Form for the Ocean Drive Historic District

### *4.5.1 Purpose and Intended Outcome*

The Ocean Drive Historic District was designated an NHL in 1976 when the original NRHP nomination was completed and accepted by NPS. A subsequent nomination was drafted in 2008 but has not been accepted by NPS. The purpose of this mitigation measure is to provide funding to hire a SOI qualified professional to complete an NHL nomination form for the Ocean Drive Historic District document the current conditions of the district, confirm the boundaries, and identify and document the contributing and non-contributing resources.

### *4.5.2 Scope of Work*

This work is anticipated to consist of the following:

- Consult with NPS, Participating Parties, and property owners;
- Review of existing Ocean Drive Historic District nomination form;
- Research of available historic sources and documentation;
- Field survey, conditions assessments, NRHP-eligibility analysis;
- Annotated photographs;

- Drafting of the NHL nomination;
- Submitting the draft for review and comment to the Participating Parties;
- Developing a final NHL Nomination to be provided to the Participating Parties; and
- If the NRHP nomination is formally reviewed by the RIHPHC's State Review Board, then the consultants who prepared the nomination will be available to present the nomination.

### *4.5.3 Methodology*

Revolution Wind will release a RFP for consultant to perform the scope of work listed in Section 4.5.2. The consultant selected will prepare a draft updated nomination form, prepared in accordance with applicable NPS and RIHPHC guidance. The draft document will include a historic context and statement of significance, identification, photographs, and descriptions of all contributing resources, and all maps and photographs required by NPS guidance. A final draft will be produced by the consultant that incorporates comments and additional information provided by the Participating Parties.

### *4.5.4 Standards*

The project will comply with following standards:

- The SOI's Guidance on the *Identification of Historic Properties* (36 CFR 800.4);
- The SOI's *Professional Qualifications Standards* (36 CFR Part 61);
- The National Park Service's (NPS) *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation,* as applicable (NPS, 1997a);
- *National Register Bulletin 16a: How to Complete the National Register Registration Form* (NPS, 1997b); and
- RIHPHC guidance.

### *4.5.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Preliminary Draft of the NRHP Nomination Form; and
- Revised draft of the NRHP Nomination Form.

### *4.5.6 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

## 4.6 NHL Nomination Form for the Bellevue Avenue Historic District

### *4.6.1 Purpose and Intended Outcome*

The Bellevue Avenue Historic District was designated an NHL in 1976 when the original NRHP nomination was completed and accepted by NPS. The purpose of this mitigation measure is to provide funding to hire a SOI qualified professional to complete an NHL nomination form for the Bellevue Avenue Historic District document the current conditions of the district, confirm the boundaries, and identify and document the contributing and non-contributing resources in the historic district.

### *4.6.2 Scope of Work*

This work is anticipated to consist of the following:

- Consult with NPS, Participating Parties, and property owners;
- Review of existing Ocean Drive Historic District nomination form;
- Research of available historic sources and documentation;
- Field survey, conditions assessments, NRHP-eligibility analysis;
- Annotated photographs;
- Drafting of the NHL nomination;
- Submitting the draft for review and comment to the Participating Parties;
- Developing a final NHL Nomination to be provided to the Participating Parties; and
- If the NRHP nomination is formally reviewed by the RIHPHC's State Review Board, then the consultants who prepared the nomination will be available to present the nomination.

### *4.6.3 Methodology*

Revolution Wind will release a RFP for a consultant to perform the scope of work listed in Section 4.6.2. The consultant selected will prepare a draft updated nomination form, prepared in accordance with applicable NPS and RIHPHC guidance. The draft document will include a historic context and statement of significance, identification, photographs, and descriptions of all contributing resources, and all maps and photographs required by NPS guidance. A final draft will be produced by the consultant that incorporates comments and additional information provided by the Participating Parties.

### *4.6.4 Standards*

The project will comply with following standards:

- The SOI's Guidance on the *Identification of Historic Properties* (36 CFR 800.4);
- The SOI's *Professional Qualifications Standards* (36 CFR Part 61);
- The National Park Service's (NPS) *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation,* as applicable (NPS, 1997a);
- *National Register Bulletin 16a: How to Complete the National Register Registration Form* (NPS, 1997b); and
- RIHPHC guidance.

### *4.6.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Preliminary Draft of the NRHP Nomination Form; and
- Revised draft of the NRHP Nomination Form.

### *4.6.6 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

## 4.7 Updated Historic Resources Surveys of the Green Hill and Matunuck Neighborhoods

### *4.7.1 Purpose and Intended Outcome*

Per the request of RIHPHC, Revolution Wind will provide funding to hire a SOI qualified professional to complete an update of the existing *Historic and Architectural Resources of South Kingstown, Rhode Island: A Preliminary Report*, which was completed in 1980. The updated historic resources surveys will identify and document historic and potentially historic properties located within the of the Green Hill and Matunuck neighborhoods.

### *4.7.2 Scope of Work*

The scope of work will consist of the following:

- Review the existing *Historic and Architectural Resources of South Kingstown, Rhode Island: A Preliminary Report*;
- Review existing historic property documentation available at local repositories and the RIHPHC files;
- Develop a methodology for completion of the survey to be distributed to the Participating Parties for review and comment;
- Complete survey per the approved methodology;
- Develop a draft survey report to be distributed to the Participating Parties for review and comment;
- Develop final report, addressing the comments received, to be distributed to the Participating Parties.

### *4.7.3 Methodology*

Revolution Wind will release a RFP for consultant services and select a consultant to perform the scope of work listed in Section 4.7.2. The consultant selected will prepare a draft survey, prepared in accordance with applicable National Park Service and RIHPHC guidance. The draft document will include a methodology, an updated historic context and history of the neighborhoods, associated maps, photographs, building descriptions, and inventory forms as required by RIHPHC. The draft survey will be distributed to the Participating Parties for review and comment. A final draft will be produced by the consultant that incorporates comments and additional information provided by the Participating Parties.

#### *4.7.4 Standards*

The exhibit will conform to the following standards:

- The SOI's *Professional Qualifications Standards* (36 CFR Part 61), as applicable;
- RIHPHC guidance;

#### *4.7.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFP;
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft report; and
- Final report.

#### *4.7.6 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

### 4.8 NRHP Nomination for Puncatest Neck Historic District

#### *4.8.1 Purpose and Intended Outcome*

The purpose of this mitigation measure is to recognize and document the historic and cultural significance of the Puncatest Neck Historic District by completing an NRHP Nomination Form. Listing properties on the NRHP not only documents the history of the area and specific properties but can help build community knowledge and pride. Nomination Forms can be used as educational tools for both the owners of the properties and the community as a whole and can help guide the future restoration and rehabilitation of the buildings. NRHP listing also allows properties to be eligible for state and federal grant funding and historic tax credit programs. NRHP listing does not place any restrictions on a property, nor does it prevent the remodeling or demolition of the building or allow for public access to the building. It does not in any way restrict the rights of the private property owner.

#### *4.8.2 Scope of Work*

This work is anticipated to consist of the following:

- Consulting with the Participating Parties and property owners;
- Research of available historic sources and documentation;

- Field survey and conditions assessments;
- Annotated photographs;
- Drafting of the NRHP listing document;
- Submitting the preliminary draft NRHP Nomination for review and comment to the Participating Parties;
- Developing a final draft NRHP Nomination to be provided to the Participating Parties; and
- If the NRHP nomination is formally reviewed by the RIHPHC's State Review Board, then the consultants who prepared the nomination will be available to present the nomination.

### *4.8.3 Methodology*

Revolution Wind will release a RFP to hire a SOI Qualified Professional consultant to perform the scope of work listed in Section 4.8.2. The consultant selected will prepare a draft nomination form, prepared in accordance with applicable NPS and RIHPHC guidance. The draft document will include a historic context and statement of significance, identification, photographs, and descriptions of all contributing resources, and all maps and photographs required by NPS guidance. A final draft will be produced by the consultant that incorporates comments and additional information provided by the Participating Parties.

### *4.8.4 Standards*

The mitigation measure will comply with following standards:

- The SOI's Guidance on the *Identification of Historic Properties* (36 CFR 800.4);
- The SOI's *Professional Qualifications Standards* (36 CFR Part 61);
- The NPS *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation,* as applicable (NPS, 1997a);
- *National Register Bulletin 16a: How to Complete the National Register Registration Form* (NPS, 1997b); and
- RIHPHC guidance.

### *4.8.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Preliminary Draft of the NRHP Nomination Form; and
- Revised draft of the NRHP Nomination Form.

### *4.8.6 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

## 5.0 IMPLEMENTATION

### 5.1 Timeline

The timeline for implementation of the mitigation measures is identified in the MOA.

### 5.2 Organizational Responsibilities

#### *5.2.1 Bureau of Ocean Energy Management (BOEM)*

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM will be responsible for sharing the annual summary report with the Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

#### *5.2.2 Revolution Wind, LLC*

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

#### *5.2.3 Other Parties, as Appropriate*

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

### 5.3 Participating Party Consultation

This HPTP was developed in consultation with the RIHPHC and other Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties.

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**ATTACHMENT 12 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: NINE HISTORIC PROPERTIES, TOWN OF MIDDLETOWN, NEWPORT COUNTY, RHODE ISLAND**

# Historic Property Treatment Plan

for the

# Revolution Wind Farm

## Nine Historic Properties

## Town of Middletown, Newport County, Rhode Island

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind, LLC
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**June 2023**

## ABSTRACT


| | |
|---|---|
| Federal Undertaking: | Revolution Wind Farm and Revolution Wind Export Cable Project |
| Location: | Outer Continental Shelf and Rhode Island |
| Federal and State Agencies: | Bureau of Ocean Energy Management<br>National Park Service<br>U.S. Army Corps of Engineers<br>Massachusetts Historical Commission<br>Rhode Island Historical Preservation & Heritage Commission<br>New York Historic Preservation Office<br>Connecticut Historic Preservation Office<br>Advisory Council on Historic Preservation |
| Regulatory Process: | National Environmental Policy Act<br>Section 106 of the National Historic Preservation Act<br>Section 110(f) of the National Historic Preservation Act |
| Purpose: | This Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects from the Revolution Wind Project. |
| Adverse Visual Effect Finding for: | The Bailey Farm<br>The Clambake Club of Newport<br>Paradise Rocks Historic District<br>Sea View Villa<br>St. George's School: Church of St. George, Little Chapel, and Memorial Schoolhouse<br>The Indian Avenue Historic District<br>Whetstone<br>The Land Trust Cottages<br>The Bluff/John Bancroft Estate |
| Submitted By: | Revolution Wind, LLC |
| Date: | June 2023 |

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## LIST OF ACRONYMS

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ADLS | Aircraft Detection Lighting System |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| EDR | Environmental Design and Research, D.P.C. |
| DEIS | Draft Environmental Impact Statement |
| FEIS | Final Environmental Impact Statement |
| FR | Federal Register |
| HPTP | Historic Property Treatment Plan |
| MOA | Memorandum of Agreement |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act of 1966 |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| RFP | Request for Proposals |
| RIHPHC | Rhode Island Historical Preservation & Heritage Commission |
| ROD | Record of Decision |
| RWF | Revolution Wind Farm |
| USCG | United States Coast Guard |
| WTG | Wind Turbine Generator |

## 1.0 EXECUTIVE SUMMARY

This Historic Property Treatment Plan (HPTP) for the Bailey Farm, which is listed on the National Register of Historic Places (NRHP); the Clambake Club of Newport, which is listed on the NRHP; the Paradise Rocks Historic District, which is a Rhode Island Historical Preservation & Heritage Commission (RIHPHC) Historic Resource; the Sea View Villa, which is a RIHPHC Historic Resource; the St. George's School: Church of St. George, Little Chapel, and Memorial Schoolhouse, which is listed on the NRHP; the Indian Avenue Historic District which is listed on the NRHP; Whetstone, which is a RIHPHC Historic Resource; the Land Trust Cottages, which is a RIHPHC Historic Resource; and the Bluff/John Bancroft Estate, which is a RIHPHC Historic Resource, (the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm* (HRVEA; EDR, 2023) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) has provided this HPTP in accordance with the Bureau of Ocean Energy Management's (BOEM) Findings of Adverse Effect (FoAE) for the Undertaking under the National Historic Preservation Act of 1966 (NHPA).

BOEM has used the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has consulted with the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, federally recognized Native American Tribes, and other NHPA Section 106 consulting parties in accordance with this process. Revolution Wind has provided this HPTP to BOEM for inclusion in the Final Environmental Impact Statement (FEIS).

This HPTP describes the mitigation measures to resolve potential adverse effects on historic properties, the implementation steps, and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS as well as outreach to consulting parties performed by BOEM. This HPTP document has undergone revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and other consulting parties throughout the NEPA substitution process. This HPTP is included in the Memorandum of Agreement (MOA) issued in accordance with 36 CFR §§ 800.8, 800.10.

This HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2023) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2022) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the mitigation actions. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

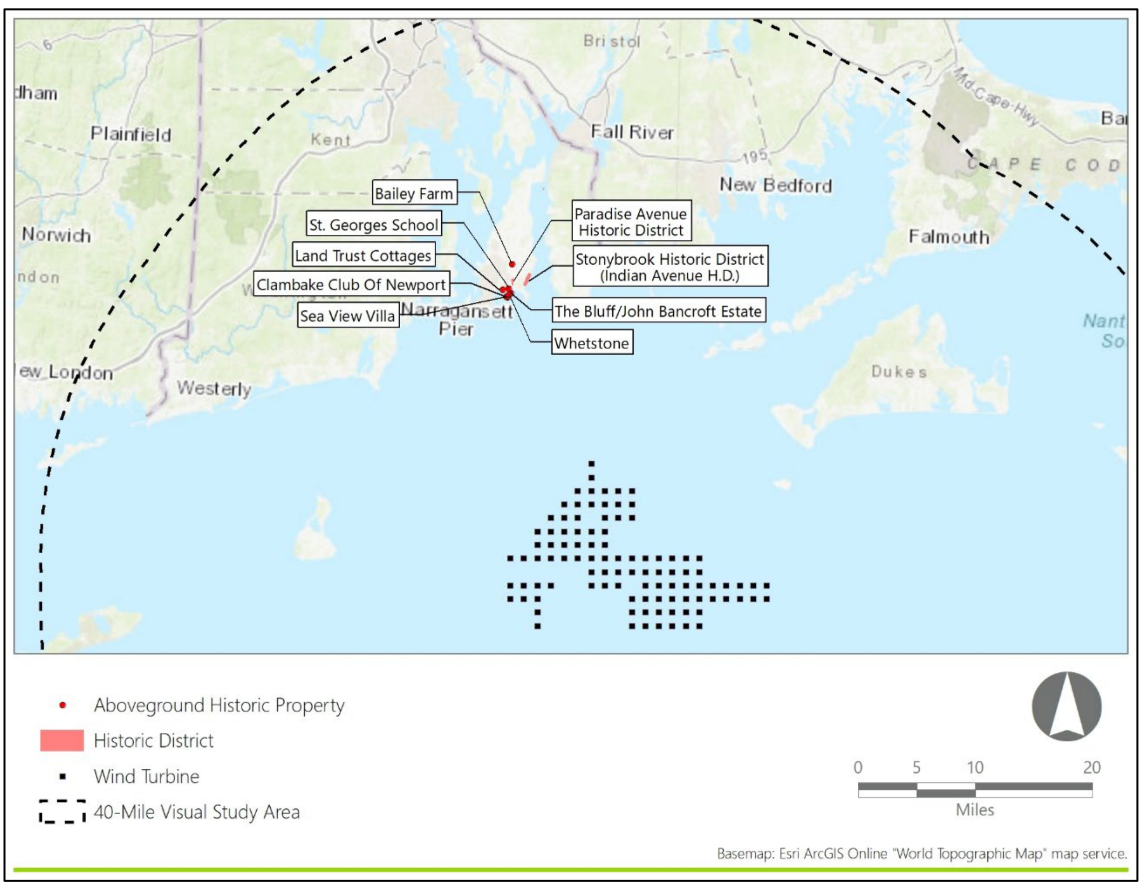
- **Section 6.0, References**, is a list of works cited in this HPTP.

## 2.0 BACKGROUND INFORMATION

### 2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

**Figure 2.1-1. Project Location**



## 2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP addresses the mitigation requirements identified by BOEM to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect consultations among consulting parties to refine a conceptual mitigation framework proposed by Revolution Wind.

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

### *2.2.1 Municipal Regulations*

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

## 2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021 pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic properties and invited the following parties:

- The Town of Middletown
- The Rhode Island Historical Preservation & Heritage Commission.

## 3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

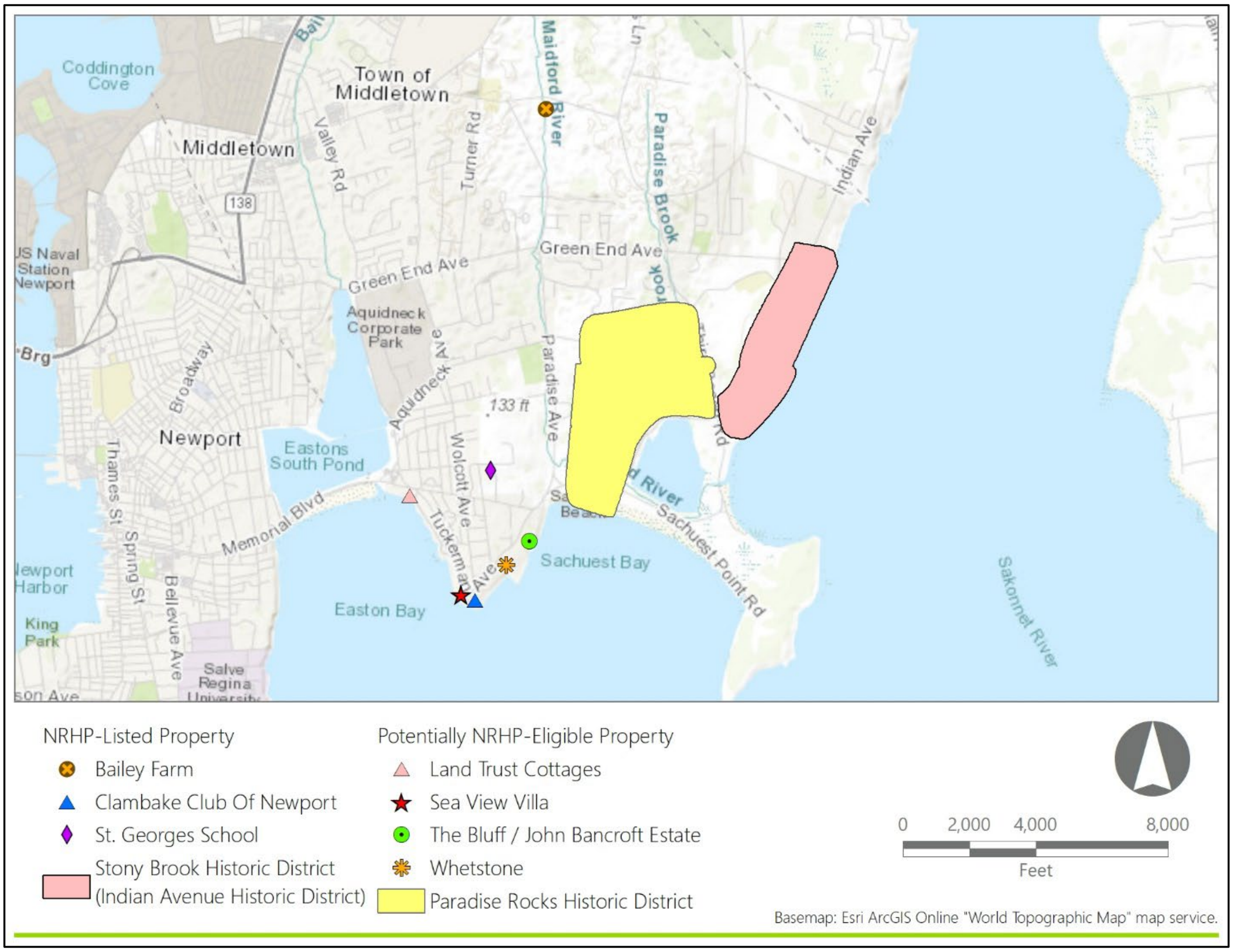
### 3.1 Historic Properties

This HPTP involves nine historic properties, as identified in Table 3.1-1 and located on Figure 3.1-1.

**Table 3.1-1. Historic Properties included in the HPTP**

| Name | Property Designation | Municipality | State | Site No. (Agency) | Ownership | Historic Property Type |
|---|---|---|---|---|---|---|
| Bailey Farm | NRHP-Listed | Middletown | RI | 84001887 (NPS Ref. #84001887) | Private | Agricultural Properties |
| Clambake Club of Newport | NRHP-Listed | | | 95001267 (NPS Ref. #95001267) | Private | Recreational Properties |
| Paradise Rocks Historic District | RIHPHC Historic Resource | | | MT 4 (RI SHPO) | Private (Multiple) | Historic Buildings and Structures |
| Sea View Villa | RIHPHC Historic Resource | | | MT 75 (RI SHPO) | Private | Historic Buildings and Structures |
| St. George's School: Church of St. George, Little Chapel, and Memorial Schoolhouse | NRHP-Listed | | | 4001235 (NPS Ref. #04001235) | Private | Historic Buildings and Structures |
| Indian Avenue Historic District | NRHP-Listed | | | 9000708 (NPS Ref. #09000708) | Private (Multiple) | Historic Buildings and Structures |
| Whetstone | RIHPHC Historic Resource | | | MT 77 (RI SHPO) | Private | Historic Buildings and Structures |
| Land Trust Cottages | RIHPHC Historic Resource | | | 903 | Private | Historic Buildings and Structures |
| The Bluff/John Bancroft Estate | RIHPHC Historic Resource | | | MT 78 (RI SHPO) | Private | Estates and Estate Complexes |

**Figure 3.1-1. Historic Property Locations**




In Sections 3.23 through 3.11, each historic property is individually considered, described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

## 3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The historic properties identified in this HPTP are included within the following property types as defined in the HRVEA: "Historic Buildings and Structures," "Historic Cemeteries and Burial Grounds," "Agricultural

Properties," "Recreational Properties," and "Estates and Estate Complexes." Each property type is defined below as well as the characteristics typical of their maritime setting.

"Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the "Estates and Estate Complexes" property type (see below). These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Historic Buildings and structures not fitting within the previously described types occur throughout the study area and in a variety of local contexts. Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic structures were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and Historic Buildings frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

"Historic Cemeteries and Burial Grounds" consists of cemeteries identified by federal, state, or local governmental agencies as having historic significance. These above-ground historic properties may be municipally owned cemeteries on public land, small family plots on private land, or abandoned burial grounds. Historic cemeteries are lasting memorials to the past, provide a guide to the changing values and composition of communities in the course of their historic development.

Historic cemeteries and burial ground vary throughout the study area. Small, private, non-denominational and family cemeteries were relatively common in New England, and many have survived to present-day. Many examples of small cemeteries were associated with specific farms or families and were frequently placed within the available agricultural lands surrounding a farmstead or near multiple associated family farms. Where such burial grounds are located near the water they may be associated with ocean or other maritime viewsheds, however, ocean vistas are less likely to have been a significant consideration in the siting of such cemeteries than their larger, more formal counterparts in the region. Where cemeteries are located within districts or other historic settlements strongly associated with maritime settings, such burial grounds may be sited to maintain a visual connection to the waters in order to maintain a sense of continuity linking the departeds' final resting places with the environment in which they lived. Cemeteries in urban locations expressing such patterns may include formal design elements associated with the "rural cemetery movement" of the 19th century, which sought to create naturalistic, park-like settings to express "an appreciation of nature and a sense of the continuity of life" (NPS National Register Bulletin 41: 6). Maritime views from hillside cemeteries that were intentionally incorporated or framed by landscape designs may be more sensitive to discordant modern elements than those associated with less formal burial grounds that may not have been specifically located to provide ocean views.

"Agricultural Properties" consist of historic farm buildings and landscapes which have retained a high degree of integrity and are generally no longer used for their original purpose. These above-ground historic properties feature barns, farmhouses, and large, open tracts of pastureland. Generally, these above-ground historic properties do not derive their significance in any direct way from the ocean or maritime activities.

Historic agricultural properties, including farms, farmhouses, barns and related buildings and structures are relatively common in the study area. Many of these properties were built between 1700 and 1850, after which agricultural economies in New England and New York declined sharply. The historic settings for such properties typically include open, agrarian landscapes which once may have afforded open views of the seas when sited along the shoreline or at higher elevations within the coastal interior. Few of the once expansive agrarian landscapes associated with the historic use of the region's farms survive. Some have been altered by later residential and commercial development and many have been transformed by reforestation. Despite these changes, historic agricultural properties remain an important part of the region's heritage and tangible expression of several centuries of intensive farming that transformed the landscapes throughout southern New England and eastern Long Island.

"Recreational Properties" is defined by the role these properties served in their original functions as places for the resort tourism economy of the late-nineteenth century to flourish. These above-ground historic properties feature beaches, casinos, restaurants, and other buildings and structures built to entertain seasonal vacationers. They are typically located near the shoreline or immediately adjacent to the sea, and in some cases, are the beaches themselves. The enjoyment of, and interaction with, the sea are integral features of the significance of these above-ground historic properties. In many cases, the beachfront, shoreline, and adjacent ocean waters are prominent features of the historic setting due to their close association with historic recreational activities.

The same macroeconomic trends that saw the decline of the quintessential New England farm in the mid-19th century are associated with a population shift to cities and rise in affluence for some segments of society. Summer resorts, supported by steamships, rail transportation, and eventually, automobiles were developed in numerous locations in the study area in the late 19th century. These resorts varied between properties intended to serve the rising group of "upper middle income" families living in the region's cities to estate-like developments serving a more affluent set. Seaside resorts, like many other shoreline recreational, commercial, and residential properties, were often sited to take advantage of aesthetically pleasing ocean or maritime views. Depending on location and the the conformation of the local shoreline, such properties may be associated with specific bay or cove viewsheds that include limited areas of the open ocean waters. Recreational activities at resorts frequently included swimming and designated beaches where residents and visitors may have spent considerable time during the summer months. Where these features are still present and express a tangible association with the historic resort property, views from beaches may be as important as views from more formal elements of the designed landscape. Likewise, historic hotels and inns became more common elements of the region's shoreline communities in the late 19th century. Such properties were often sited near harbors, ferry landings, rail stations, and public or private beaches and may be associated with similar historic maritime settings. Views to ocean waters or the more intimate bays and coves of the region may have been an integral part of the visitor's motivation for staying in such establishments. Such considerations can be expressed through the inclusion of building and landscape features clearly intended to afford views of ocean. Older taverns and inns in the study area may be found along the working harbors and ports and were intended to serve the fishing, whaling, and related participants in maritime commerce. The design and location of these properties may not show the same influence of aesthetic considerations but will likely also retain a strong association with the waterfront and maritime environment.

"Estates and Estate Complexes" consists of high-style residences, or groupings of residences, typically designed by prominent architects of the nineteenth and early twentieth centuries, such as Richard Morris Hunt and McKim, Mead and White. This property type consists mainly of the mansions and summer "cottages" built by wealthy industrialist families, drawn to the vicinity of Newport, Rhode Island as it became a prominent vacation and recreation area for the emerging American elite, and to Montauk Point as a naturalistic and remote enclave.

Estates built by or for wealthy families have been part of the region's landscapes for centuries and many such properties are located along the shorelines. High style, architect-designed mansions and associated landscapes are characteristic of several areas within the study area and many such properties were sited to take advantage of ocean views. The importance of maritime settings to these properties may be apparent in the design of building features such as veranda, porches, and large windows facing the water or through landscape elements and overall designs that were intended to frame specific views towards the seas. As with many other historic property types, the conformation of local shorelines and the specific orientation of each property may be important in assessing the association with specific aspects or elements of each associated viewshed.

## 3.3 The Bailey Farm

### *3.3.1 Physical Description and Existing Conditions*

The Bailey Farm (NPS Ref. #84001887, originally inventoried as the Chapman House and Farm) is an approximately 47-acre farm located at 373 Wyatt Road in Middletown, Road Island, approximately 2.25 miles from the coastline in Sachuest Bay (Figure 3.1-1). The property consists of a central, main farm complex including the original farmhouse, a barn, associated outbuildings including sheds and garages, and a cistern. The fields surrounding the central farm complex are still in use (predominantly as a vineyard) and are bound and interlaced with dry-laid stone walls. The Bailey family burying ground is located in the northwestern corner of the parcel, partially enclosed by a stone wall and modern metal fence. The Maidford River (a small brook) runs north to south, bisecting the property immediately west of the central farm complex (Nebiker et al., 1984; RIHPC, 1979a:40).

A more modern house (constructed circa 1930) with associated outbuildings is located in the northwestern corner of the property north of the Bailey family burying ground but does not contribute to the historical significance of the Bailey Farm (Nebiker et al., 1984).

The frame of the Bailey farmhouse dates from the mid-eighteenth century but was renovated in the nineteenth century Greek Revival style, including a large brick center chimney and three-bay façade. The outbuildings date from the mid-nineteenth to early-twentieth century (likely replacements for earlier barns and sheds) and have gabled roofs, but have been updated with modern shingles, windows, and fixtures (such as solar panels). Though the outbuildings have been updated and/or replaced, they retain their original placement and orientation to the road and the surrounding landscape (Nebiker et al., 1984).

### *3.3.2 Historic Context*

The Bailey Farm was once a farmstead occupying as much as 100 acres that was owned and occupied by the Bailey family, who were settlers of nearby Newport, throughout the eighteenth and into the nineteenth century. When the farmhouse underwent its Greek Revival renovations in 1838 the property was owned by Easton Bailey. The property was sold by the Bailey family in the 1850s and was bought and sold several times before being purchased by Peleg Sherman in 1878. His family owned the land until 1918, until it was sold to the Nunes family, whose descendants still owned the property at the time of the Bailey Farm's nomination for the NRHP in 1979. In the year 1850, under the operation of James Gardiner, the Bailey Farm produced $200 worth of fruits and vegetables, and $210 worth of meat, marking a relatively prosperous operation compared to other Rhode Island hill farms (RIHPC, 1979b; RIHPC, 1979a:40; Nebiker et al., 1984).

### *3.3.3 NRHP Criteria and the Maritime Visual Setting*

The NRHP-listed Bailey Farm meets Criterion A for its associations with the nineteenth-century agriculture of island farms of Narragansett Bay and NRHP Criterion C for its importance as an example of architecture and engineering of the Greek Revival, with a period of significance from 1825-1849 (Nebiker et al., 1984). The Bailey Farm was listed on the NRHP in 1964 and enjoys views to Sachuest Bay.

## 3.4 The Clambake Club of Newport

### *3.4.1 Physical Description and Existing Conditions*

The Clambake Club of Newport is a one-story building located on the bluff at Easton Point. It is a wood-framed, wood-shingled structure laid out in an L-shaped plan. Each wing is covered by a gabled roof, with cedar shingles, punctuated by large stone chimneys. Horizontal cedar-board siding covers the exterior. Several minor additions protrude from the sides of the original building. Areas of exposed foundation show a mix of irregularly cut stone and/or stucco. On the south side of the structure, which drops off to the water, the building is supported by masonry piers (Werenfels, 1995; RIHPC, 1979b:34).

The main entrance on the north side of the structure is cross-gabled, with an arched fan-light window above the wood-paneled entrance door. Stone piers support a flat roof outside the main entrance. The south side of the structure is characterized by a series of enclosed porches. The porches all have an arrangement of large viewing windows that offer views of the Rhode Island Sound. The porch at the western end of the south side of the structure has a stone terrace outside (Werenfels,1995).

Two outbuildings are also located on the property, the Chef's Cottage and the Guest Cottage. The Chef's Cottage is a small, wood-framed, one-story building with a gabled roof on the north end of the property. The exterior of the Chef's Cottage is also covered in horizontal cedar-board siding. The roof is made of asphalt shingles. The Guest Cottage is a small, wood-framed, one-story building with a gabled roof located on the western end of the property. The Guest Cottage has a gabled entrance portico, and a large bay window facing the Rhode Island Sound to the south. The exterior to the Guest Cottage is covered in horizontal cedar-board siding, and has a cedar shingle roof (Werenfels,1995).

### *3.4.2 Historic Context*

The Clambake Club of Newport has occupied the site at Easton's Point since the 1890s, officially organizing as a club to utilize the property in 1895. An existing dwelling and stable on the property were improved upon beginning in 1897 when they entered into a formal rental agreement with the owner of the property. In 1903 the Clambake Club of Newport property was purchased by founding member Center Hitchcock, who constructed the first clubhouse facility specifically built for the Clambake Club's activities sometime between 1903 and 1907. Club records indicate the facility was likely designed by Colonel Francis Hoppin. A photograph from 1910 shows a simple, one-story building with gabled roofs (Werenfels, 1995).

The original building (with some small additions) survived until September 21, 1938, at which time a hurricane destroyed portions of the building on its southern and eastern ends, though the main body of the building survived the storm. The club was rebuilt in 1939 by William L. Van Alen of Wilmington, Delaware, though it is unclear how much of the original structure was incorporated into the design of the new building. However, the simple, one-story gabled-roof character of the building remained the same (Werenfels, 1995; RIHPC, 1979b:34).

The two outbuildings are not depicted on the 1921 Sanborn Map Co. *Atlas of Newport, Jamestown, Middletown and Portsmouth, Rhode Island* (Sanborn, 1921) and it is unclear if they existed before the 1938 hurricane or if they were later additions to the property (Werenfels, 1995).

### *3.4.3 NRHP Criteria and the Maritime Visual Setting*

The Clambake Club of Newport is significant under NRHP Criterion A for its associations with the late nineteenth-century and early twentieth century entertainment and recreation movements, specifically the seaside recreational facilities on Rhode Island and New England coastlines used for clambakes, social gatherings, and sporting activities such as fishing and shooting. The Clambake Club of Newport has a period of significance from 1875-1949 and is still in use as a private club today (Werenfels, 1995). The location of the main building, and both outbuildings speak to the property's historic association with views to and enjoyment of the seascape. Large bay windows and multiple porches extending towards the water show the importance of the ocean views and the immediate proximity of the waterfront to the historical character of the property. It was listed in the NRHP in 1995.

## 3.5 The Paradise Rocks Historic District

### *3.5.1 Physical Description and Existing Conditions*

The Paradise Rocks Historic District is located at the south end of Middletown, to the north of Gardiner Pond and Second Beach. According to the Rhode Island Historical Preservation & Heritage Commission (1979a:17), "On an island devoted largely to agricultural, residential, commercial, and industrial uses, the Paradise Rocks area is a superb and unique natural enclave." The Paradise Rocks Historic District is a largely undeveloped area, with portions of the district set aside as wildlife sanctuaries. The district encapsulates Nelson Pond and Paradise Brook, and is named for Paradise Rocks, a north-south trending outcropping of fine blue-hued conglomerate rock" (RIHPC, 1979a:2). The Paradise Rocks Historic District consists of several resources, both natural and man-made. These include Hanging Rock, the Smith-Gardiner-Norman Farm, Gray Craig Estate, the Allen-King-Norman Farm, and the Norman Bird Sanctuary and Museum. The history of each resource is described in the following section.

### *3.5.2 Historic Context*

For most of its history, the area within Paradise Rocks Historic District was left in its natural state. Unlike the surrounding area (i.e., Stonybrook Historic District), the District did not become a location for numerous sprawling summer estates. During the nineteenth century, the area was utilized for agriculture and hunting. By the twentieth century more "passive recreation" was enjoyed in the bird sanctuary, with only several residences constructed (RIHPC, 1979a:17). A description and history of some of the resources within the District is listed below.

***Hanging Rock***

Hanging Rock is a conglomerate-rock mass near Second Beach that juts out into a marsh, with an abrupt cliff-like break at its south end. According to the Rhode Island Historical Preservation & Heritage Commission, (1979a:17-18), the rock was also known as "Berkeley's Seat" during the eighteenth century, as it was a favorite location of Bishop George Berkeley. Today, it is a popular tourist attraction.

***Smith-Gardiner-Norman Farm (Paradise Farm)***

The Smith-Gardiner-Norman Farm is an NRHP-listed historic district located on 129 acres. The property consists of a mid-eighteenth-century farmhouse with later additions, a mid-nineteenth century barn, two agricultural outbuildings, two burial sites, a stone-lined sheep pen, stone-lined pastures and fields, wooded areas, Hanging Rock, and an abandoned bluestone quarry. The farmhouse consisted of a two-and-a-half story structure rebuilt in the late nineteenth century in the Colonial Revival style. According to the Rhode Island Historical Preservation & Heritage Commission (1979a:18), the farmhouse had a gambrel roof, two interior brick chimneys, a central entry with sidelights in a veranda, gable dormers in front, and a flat roof addition.

The property was primarily farmed by tenant farmers from 1850 to 1900. However, it was best known as the summer residence of George H. and Abbie Kinsley Norman who bought the property in 1898. Mabel

Norman Cerio, the last private owner of the Smith-Gardiner-Norman Farm, adapted the farmhouse and immediate neighboring fields for use as a main residence in 1915. Cerio bequeathed much of the estate to the Norman Bird Sanctuary Trust for use as a bird sanctuary in 1949, which continues to be its use today. At the time of Cerio's death, a 16-acre parcel comprising the Paradise Farmhouse, outbuildings, and agricultural fields along Third Beach Road remained in the hands of the Norman heirs. Various fields were leased for commercial use until the 1990s. In the late 1990s, the Norman Bird Sanctuary purchased this parcel and reintegrated it into the sanctuary (Town of Middletown, 2015).

***Gray Craig***

Gray Craig, also known as the Michael M. Van Bueren House, was once the farm of one the earliest families in Middletown during the eighteenth century. The resource as it exists today consists of a large two-and-a-half story stone house with four chimneys and views of Sachuest Beach and the Atlantic Ocean. Updates were made to the estate by Mary and Michael Van Bueren during the early twentieth century to transform the estate into a chateau-like house. Additions included kennels, greenhouses, a walled and secret garden, a tea house, a gatehouse, a stable, and a barn (RIHPC, 1979a:18).

***Allen-King-Norman Farm***

The Allen-King-Norman Farm consists of a two-and-a-half story Federal-era structure with large brick and central chimneys. According to the Rhode Island Historical Preservation & Heritage Commission (1979a:18), the farmhouse had a central portico entry in a 5-bay, south-facing façade, and a large wing at a right angle at the rear. There was a complex of wood-shingle and stone outbuildings at the rear, and the grounds, with stone walls, were well landscaped. The farm was opened to the public as a bird sanctuary in 1950 and named for George H. Norman and George H. Norman, Jr.

***Norman Bird Sanctuary and Museum***

The Norman Bird Sanctuary, maintained by the Rhode Island Audubon Society, opened to the public in 1950 and consisted of a 450-acre tract of woodland, field, marshes, and rocky hills. Portions of the Sanctuary was formed from the Smith-Gardiner-Norman Farm and Allen-King-Norman Farm. A converted barn and several small outbuildings serve as the headquarters which comprise the bird sanctuary (RIHPC, 1979a:18).

### *3.5.3 NRHP Criteria and the Maritime Visual Setting*

The Paradise Rocks Historic District is an NRHP-eligible resource, possibly under Criterion A and C. The district contains a typical landscape within coastal New England and Middletown that was utilized for agriculture by Europeans for over 200 years. In addition, the few houses within the district are typical examples of nineteenth century residences within Middletown, Rhode Island, embodying the distinctive characteristics of the type, period, or methods of construction. The homes are also in keeping with the vernacular building tradition of coastal New England.

One of the resources within the District, the Smith-Gardiner-Norman Farm (also known as Paradise Farm), was listed in the NRHP under Criterion A and C for its significance in the history of Middletown's settlement and agriculture. According to the NRHP Inventory Nomination Form (Connors, 2007), the Paradise Farm is "a well-preserved example of Rhode Island's eighteenth and nineteenth century island farms, typical of its region in its form and in its history of use and ownership until the early twentieth century." Contributing structures included a farmhouse, a two-car garage, carriage shed, barn, stone walls, agricultural fields, orchard, family garden, sheep pen, Gardiner Family Burial Plot (1786-1872), gravesite (date unknown), Hanging Rock, and quarry. The period of significance for the Farm spans from 1750 to 1949. While the early period's significance included the history surrounding the historic farmstead, the later period's significance included the pattern of development in the history of the island towns and the use of agricultural areas in island towns as country retreats for wealthy families. The Smith-Gardiner-Norman Farm may also be NRHP eligible under Criterion D, as it may yield evidence about the lifeways of coastal Native Americans as well as successive owners, tenants, and slaves (Connors, 2007).

## 3.6 The Sea View Villa

### *3.6.1 Physical Description and Existing Conditions*

The Sea View Villa is a two-and-a-half story, multi-gabled chateau with a complex plan, several porches, and wood-carved details on the exterior (RIHPC, 1979a:34). The house is near the vicinity of Easton's Point on Tuckerman Avenue. The house is less than 100 meters from the shoreline and approximately 40 feet above mean sea level, overlooking the Atlantic Ocean. Sea View Villa is currently a privately owned apartment complex (Sea View Villa, n.d.).

### *3.6.2 Historic Context*

The Sea View Villa was built by General Zachariah Cantey Deas in the 1880s. The original lot, much like those in other sections of Middletown, were laid out by a syndicate of Boston businessmen. In 1945, the property was purchased by Tony and Mary Spiratos, whose family continues to own the property. During this time, Sea View Villa was host to President Eisenhower's Cabinet and the White House's staff. During the latter half of the twentieth century and to the present, the Spiratos family made major renovations to the estate, updating the various rooms (such as the old servant's quarters) into apartments for rent (RIHPC, 1979a:6; Sea View Villa, n.d.).

### *3.6.3 NRHP Criteria and the Maritime Visual Setting*

The Sea View Villa is an NRHP-eligible resource and appears to meet Criterion C. The house is a typical example of a late-nineteenth century residence within Middletown, Rhode Island, embodying the distinctive characteristics of the type, period, or methods of construction. In addition, the house is in keeping with the vernacular building tradition of coastal New England. The property's natural landscape and maritime visual residence.

## 3.7 The St. George's School: Church of St. George, Little Chapel, and Memorial Schoolhouse

### *3.7.1 Physical Description and Existing Conditions*

The St. George's School (NPS Ref. #04001235) collectively refers to three buildings (attached to one another) together occupying less than one acre on a 125-acre school campus: the Church of Saint George, the

Memorial Schoolhouse, and the Little Chapel. Approximately 50 other structures, as well as lawns and athletic fields, cover the rest of the campus. Approximately half of the other structures were built between the 1880s and 1930s; some of those may also warrant NRHP nomination. The Memorial Schoolhouse, Church of Saint George, and the Little Chapel occupy the center of the campus between landscaped courtyards. The entire campus has been likened to an English manor estate, with buildings consistently between one and three stories, with gabled roofs, red brick exteriors, and Georgian Revival and Tudor Revival architecture (Cavanaugh, 2004: Section 7, pg. 1-2).

While the original campus was laid out in quadrangles, preserving ocean views to the east and south was later considered. The hilltop location of the school property offers "magnificent views of Second Beach, Sachuest Bay, Rhode Island Sound" and other landmarks (Cavanaugh, 2004: Section 7, pg. 1). Currently, the school serves as a private, Episcopal, coeducational boarding school (St. George's School, n.d.).

***The Little Chapel***

The Little Chapel is a brick one-room building with one-story, and a gabled roof of green slate on a poured concrete foundation. Constructed between 1909 and 1911, the Tudor Revival style building was relocated in 1924 less than 100 feet away from its original site to make way for construction of the Church of Saint George. The Little Chapel is now attached to the larger Church of Saint George on the larger structure's southeast corner in the position of a Gothic church's "Lady Chapel." The Little Chapel was modified between 1924 and 1928 to match the style of the Church of Saint George. The Little Chapel now exhibits a parapeted gable roof, Gothic pointed-arch doorway, diamond-paned leaded casement windows, and exposed roof beams and trusses. At the time of its inclusion on the NRHP, the slate roof and gutters of the Little Chapel were in disrepair (Cavanaugh, 2004: Section 7, pg. 3-5).

***The Memorial Schoolhouse***

The Memorial Schoolhouse is a two and one half-story red brick building built in the Tudor Revival style. It was constructed between 1921 and 1923 as a memorial to the alumni of the school who died in World War I. It has cast stone trim, a multi-gabled slate roof, and a wood-framed cupola. The main entranceway is semi-hexagonal with an arched doorway and Renaissance detailing. A miniature turret is adjacent to the north slype door. The schoolhouse is oriented on and east-west axis, and its primary façade faces the south. The schoolhouse is in very good condition, and retains full integrity of setting, feeling, and association (Cavanaugh, 2004: Section 7, pg. 6-11).

***The Church of Saint George***

The Church of Saint George was constructed between 1924 and 1927 by one of the major church architects of his generation, Ralph Adams Cram of the Boston firm of Cram & Ferguson. According to the St. George's School NRHP registration form, "the Gothic Revival Style Church of St. George (commonly referred to as "the Chapel") is not only the most visually prominent, but also the most historically and architecturally significant building on campus" (Cavanaugh, 2004; Section 7, pg. 12).

While notably smaller than medieval period counterparts, the Church of Saint George presents the Gothic feelings of height and weightlessness. Character defining features include: the stone materials; the buttresses; the rib-vaulted roof; the pointed-arch window and door openings; the stained-glass windows outlined with stone tracery; the cloister with its fan-vaulting, pointed arches and stone tracery; the great tower; and the copious ornamentation inside and out (Cavanaugh, 2004: Section 7, pg. 12).

The Church of Saint George was constructed primarily of gray limestone, with areas of marble, granite and limestone interior. The roof is lead coated copper. The church is arranged in a T-shape, with a long nave running east-west and a short transept at the west end. The nave and the transept have end-gabled roofs. The church has four exterior towers, with the largest square tower rising 147 feet. A long, narrow, two-story stone structure called a slype connects the church with the Memorial Schoolhouse (Cavanaugh, 2004: Section 7, pg. 12).

### *3.7.2 Historic Context*

The St. George's School was founded as an Episcopal school for boys in 1896 by Mr. John Byron Diman, a deacon in the Episcopal Church and alumnus of Brown, Cambridge, and Harvard. At the time, Rhode Island did not have a state-supported public high-school system, so the St. Georges School filled the need for private education. Originally the school rented a location in Newport, before relocating in 1901 to the present-day location due to Diman's love of the "rural, naturalistic qualities and extensive ocean views" (Cavanaugh, 2004; Section 8, pg. 45). By 1906 the school had 88 students, and construction of new campus buildings included classrooms, dormitories, residences, a dining hall and other supporting facilities. The Little Chapel was constructed between 1909 and 1911 to serve as a place for morning communion services, confirmation classes, Bible study, and community meetings. The Memorial Schoolhouse, constructed between 1921 and 1923, was built to memorialize those school alumni who had died in World War I. The Church of Saint George, constructed between 1924 and 1928, was built to provide religious services to the entire Episcopal community of St. George's School (Cavanaugh, 2004: RIHPC, 1979a:31).

### *3.7.3 NRHP Criteria and the Maritime Visual Setting*

The St. Georges School is significant under NRHP Criterion A for reflecting the rise of faith-based private education in America, particularly of Episcopal boarding schools in New England, at the end of the 19th century and the beginning of the 20th century. Collectively and individually, the three buildings which comprise the NRHP listing are also significant Under Criterion C. The Little Chapel and the Memorial Schoolhouse both represent the Tudor Revival style. The Church of St. George is a masterpiece of English Gothic Revival ecclesiastical architecture, representing the work of one of the major church architects of his generation, Ralph Adams Cram of the Boston firm of Cram & Ferguson (Cavanuagh, 2004: Section 8, pg. 33).

The extensive and magnificent ocean views contribute to the St. George's School's integrity of setting, feeling, and association as they were a primary reason that founder John Diman chose the location. Layout and orientation of the campus buildings in relation to the east and south facing views was also considered during construction. The St. George's School was listed in the NRHP in 2004.

## 3.8 The Indian Avenue Historic District

### *3.8.1 Physical Description and Existing Conditions*

The Indian Avenue Historic District, previously known as the Indian Avenue Historic District, is located in the eastern portion of Middletown, between Green End Avenue on the north and Third Beach Road on the south. The district encompasses a one-quarter mile section of Indian Avenue and contains approximately a dozen noteworthy Late Victorian and early twentieth century structures. An 1884 stone chapel, St. Columba's Chapel, is located nearby (RIHPC, 1979a:13). Most of the houses are located to the east of Indian Avenue, overlooking the Atlantic Ocean, with many consisting of one-and-a-half to two-story houses set back from the road and obscured by trees. The original homes were typically constructed from stone or vertical board-and-batten walls. Additional outbuildings, such as carriage houses, were and continue to be a common feature of these large estates (RIHPC, 1979a:14-15).

The land gently rises from sea level at the river's shore to just over 50 feet at the district's northwestern corner. Just south of Vancluse Avenue, which forms part of the district's western edge, a small creek crosses Indian Avenue and meanders into the Sakonnet River east of the intersection of Vaucluse and Indian Avenues. The district's principal properties comprise a large, early twentieth century multiple resource estate with landscaped grounds, subdivided in the late twentieth century. It is comprised of four contributing buildings, five non-contributing buildings, and two discrete contributing sites. The contributing buildings include 75 Vancluse Avenue, 501 Indian Avenue, 502 Indian Avenue, 515 Indian Avenue, 521 Indian Avenue. The properties were largely divided from the Edward C. Knight, Jr. estate (Stonybrook) designed by Horace Trumbauer in 1928. In addition to the main house on a waterfront lot, the Knight estate extended across Indian Avenue, with formal gardens and outbuildings in the same style as Stonybrook (i.e., Late Gothic Revival) (Woodward, 2009).

### *3.8.2 Historic Context*

From the time of European settlement in the eighteenth century until the mid-nineteenth century, the land within the Indian Avenue Historic District was primarily utilized for agriculture. A farmhouse stood at each end of the present-day district. In addition, a ferry landing near the end of Green End Avenue, originally known as Taggart's Ferry, carried farm produce between Little Compton and Newport until about 1870 (RIHPC, 1979a:13).

After the Civil War, the nearby town of Newport saw a marked increase in the purchase and construction of summer estates. Inspired by this growth, Eugene Sturtevant began his effort to make Middletown the "court end of the island" in 1871 (RIHPC, 1979a:6). Sturtevant and a partner purchased two and a half miles of farmland along the Sakonnet shore and money was invested into a 5-mile fenced road (Indian Avenue). The plat featured the road flanked by one hundred rectilinear lots, with an average frontage of 200 feet and depths of 400 feet or more (Woodward, 2009). The Indian Avenue neighborhood developed on a small scale, with the first purchases being made by Philadelphia and Hartford families. The advent of the automobile attracted more development within the district, as it was easier to drive the 3.5 miles from Newport (RIHPC, 1979a:13).

For the first three decades of the twentieth century, many new summer estates were constructed, though much of the original plat remained in agricultural use (Woodward, 2009). A pattern of summer estates with ample landscaped grounds interspersed with occasional farm fields defined the district in the decades after World War II. In the last quarter of the twentieth century another round of development added a new generation of large houses, filling in formerly undeveloped land or subdivided portions of the earlier estates (Woodward, 2009; RIHPC, 1979a:13).

### *3.8.3 NRHP Criteria and the Maritime Visual Setting*

The Indian Avenue Historic District was added to the NRHP in 2009 under Criterion C. According to the NRHP Nomination Form (Woodward, 2009), the district is a "…notable example of the high-style residential development associated with the growth of an extensive summer-resort society that was centered in Newport, Rhode Island and spread into the neighboring towns of Middletown, Portsmouth, and Jamestown in the late nineteenth and early-twentieth centuries. The district… is the community's largest, most fully developed, and most intact representative of this phenomenon." In addition, it represents the work of a prominent architect of the time, Horace Trumbauer, and exemplified a style of life common to other sections of Middletown (RIHPC, 1979a:13). The district as a whole derives historic significance from its seaside location and maritime visual setting, as the location specifically relied on its coastal setting and maritime view in order to attract homeowners. According to the Rhode Island Historical Preservation & Heritage Commission (1979a:13), the maritime visual setting was an important aspect of the estates and District, as the "well sited lots afford[ed] good views of the river and ocean."

## 3.9 The Whetstone

### *3.9.1 Physical Description and Existing Conditions*

The Whetstone is a two-story Early Victorian structure with two brick interior chimneys, round-head dormers, a front porch, and several additions. It is sited on the bluff overlooking Whetstone Point and Long Rock and Sachuest Bay at 455 Tuckerman Avenue (RIHPC, 1979a:34). The house is located approximately 100 meters from the shoreline and at approximately 40 feet above mean sea level, overlooking the Atlantic Ocean. The Whetstone is currently a privately owned home.

### *3.9.2 Historic Context*

The Whetstone was built in 1860 by Lewis P. W. Balch, a doctor from New York, prior to the growth of Newport's summer colony after the Civil War (RIHPC, 1979a:6, 34). Prior to this, the Whetstone home was primarily located within a rural and agricultural environment. After the Civil War, increased construction in summer houses occurred on the south and east side of Tuckerman Avenue, as the lots offered views of the Atlantic Ocean. During the twentieth century, additional houses and roads were constructed to the north of the Whetstone. Currently, the Whetstone house is located within a moderately dense residential area.

### *3.9.3 NRHP Criteria and the Maritime Visual Setting*

The Whetstone is an NRHP-eligible resource and appears to meet Criterion C. The house is a typical example of a mid-nineteenth century residence within Middletown, Rhode Island, embodying the distinctive characteristics of the type, period, or methods of construction. In addition, the house is in keeping with the vernacular building tradition of coastal New England. The property's natural landscape and maritime visual setting are a key component of its historic significance as a mid-nineteenth century vernacular seaside residence.

## 3.10 The Land Trust Cottages

### *3.10.1 Physical Description and Existing Conditions*

The Land Trust Cottages are a group of five Shingle-style houses located off of Purgatory Road, at the east end of Easton Beach. The cottages are comprised primarily of two-and-a-half-story, gambrel-roof structures closely grouped together located between a tall hedgerow along Purgatory Road and Easton Bay.

### *3.10.2 Historic Context*

The Land Trust Cottages were laid out for development in 1885-1887 under the guidance of Frederick Law Olmsted. The cottages were constructed as part of a wave of post-Civil War development in Middletown and Newport, primarily by businessmen and investors from Boston. In 1887-1888 E. B. Hall, a Boston builder, erected the cottages on a relatively small lot, positioned to take advantage of views of Easton Bay. The cottages have remained private residences since their construction, with relatively minimal alteration to materials or form (Nebiker and Kennedy, 1990; Jordy, 2012; Dunn, 2014).

### *3.10.3 NRHP Criteria and the Maritime Visual Setting*

The Land Trust Cottages were included in the *Historic and Architectural Resources of Middletown RI* multi-property documentation form (Nebiker and Kennedy, 1990), but have not been formally listed on the NRHP. The RIHPHC have classified the property as potentially eligible for listing on the NRHP. The Land Trust Cottages appear to meet NRHP eligibility Criterion C as an intact, representative example of seaside Shingle-style residences, as well as for the associations with Frederick Law Olmsted. The coastal location and maritime visual setting of the cottages are a key component of their historic significance as late-nineteenth century summer cottages.

## 3.11 The Bluff/John Bancroft Estate

### *3.11.1 Physical Description and Existing Conditions*

The Bluff/John Bancroft Estate is located at 575 Tuckerman Avenue. The property extends from the roadway to the bluffs overlooking Sachuest Bay. The building is an irregular-shaped, five-story Shingle-style residence originally constructed in 1895, converted into apartments in 1950, and renovated into ten luxury condominiums in 2006.

### *3.11.2 Historic Context*

The Bluff/John Bancroft Estate was designed by architect William Ralph Emerson (regarded as one of the leading architects of the Shingle Style) for John Chandler Bancroft, a businessman and artist and collector of Japanese art from Boston, with a Japanese garden designed by Frederick Law Olmsted. The house was constructed on a bluff overlooking Sachuest Bay to take advantage of the sweeping views of the bay. The house was constructed as part of a wave of post-Civil War development in Middletown and Newport, primarily by businessmen and investors from Boston. Although Bancroft passed away in 1901, the building is still associated with his name due to his connections and contributions to the art world of Rhode Island in the late nineteenth century (RIHPC, 1979; Sieger, 2000; Historic New England, 2016; Dunn, 2017; WUC, 2020).

### *3.11.3 NRHP Criteria and the Maritime Visual Setting*

The Bluff/John Bancroft Estate was included in the *Historic and Architectural Resources of Middletown RI* multi-property documentation form (Nebiker and Kennedy, 1990), but has not been formally listed on the NRHP. The RIHPHC have classified the property as potentially eligible for listing on the NRHP. The Bluff/John Bancroft Estate appears to meet NRHP eligibility National Register Criterion A for its associations with John Chandler Bancroft, and Criterion C as an intact, representative example of the work of William Ralph Emerson, a prominent New England architect renowned for his Shingle-style designs, as well as the associations with Frederick Law Olmsted, who designed the Japanese garden on the property that is partially intact. The property's coastal location and uninterrupted maritime visual setting are a key component of its historic significance as a mid-nineteenth century seaside estate.

# 4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. These mitigation measures were developed in consultation with the Participating Parties by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change.

## 4.1 Support Ongoing Maintenance and Aesthetic Improvements to the Third Beach Road and Hanging Rocks Road through Stone Wall Preservation and Observation Trails within the Paradise Rocks Historic District

### *4.1.1 Purpose and Intended Outcome*

Per the request of the Norman Bird Sanctuary, Revolution Wind will provide funding to support the ongoing implementation of resiliency measures, ongoing maintenance, and/or aesthetic improvements to the historic stone walls along Third Beach Road and Hanging Rocks Road to ensure the long-term preservation of these historic and cultural resources. In addition, the funding may be used toward the ongoing improvement to the Norman Bird Sanctuary's Coastal Trail to provide support for viewing platforms and other trail improvements to enjoy and observe these historic and cultural resource.

### *4.1.2 Scope of Work*

This scope of work will consist of the following:

- Review existing Town of Middletown Charter and Code of Ordinances;
- Review existing planning documents, guidance, and regulations;
- Review, photograph and document existing conditions;
- Solicit public engagement to discuss preservation priorities;
- Develop a draft plan, including drawings if necessary, to be distributed to the Participating Parties for review and comment;
- Develop a final plan, including drawings if necessary to be distributed to the Participating Parties;
- Complete project;
- Develop a draft report of work completed, including as-built documentation and photographs to be distributed to the Participating Parties for review and comment; and
- Develop the final report to be distributed the Participating Parties.

### *4.1.3 Methodology*

Revolution Wind will release a request for proposals (RFP) for consultant services and select a consultant to perform the scope of work listed in Section 4.1.2.

#### *4.1.4 Standards*

The mitigation measure will comply with following standards:

- Town of Middletown Charter and Code of Ordinances; and
- The Secretary of the Interior's *Standards for the Treatment of Historic Properties* (36 CFR 68).

#### *4.1.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Photographs and documentation of existing conditions;
- Draft plan;
- Final plan;
- Draft report of work completed, including as-built documentation; and
- Final report.

#### *4.1.6 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

### 4.2 Updated Town-Wide Historic Resources Survey

#### *4.2.1 Purpose and Intended Outcome*

Per the request of RIHPHC, Revolution Wind will provide funding to hire a Secretary of the Interior (SOI) qualified professional to complete an update of the existing Historic and Architectural Resources of Middletown, Rhode Island: A Preliminary Report, which was completed in 1979. The updated town-wide historic resources survey will identify and document historic and potentially historic properties located within the Town of Middletown.

#### *4.2.2 Scope of Work*

The scope of work will consist of the following:

- Review the existing Historic and Architectural Resources of Middletown, Rhode Island: A Preliminary Report;
- Review existing historic property documentation available at local repositories and the RIHPHC files;
- Develop a methodology for completion of the survey to be distributed to the Participating Parties for review and comment;
- Complete survey per the approved methodology;

- Develop a draft survey report to be distributed to the Participating Parties for review and comment; and
- Develop final report, addressing the comments received, to be distributed to the Participating Parties.

### *4.2.3 Methodology*

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.1.2. The consultant should be a SOI qualified professional and have demonstrated knowledge and experience in completing town-wide architectural surveys.

### *4.2.4 Standards*

The exhibit will conform to the following standards:

- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable; and
- RIHPHC guidance.

### *4.2.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- Request for Proposals (RFP);
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft report; and
- Final report.

### *4.2.6 Funds and Accounting*

Funding amounts were determined to be sufficient by BOEM in consultation with the consulting parties and are identified in an attachment to the MOA.

# 5.0 IMPLEMENTATION

## 5.1 Timeline

The timeline for implementation of the mitigation measures is identified in the MOA.

## 5.2 Organizational Responsibilities

### *5.2.1 Bureau of Ocean Energy Management (BOEM)*

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM will be responsible for sharing the annual summary report with the Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

### *5.2.2 Revolution Wind, LLC*

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

### *5.2.3 Other Parties, as Appropriate*

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

## 5.3 Participating Party Consultation

This HPTP was provided by Revolution Wind for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. Participating Parties were provided the opportunity for review and comment on the HPTP concurrent with BOEM's NEPA substitution schedule for the Project. This HPTP was further refined through informational

and consultation meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information.

## 6.0 REFERENCES

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**ATTACHMENT 13 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM, NINE HISTORIC PROPERTIES SUBJECT TO ADVERSE EFFECTS IN THE TOWN OF AQUINNAH, DUKES COUNTY, MASSACHUSETTS**

# Historic Property Treatment Plan

## for the

# Revolution Wind Farm

## Nine Historic Properties

## Town of Aquinnah, Dukes County, Massachusetts

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:


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**June 2023**

## ABSTRACT

| | |
|---|---|
| Federal Undertaking: | Revolution Wind Farm and Revolution Wind Export Cable Project |
| Location: | Outer Continental Shelf and Rhode Island |
| Federal and State Agencies: | Bureau of Ocean Energy Management<br>National Park Service<br>U.S. Army Corps of Engineers<br>Massachusetts Historical Commission<br>Rhode Island Historical Preservation & Heritage Commission<br>New York Historic Preservation Office<br>Connecticut Historic Preservation Office<br>Advisory Council on Historic Preservation |
| Regulatory Process: | National Environmental Policy Act<br>Section 106 of the National Historic Preservation Act<br>Section 110(f) of the National Historic Preservation Act |
| Purpose: | This Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects from the Revolution Wind Project. |
| Adverse Visual Effect Finding for: | 71 Moshup Trail<br>The Leonard Vanderhoop House<br>The Edwin DeVries Vanderhoop Homestead<br>The Tom Cooper House<br>The Theodore Haskins House<br>3 Windy Hill Drive<br>The Gay Head-Aquinnah Town Center Historic District<br>The Gay Head-Aquinnah Shops<br>The Gay Head-Aquinnah Coast Guard Station Barracks |
| Submitted By: | Revolution Wind, LLC |
| Date: | June 2023 |

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| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ADLS | Aircraft Detection Lighting System |
| APE | Area of Potential Effects |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| DEIS | Draft Environmental Impact Statement |
| EDR | Environmental Design and Research, D.P.C. |
| FEIS | Final Environmental Impact Statement |
| FR | Federal Regulation |
| HPTP | Historic Property Treatment Plan |
| MHC | Massachusetts Historical Commission |
| MOA | Memorandum of Agreement |
| NHL | National Historic Landmark |
| NHPA | National Historic Preservation Act of 1966 |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| PAPE | Preliminary Area of Potential Effects |
| RFP | Request for Proposal |
| RIHPHC | Rhode Island Historical Preservation & Heritage Commission |
| ROD | Record of Decision |
| RWF | Revolution Wind Farm |
| TCP | Traditional Cultural Property |
| WTG | Wind turbine generator |

## 1.0 EXECUTIVE SUMMARY

This Historic Property Treatment Plan (HPTP) for 71 Moshup Trail, which is a Massachusetts Historical Commission (MHC) Inventory Site; the Leonard Vanderhoop House, which is a MHC Inventory Site; the Edwin DeVries Vanderhoop Homestead, which is listed on the National Register of Historic Places (NRHP); the Tom Cooper House, which is an MHC Inventory Site; the Theodore Haskins House, which is an MHC Inventory Site; 3 Windy Hill Drive, which is an MHC Inventory Site; the Gay Head – Aquinnah Town Center Historic District, which is listed on the NRHP; the Gay Head – Aquinnah Shops, which is an MHC Inventory Site; and the Gay Head-Aquinnah Coast Guard Station Barracks, which is an MHC Inventory Site (hereinafter, the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm* (HRVEA; EDR, 2023) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) has provided this HPTP in accordance with the Bureau of Ocean Energy Management's (BOEM) Findings of Adverse Effect (FoAE) for the Undertaking under the National Historic Preservation Act of 1966 (NHPA).

BOEM has used the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has consulted with the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, federally recognized Native American Tribes, and other NHPA Section 106 consulting parties in accordance with this process. Revolution Wind has provided this HPTP to BOEM for inclusion in the Final Environmental Impact Statement (FEIS).

This HPTP describes the mitigation measures to resolve adverse effects on historic properties, the implementation steps, and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS as well as outreach to consulting parties performed by BOEM. This HPTP document has undergone revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and other consulting parties throughout the NEPA substitution process. This HPTP is included in the Memorandum of Agreement (MOA) issued in accordance with 36 CFR §§ 800.8, 800.10.
This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2023) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2022) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the mitigation actions. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

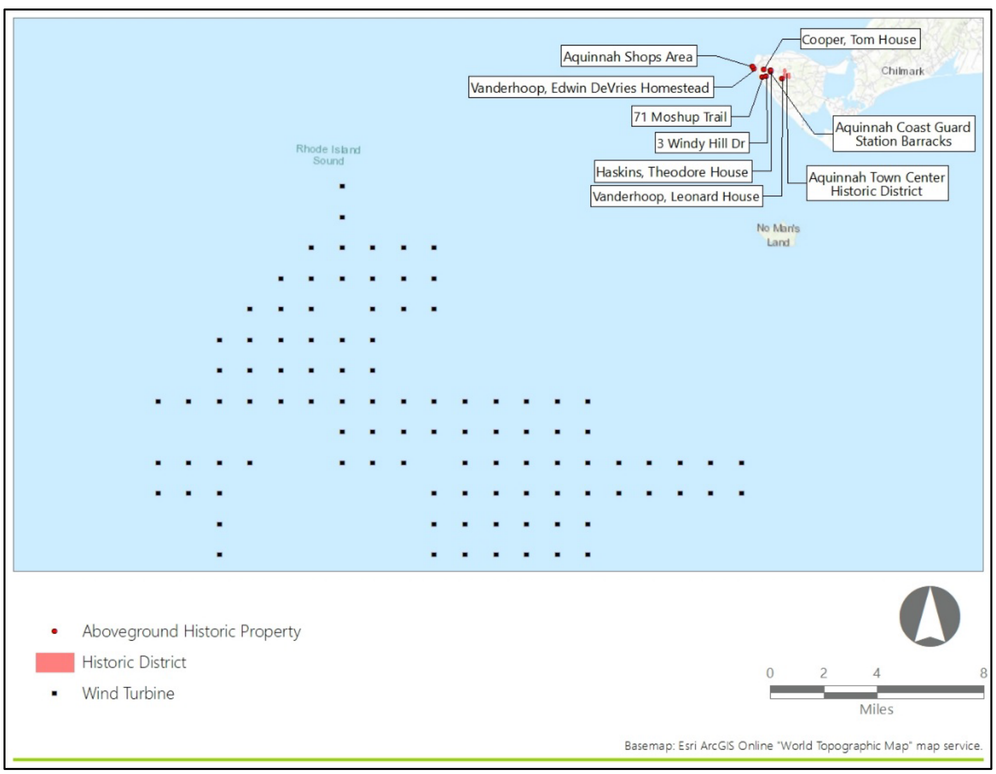
- **Section 6.0, References**, is a list of works cited in this HPTP.

## 2.0 BACKGROUND INFORMATION

### 2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

**Figure 2.1-1. Project Location**



## 2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of a ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks (NHLs) for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP addresses the mitigation requirements identified by BOEM to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect consultations among consulting parties to refine a conceptual mitigation framework proposed by Revolution Wind.

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2 – Organizational Responsibilities.

### *2.2.1 Municipal Regulations*

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

### *2.2.2 Preservation Easements and Restrictions*

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The State of Massachusetts preservation restrictions are outlined in Massachusetts General Law Chapter 184, Sections 31-33. Any mitigation work associated with the historic properties will comply with the conditions of all extant historic preservation easements. Additional information regarding compliance with extant preservation restrictions appears in Section 5.0, Implementation. The MHC holds a preservation easement on the Aquinnah Public Library/Gay Head School (a contributing building to the Gay Head – Aquinnah Town Center Historic District) per Massachusetts General Law Chapter 184, Sections 31-33.

## 2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021 pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Wampanoag Tribe of Gay-Head (Aquinnah)
- The Martha's Vineyard Commission
- The Gay Head Lighthouse Advisory Committee
- The Town of Aquinnah
- The Massachusetts Historical Commission.[1]

[1] MHC was invited to attend stakeholder outreach meetings regarding historic properties in Massachusetts; however, MHC has not participated in outreach meetings for Revolution Wind.

# 3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

## 3.1 Historic Properties

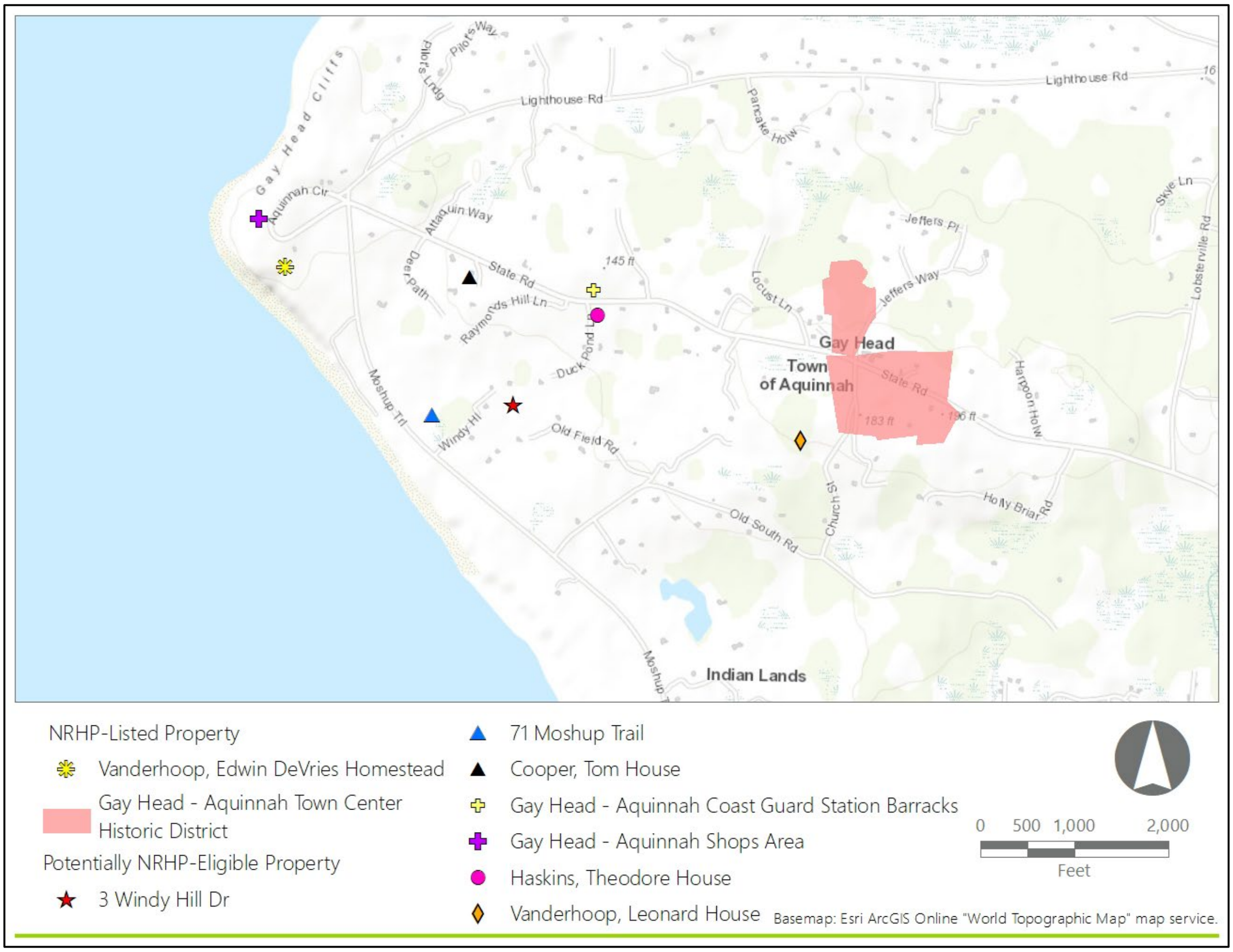
This HPTP addresses eight historic properties, as identified in Table 3.1-1 and located on Figure 3.1-1.

**Table 3.1-1. Historic Properties included in the HPTP**

| Name | Property Designation | Municipality | State | Site No. (Agency) | Ownership | Historic Property Type |
|---|---|---|---|---|---|---|
| 71 Moshup Trail | MHC Historic Inventory Site | Town of Aquinnah | MA | GAY.31 (MHC) | Private | Historic Buildings and Structures |
| Leonard Vanderhoop House | MHC Historic Inventory Site | Town of Aquinnah | MA | GAY.4 (MHC) | Private | Historic Buildings and Structures |
| Edwin DeVries Vanderhoop Homestead | NRHP-Listed | Town of Aquinnah | MA | GAY.40 (MHC); 06000784 (NPS) | Municipal | Historic Buildings and Structures |
| Tom Cooper House | MHC Historic Inventory Site | Town of Aquinnah | MA | GAY.53 (MHC) | Private | Historic Buildings and Structures |
| Theodore Haskins House | MHC Historic Inventory Site | Town of Aquinnah | MA | GAY.51 (MHC) | Private | Historic Buildings and Structures |
| 3 Windy Hill Drive | MHC Historic Inventory Site | Town of Aquinnah | MA | GAY.55 (MHC) | Private | Historic Buildings and Structures |
| Gay Head – Aquinnah Town Center Historic District | NRHP-Listed | Town of Aquinnah | MA | GAY.A (MHC); 99000187 (NPS) | Municipal; Private | Historic Buildings and Structures |
| Gay Head – Aquinnah Shops | MHC Historic Inventory Site | Town of Aquinnah | MA | GAY.B (MHC) | Private; Tribal Nation | Historic Buildings and Structures |

| | | | | | | |
|---|---|---|---|---|---|---|
| Gay Head-Aquinnah Coast Guard Station Barracks | MHC Historic Inventory Site | Town of Aquinnah | MA | GAY.52 | Private | Historic Buildings and Structures |

**Figure 3.1-1. Historic Property Location**




In Sections 3.3. through 3.10, each property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

## 3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this document.

The historic properties included in this HPTP are all considered within the historic property type defined in the HRVEA as “Historic Buildings and Structures” which includes buildings and associated properties historically used as residences. Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic houses were oriented to local roadways, with the front and rear elevations parallel to the nearby road’s alignment. Local roadways along the region’s shorelines often parallel the water’s edge and historic homes frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property’s historic setting. Historic commercial fishing activities were focused along the eastern shores of Menemsha Pond, which afforded relatively sheltered harbor and access to Vineyard Sound to the north.

Topography and landcover also play critical roles in defining both the historic settings and existing visual settings for each historic property. Of these two factors, the latter has been generally subject to greater change since the period of original construction and/or period of significance for many historic properties located in the Town of Aquinnah. Mid- to late-twentieth century reforestation has transformed many of the formerly open, agrarian lands of Martha’s Vineyard and constrained local viewsheds from numerous buildings once set on or near agricultural or pasture lands (e.g. Seccombe, 2010). The extensive agricultural heritage in the area is now largely expressed by the stone walls constructed along former pastures, fields, and roads and the surviving farmhouses and barns. Post-1950 residential construction has affected the settings for a smaller number of historic properties but may have diminished the integrity of historic settings for specific properties. The extensive forest cover affords privacy in many residential areas, but limits direct ocean views.

The topography of Aquinnah is strongly influenced by the last glaciation. The elevated Gay Head (Aquinnah) Cliffs along the western shoreline and the highlands in the central section of the town were formed by deformation and upthrusting of ancient sediments as the ice advanced over the area approximately 24,000 years ago (Oldale and O’Hara, 1984). Where vegetation is absent or sparse, views towards the Project may be available from these higher elevations. The bordering areas along the Menemsha Pond to the east and along the southwestern shores have relatively low relief. Direct views of the ocean horizon are screened from Menemsha Pond by the Gay Head (Aquinnah) Cliffs. In the shoreline areas along the southwestern shores, even the commonly low tree and shrub canopies of the island may screen ground-level views of ocean due to the limited relief.

## 3.3 71 Moshup Trail

### *3.3.1 Physical Description and Existing Conditions*

71 Moshup Trail is a one-and-one-half-story vernacular residence with a gable roof and wood shingle siding. Notable features include the semi-hexagonal tower and full-width porch on the primary (northeast elevation). Windows are generally two-over-two wood sash, and the primary entry door is offset on the northeast elevation. A single-story shed-roofed addition and a gabled dormer window are located on the

southwest elevation. The building has an asphalt shingle roof and rests on a stone foundation. A gable-roofed garage is also located on the roughly 9-acre lot.

### *3.3.2 Historic Context*

Throughout the eighteenth century, most residential settlement was concentrated in the western and southern parts of the present-day Town of Aquinnah, which constituted the reservation lands of the Wampanoag Tribe of Gay Head (Aquinnah). Individual residences were linked by a network of paths, and by the mid-nineteenth century, several east-west roads connected the residential areas to the Gay Head Light and Clay Cliffs of Aquinnah to the west and the present-day Town of Chilmark to the east (Harrington, 1998a). In the 1860s, the "District of Gay Head" was established by the Massachusetts General Court. The district was incorporated as the Town of Gay Head in 1870, despite the objections of the Wampanoag residents, who viewed the town's creation as the alienation of their lands in violation of the Federal Non-Intercourse Act of 1790 (WTGHA, 2022). At the time, tribal members accounted for all of the town's 227 residents, and the survey and privatization of their land allowed non-tribal owners to acquire property in the town. By 1895, at least 18 non-tribal individuals owned land in the Town of Gay Head, and that number would increase in the following decades. The year-round (primarily Wampanoag) population declined during the twentieth century as communal economic systems dependent on fishing and agriculture waned. Meanwhile, visitation from off-island residents increased dramatically, and many new residences were constructed for use as summer rentals or vacation homes (Harrington, 1998a).

The residence at 71 Moshup Trail was built in approximately 1920. Its primary elevation faces northeast, towards a now-inaccessible extension of Old South Road which provided access to a small number of residences in the area during the early twentieth century. The current roadway, Moshup Trail, was built in 1956, extending east from Aquinnah Circle and providing access to home sites and points of interest along the town's south shore (Harrington, 1998b).

### *3.3.3 NRHP Criteria and the Maritime Visual Setting*

71 Moshup Trail appears to meet National Register Criterion C as a typical example of an early twentieth-century residence in keeping with the characteristic scale, form, and materials of the vernacular building tradition of coastal New England. The property's natural landscape and maritime visual setting are a key component of its historic significance as an early-twentieth-century vernacular seaside residence.

## 3.4 The Leonard Vanderhoop House

### *3.4.1 Physical Description and Existing Conditions*

The Leonard Vanderhoop House, located at 5 Church Street, is a one-and-one-half-story Greek Revival-derived vernacular residence with multiple additions sited on approximately 5.6 acres. The primary volume consists of a gable-and-ell modified (after 1998) with the addition of wall dormers. A small single-story addition to the west has a flat roof supporting an open deck. The exterior is clad in wood shingle and the roof is of asphalt shingle. The primary elevation faces northeast to an unpaved extension of Church Street.

### *3.4.2 Historic Context*

The Leonard Vanderhoop House was built in approximately 1850 and was one of several residences, along with a school, church, and parsonage, which formed the nucleus of the Gay Head community along present-day Old South Road during the mid-nineteenth century. Leonard L. Vanderhoop (1855-1934), the earliest identified resident of the house, was a restaurant owner and Town Treasurer. The Vanderhoop family, descended from Leonard's parents William A. Vanderhoop and Beulah Salsbury, are a prominent Aquinnah family whose members own many properties and have held key positions in the town government as well as in the Wampanoag Tribe of Gay Head (Aquinnah) (Harrington, 1998c).

In 1870, the same year that the Town of Gay Head was incorporated, the improvement of present-day State Road by the State of Massachusetts dramatically altered the development patterns within the town. The new road was laid out north of Old South Road along the existing path that connected Chilmark to the east to the Gay Head Lighthouse. Nearly all of the existing buildings were subsequently moved from the older community around Old South Road to the new center of activity around the intersection of State Road and Church Street. By 1926 only a single unoccupied house remained at the old settlement (Harrington, 1998a). The Leonard Vanderhoop House was relocated during this period to its current site at 5 Church Street. It remains in the Vanderhoop family today.

### *3.4.3 NRHP Criteria and the Maritime Visual Setting*

The Leonard Vanderhoop House has been significantly altered with the replacement of windows and doors and the introduction of wall dormers. However, it retains its overall massing and its historic setting. The house's relocation after 1870 in response to changing settlement patterns contributes to its historic significance. The Leonard Vanderhoop House appears to meet National Register Criterion A for its association with the mid-nineteenth century settlement along Old South Road. The Vanderhoop family is one of the most well-known families in the history of the Town of Aquinnah. The house is a Shingle-style building, typical of the buildings located on Martha's Vineyard, and has views to the water afforded by its relatively high elevation on the moraine. The remaining ocean views are associated with a once more expansive ocean viewshed that has been partially screened by reforestation.

## 3.5 The Tom Cooper House

### *3.5.1 Physical Description and Existing Conditions*

The Tom Cooper House, located at 1 Sunset Lane, is a two-story residence consisting of a primary gable-roofed volume with multiple additions sited on approximately 0.5-acre. The exterior is clad in wood shingle and the roofs are clad in asphalt shingle. The residence appears to have been heavily remodeled in about 2005. All of the windows and doors appear to be modern replacements. Other alterations include the addition of a hipped-roof volume atop a walk-out basement, the enlargement of the original volume with wall dormers, and the addition of a visually prominent stone chimney.

### *3.5.2 Historic Context*

Sunset Lane is a short road extending south from State Road. It was developed in the early twentieth century, following the improvement of State Road. The Tom Cooper House was built during the last quarter of the nineteenth century. Tom Cooper was the first known occupant of the house, during the early twentieth century. The Cooper family operated a restaurant out of the residence in the 1920s, later converted to an ice cream shop in the 1960s (Harrington, 1998d). The building was substantially remodeled in approximately 2005 (Town of Aquinnah, 2022).

### *3.5.3 NRHP Criteria and the Maritime Visual Setting*

The Tom Cooper House appears to meet National Register Criteria A and/or C for its architecture and its role as a restaurant contributing to the development of the tourism industry in Gay Head. The natural landscape and maritime visual setting appear to be key components that contribute to the historic significance of the Tom Cooper House.

## 3.6 The Theodore Haskins House

### *3.6.1 Physical Description and Existing Conditions*

The Theodore Haskins House, also known as the C. Adrian Vanderhoop House, located at 72 State Road/1150 State Road, is a one-and-one-half-story Colonial Revival-derived vernacular residence consisting of a gable-roofed main volume with multiple dormers and additions sited on approximately 1.0 acre. The exterior has wood shingle siding and an asphalt shingle roof, atop a concrete masonry unit foundation. A substantial brick chimney is located on the primary elevation. Windows are generally wood sash and appear original.

### *3.6.2 Historic Context*

The Theodore Haskins House was built in the first quarter of the twentieth century for Theodore E. Haskins, who subsequently sold the property to C. Adrian Vanderhoop (1880-1956), a member of the prominent Vanderhoop family of Gay Head (see Section 3.3.2). In 1957, the property was acquired by the Gentry family, who still own it today (Harrington, 1998e; Town of Aquinnah, 2022).

### *3.6.3 NRHP Criteria and the Maritime Visual Setting*

The Theodore Haskins House appears to meet National Register Criterion C as an intact and representative example of an early-twentieth-century residence in keeping with the characteristic scale, form, and materials of the vernacular building tradition of coastal New England with views to the ocean. The property is sited along the southwestern flank of an elevated glacial moraine with slopes oriented towards the Project. The remaining ocean views from the property are surviving elements of a once more expansive ocean viewshed that has been diminished by post-1950 reforestation.

## 3.7 3 Windy Hill Drive

### *3.7.1 Physical Description and Existing Conditions*

The house at 3 Windy Hill Drive (current address, 5 Windy Hill Drive) is a two-story Colonial Revival-derived vernacular residence with hipped roofs, wood shingle siding, and a raised basement, sited on approximately 0.5 acre. The residence was significantly remodeled in the late-twentieth- or early-twenty-first century, with little or no historic exterior materials remaining.

### *3.7.2 Historic Context*

The house at 3 Windy Hill Drive was built in the first quarter of the twentieth century. It was originally accessed via a network of trails and roads which extended south from Old South Road. Windy Hill Drive is now accessible from Moshup Trail, which was begun in 1956 to provide access to residential lots and points of interest on the town's south shore (Harrington, 1998f; Town of Aquinnah, 2022).

### *3.7.3 NRHP Criteria and the Maritime Visual Setting*

The address 3 Windy Hill Drive appears to meet National Register Criterion C as an intact and representative example of a residence in keeping with the characteristic scale, form, and materials of the vernacular building tradition of coastal New England, and in particular Martha's Vineyard with views to the ocean. The natural landscape and maritime visual setting appear to be key components that contribute to the historic significance of 3 Windy Hill Drive.

## 3.8 The Edwin DeVries Vanderhoop Homestead

### *3.8.1 Physical Description and Existing Conditions*

The Edwin DeVries Vanderhoop Homestead, located at 35 Aquinnah Circle, is a two-story wood-frame vernacular residence with complex massing consisting of multiple intersecting gable roofed volumes along with a single-story rear addition. The building has wood shingle siding, wood shingle roofing, and a granite foundation. Windows are generally two-over-two double hung wood sash with simple wood surrounds. The primary (north) elevation is arranged symmetrically, with two single-story entry porches flanking a two-story gable-roofed one-bay-wide projection. A 12-footby-29-foot open terrace (built in 2005) along the rear elevation of the of the house and provides expansive views of the ocean waters framed by the slightly elevated sections of the cliffs to the north. The existing terrace replaced a wooden deck. The residence is sited on an approximately 3.8-acre lot which extends southwest to the Clay Cliffs of Aquinnah and consists of grass lawn, mown fields, and low vegetation.

The house consists of two main side-gable volumes which are offset and are each roughly the size of a modest Cape Cod-style residence of the nineteenth century. The presence of a full basement beneath one of the volumes and the absence of a basement beneath the other suggests that one of the volumes may have been relocated from a previous site. Historic imagery shows that a barn and several additional outbuildings were once located on the property but are no longer extant (Parcon et. al., 2006). A public walking trail leads through the property to the shoreline. The property is owned by the Town of Aquinnah and managed as part of the 49-acre Aquinnah Headlands Preserve, while the building serves as the Aquinnah Cultural Center and Aquinnah Wampanoag Indian Museum (MVLB, 2016; Aquinnah Cultural Center, 2021).

### *3.8.2 Historic Context*

The Edwin DeVries Vanderhoop Homestead was built or assembled from one or more existing buildings between 1890 and 1897. Edwin DeVries Vanderhoop (1848-1923) was one of nine children born in Gay Head to William Adriaan Vanderhoop, a Dutch-Surinamese settler, and Beulah Salsbury, a member of the Wampanoag Tribe of Gay Head (Aquinnah). Edwin D. Vanderhoop worked as a whaling captain and served in the Massachusetts legislature. He purchased the lot upon which his homestead stands in 1890. His widow Mary A.C. Vanderhoop (1860-1935) inherited the homestead upon his death and the property remained in the Vanderhoop family until 2003. In that year, the property was sold to the Marsh Hawk Land Trust and subsequently transferred to the Town of Aquinnah, subject to conservation and preservation restrictions (Parcon et. al., 2006). The building has been rehabilitated since that time.

### *3.8.3 NRHP Criteria and the Maritime Visual Setting*

The Edwin DeVries Vanderhoop Homestead meets National Register Criteria A and C in the areas of Architecture, Native American Ethnic Heritage, and Social History. It derives significance from its association with the prominent Vanderhoop family of the Wampanoag Tribe of Gay Head (Aquinnah), from its association with civic and social life in the community, and as a representative example of a late-nineteenth-century residence embodying the building traditions of coastal New England. The period of significance is circa 1890/1897 to 1956 (Parcon et. al., 2006). The rear of the residence and surrounding areas of the property retain views of the Atlantic Ocean to the south. The property's location atop the Gay Head Cliffs and the views to the sea are integral to its historic setting.

## 3.9 Gay Head – Aquinnah Town Center Historic District

### *3.9.1 Physical Description and Existing Conditions*

The Gay Head – Aquinnah Town Center Historic District is a collection of 23 contributing buildings, two contributing objects, and five non-contributing buildings grouped near the intersection of State Road and Church Street, at the approximate geographic center of the Town of Aquinnah. The contributing buildings consist of historic public, semi-public, residential, and agricultural buildings related to the civic, religious, and economic development of the Town of Aquinnah in the nineteenth and early twentieth centuries. The 23 contributing buildings are enumerated in Table 3.9-1.

**Table 3.9-1. Contributing buildings within the Gay Head – Aquinnah Town Center Historic District**

| Building Name and/or Description | Address | Construction Date |
|---|---|---|
| The Aquinnah Town Hall/Community Center is a single-story end-gable building with a moderately pitched roof, wood shingle siding, and wood windows and doors. The primary (south) elevation consists of a projecting entry vestibule featuring a double leaf paneled door flanked by six-over-six windows. The east and west elevations include single-story ells and additions which are consistent with the form and materials of the main volume. | 955 State Road | Circa 1929 |
| The former post office and residence is a small single-story shed-roofed building with a roughly square plan and wood shingle and wood board siding. The building appears to have been unoccupied since at least the late 1990s and is overgrown with vegetation. | 980 State Road | Circa 1920s |
| The Aquinnah Public Library/Gay Head School is a single-story Greek Revival-style end-gable building with wood shingle siding atop a granite foundation. The building has six-over-six windows and modest wood cornice returns, corner boards, and fascia boards. A wood deck and ramp added in the twenty-first century provide access to the library's main entrance on the south elevation. The primary historic entrance is on the north elevation and consists of a hipped-roof vestibule with doors on the east and west, which recall the building's use as a school from the time of its construction until 1968. The building was moved to its present location in 1878 (Harrington, 1998a). | 1 Church Street | Circa 1844 |
| The Gay Head Community Baptist Church is a one-and-one-half-story end-gable Greek Revival-style church with a square tower centrally located on the primary (south) elevation. The moderately-pitched roof is clad in asphalt shingle and the building has wood clapboard siding and Greek Revival-style wood cornice returns, corner boards, and fascia boards, atop a granite foundation. The outhouse located northeast of the church is also a contributing building to the historic district. It is not known whether the outhouse is still standing. The church was moved to its present location in 1907 (Harrington, 1998a). | 2 Meetinghouse Way | Circa 1850 |

| Building Name and/or Description | Address | Construction Date |
|---|---|---|
| The Minister's House/Parsonage is a one-and-one-half-story end-gable residence with modest Greek Revival-style detailing. The building has wood shingle siding and simple cornice returns, corner boards, and fascia boards, atop a stone foundation. The primary (north) elevation is three bays wide, with an offset door and two six-over-six windows at the first floor, with two additional six-over-six windows in the gable end. A secondary entrance is located in a single-story rear addition. The parsonage was moved to its present location in 1907 along with the church (Harrington, 1998a). | 3 Church Street | Circa 1856 |
| The Linus S. Jeffers Residence is a one-and-one-half-story Cape Cod-derived vernacular residence with gable-and-ell massing, wood shingle siding, shed dormer windows, and an enclosed single-story porch. | 4 Jeffers Way | Late-nineteenth century |
| The Isaac Rose/Charlie Vanderhoop House, Barn, Cottage, and Shed/cottage comprise a nineteenth-century farmstead sited on approximately 3.7 acres. The residence is a one-and-one-half-story cross-gabled Victorian Eclectic-derived vernacular building with wood shingle siding, ornate sawn vergeboards, an enclosed porch, and a circa-2005 addition. | 38 South Road / 890 State Road | Mid-nineteenth century |
| The Adriaan Vanderhoop House, Barn, and Outhouse comprise a nineteenth-century farmstead sited on approximately 3.1 acres. The residence is a small single-story gable-roofed vernacular building with a central brick chimney, wood shingle siding, two-over-two windows, and a plank door. | 46 South Road / 962 State Road | Late nineteenth century |
| The Lyman Madison House is a one-and-one-half-story vernacular residence with an end gable orientation, wood shingle siding, and a three-bay primary elevation with an offset door. | 57 South Road / 903 State Road | Late nineteenth century |
| The house at 59 South Road/905 State Road is a one-and-one-half-story former boathouse clad in wood shingle atop a raised concrete block foundation. The building has a narrow gable-roofed wall dormer on the south elevation and a single-story wing on the east. | 59 South Road / 905 State Road | Circa 1900 |
| The Totem Pole Inn property consists of six buildings on an approximately 6.9-acre parcel, including an Innkeeper's Residence, four cottages, and a shed. The Innkeeper's Residence is a one-and-one-half-story Craftsman-style residence with wood shingle siding, a dormered gable roof, and an inset porch with cobblestone piers. The cottages are stylistically varied but are unified though their use of wood shingle sliding and cobblestone foundations. The shed also has wood shingle siding. | 1-9 Totem Pole Way | Circa 1920s |

The two contributing objects within the historic district are World War I monuments erected in 1918 and 1919 and currently located in front of the Aquinnah Town Hall. The monuments consist of bronze plaques affixed to boulders. According to the west monument's inscription, the Town of Gay Head (Aquinnah) contributed the "largest number of men in proportion to its population of any town in New England" to serve in the United States armed forces during the war.

Two of the five non-contributing buildings within the historic district are part of the complex of municipal buildings at 955 State Road. The Town Office Building (1989), east of the Town Hall, is a single-story gable-roofed building with wood shingle siding and six-over-six windows. East of the Town Office Building, the Fire Station (circa 1959) is a single-story gable-roofed building with wood shingle siding. Both buildings recall the scale, form, and materials of the 1929 Town Hall. The remaining three noncontributing buildings within the historic district are residences at 2 Jeffers Way, 44 South Road/920 State Road, and 61 South Road/ 917 State Road, all constructed in the 1960s or later.

### *3.9.2 Historic Context*

Throughout the eighteenth century, most residential settlement was concentrated in the western and southern parts of the present-day Town of Aquinnah, which constituted the reservation lands of the Wampanoag Tribe of Gay Head (Aquinnah). Individual residences were linked by a network of paths, and by the mid-nineteenth century, several east-west roads connected the residential areas to the Gay Head Light and Clay Cliffs of Aquinnah to the west and the present-day Town of Chilmark to the east. Throughout the late eighteenth and nineteenth centuries, the community's population was roughly 200 (Harrington, 1998a).

The Gay Head community's civic and religious functions primarily took place within private residences until the mid-nineteenth century. The town's first and only purpose-built school building (now, the Aquinnah Public Library) was constructed prior 1844 north of present-day Old South Road. It was used for a variety of civic, social, and religious purposes in the years and decades before the community erected additional public buildings, and town records show that maintenance and upgrades to the building were frequent. The Baptist congregation of Gay Head met in the school before the Gay Head Community Baptist Church was constructed just north of the school in 1850. Within a few years, the Massachusetts Missionary Society supplied funding for a parsonage which was constructed in 1856 in order to attract a year-round minister to the church. The school, church, and parsonage, along with several additional residences, formed the nucleus of the Gay Head community along Old South Road in the mid-nineteenth century (Harrington, 1998a).

In the 1860s, the "District of Gay Head" was established by the Massachusetts General Court. The district was incorporated as the Town of Gay Head in 1870, despite the objections of the Wampanoag residents, who viewed the town's creation as the alienation of their lands in violation of the Federal Non-Intercourse Act of 1790 (WTGHA, 2022). At the time, tribal members accounted for all of the town's 227 residents, and the survey and privatization of their land allowed non-tribal owners to acquire property in the town. By 1895, at least 18 non-tribal individuals owned land in the Town of Gay Head, and that number would increase in the following decades (Harrington, 1998a).

In the same year that the Town of Gay Head was incorporated, the improvement of South Road (now, State Road) by the State of Massachusetts dramatically altered the development patterns within the town. The new road was laid out north of Old South Road along the existing path that connected Chilmark to the east to the Gay Head Lighthouse. Several buildings were subsequently moved from the older community around Old South Road to the new center of activity around the intersection of South Road and Church Street. The school was relocated in 1878, while the church and parsonage were relocated in 1907. Several additional residences were also moved during this period, and by 1926 only a single unoccupied house remained at the old settlement (Harrington, 1998a).

A post office serving the new Town of Gay Head was established in 1873 and operated out of a succession of private residences, including the Linus S. Jeffers Residence, throughout its roughly 70-year existence. The Post Office/Residence at 980 State Road was likely constructed in the 1920s as a seasonal gift shop and served as the post office and postmistress' residence from the 1930s until the post office was closed during the Second World War. The building presumably continued to serve as a residence following the post office's closure; however, by the late 1990s, the building had been vacant for some time (Harrington, 1998a).

There were no purpose-built town offices in Gay Head until 1929 when the current Town Hall was constructed. Previously, town meetings had been held in the school and town officials rented space in the nearby Linus S. Jeffers residence, which also served as a grocery store and town post office. Linus Jeffers served on the Board of Directors of the Gay Head Improvement Association, which raised funds for the construction of the new Town Hall. The building was designed by Vineyard Haven architect Herbert C. Hancock. Since its construction, the building has housed many of the town's social gatherings since it has the largest capacity of any buildings within the town (Harrington, 1998a).

The year-round (primarily Wampanoag) population declined during the twentieth century as communal economic systems dependent on fishing and agriculture waned. Meanwhile, visitation from off-island increased dramatically, and many new residences were constructed for use as summer rentals or vacation homes. A group of cottages known as the Totem Pole Inn was built during this period just east of the intersection of State Road and Church Street. Gay Head's town center continued to grow in order to meet the changing community's needs. The town was without a dedicated fire department until the fire station was constructed to the east of the Town Hall in about 1959 or 1960; it is still in use today. The town's library was shuffled back and forth between the school and the Town Hall multiple times over several decades before the school closed in 1968 and the town's children began attending larger schools in Chilmark and Vineyard Haven. In 1975, the school was used as additional town office space while a substantial addition was made to the Town Hall. In the same year, the school was permanently converted into the town library and it continues to serve that function today. In the late 1980s, the town once again was in need of additional office space, and a new town office building was built east of the existing Town Hall. Additional alterations were made to the 1975 addition in 1992-1993 to house the town police barracks. The town's name was changed from Gay Head to its Wampanoag name, Aquinnah, in 1998 (Harrington, 1998a).

In general, the buildings comprising the Gay Head – Aquinnah Town Center Historic District continue to be utilized by the community for their original purposes. While the Aquinnah Public Library no longer functions as a school, it continues to be a center of activity and is well cared for by the community. A large deck and accessible ramp were recently added to the building. The Town Hall has likewise undergone maintenance and repairs in recent years. The Gay Head Community Baptist Church is the only extant church building in the Town of Aquinnah. The Post Office/Residence remains vacant. The Gay Head – Aquinnah Town Center Historic District was listed in the NRHP in 1999 (nomination completed in 1998) and in 2001, the boundary was increased to include an additional 17 contributing buildings and three noncontributing buildings (Harrington and Friedberg, 2001).

### *3.9.3 NRHP/NHL Criteria and the Maritime Visual Setting*

The Gay Head – Aquinnah community's historic relationship with and dependence upon maritime resources is integral to understanding the history and development of the historic district. The Gay Head – Aquinnah Town Center Historic District meets National Register Criteria A and C in the areas of architecture, community planning, and Native American ethnic heritage as an intact group of civic, residential, and religious buildings representing nineteenth- and twentieth-century settlement in the Town of Gay Head. The district's period of significance is circa 1850 (the construction date of the earliest building in the district, the Aquinnah Public Library) to 1951 (50 years prior to the NRHP boundary expansion in 2001; Harrington and Friedberg, 2001). The fire station was not included in the 1998 NRHP nomination because it had not yet reached 50 years of age; however, it retains a high degree of integrity and could be considered a contributing resource to the historic district. Although the library, church, and parsonage have been relocated from their original sites, they meet Criteria Consideration B because their relocation took place during the period of significance and was directly related to the growth of the town center and shifts in development patterns in the late nineteenth and early twentieth centuries. The district is sited on the elevated highlands of a prominent moraine. The surviving ocean views are important surviving elements of a once-more expansive pastoral maritime setting for the district.

## 3.10 Gay Head – Aquinnah Shops

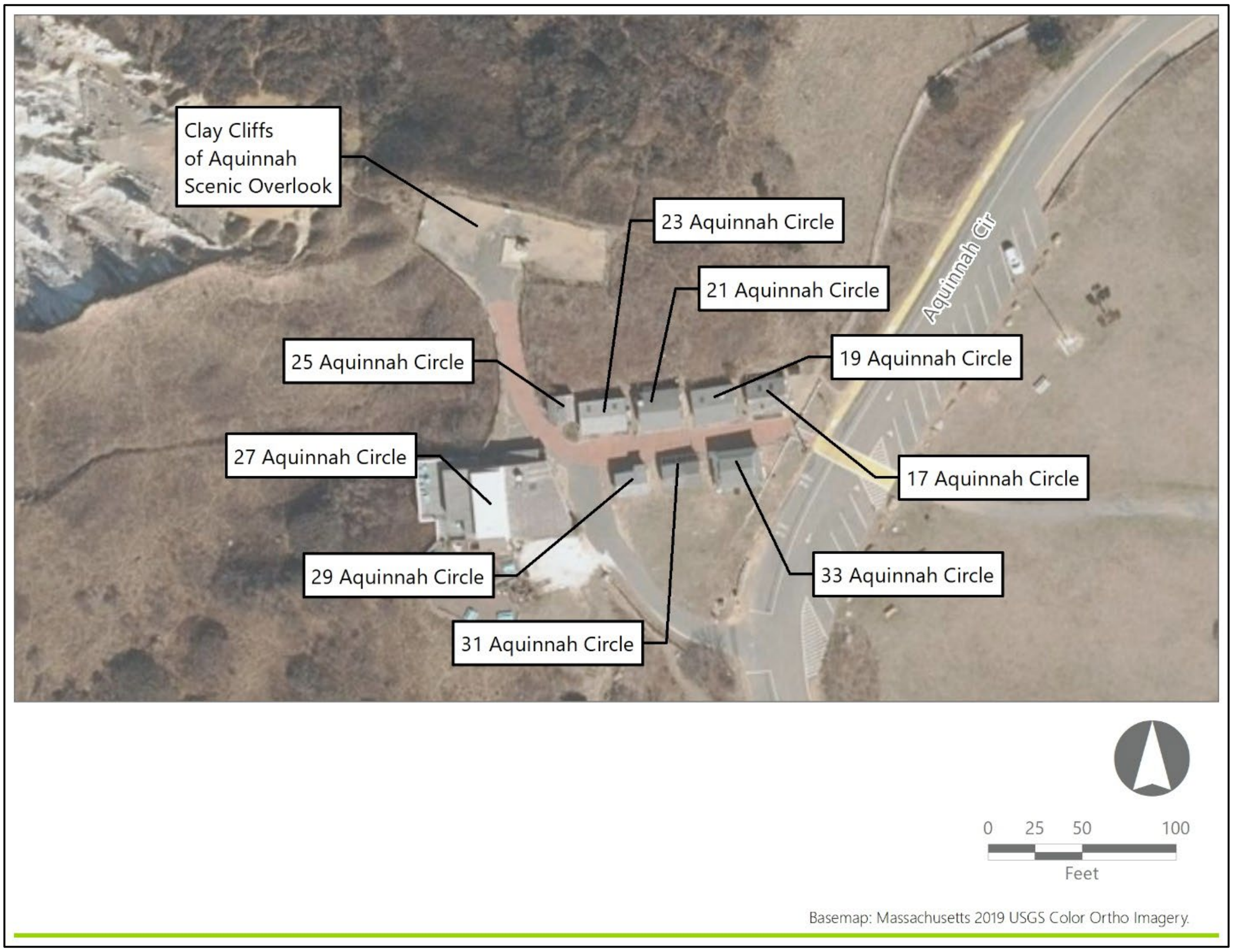
### *3.10.1 Physical Description and Existing Conditions*

The Gay Head – Aquinnah Shops are a group of nine vernacular commercial buildings clustered around a paved walkway leading from a parking area along Aquinnah Circle to the Clay Cliffs of Aquinnah Scenic Overlook (see Figure 3.1-1). All buildings are of similar scale, form, and materials, generally consisting of simple rectangular volumes with gable or hipped roofs and wood-shingle siding. The buildings are sited on two tax parcels comprising approximately 4.8 acres, which comprise the entirety of the Property. The buildings occupy limited portions of the parcels, leaving large areas of open space consisting of low-growing vegetation.

The brick paved walkway which forms the central spine of the Property is accessed from Aquinnah Circle via a short flight of concrete stairs with painted wood handrails. From east to west, the buildings north of the walkway are numbered 17, 19, 21, 23 and 25 Aquinnah Circle. The buildings south of the walkway, from east to west, are numbered 33, 31, 29, and 27 Aquinnah Circle. The westernmost building, 27 Aquinnah

Circle, is separated from the other buildings by an asphalt vehicle access drive which functions as an alternative, stair-free path to the overlook.

**Figure 3.10-1. Aquinnah Shops Site Map**




Existing conditions and alterations since the Gay Head – Aquinnah Shops were documented in 1998 (Harrington, 1998) are described for each building:

- The building at 17 Aquinnah Circle (circa 2005) is a single-story building with a rectangular footprint, a moderately pitched gable roof clad in wood shingles, and exterior wood shingle wall cladding. The primary (south) elevation features a centered two-leaf entry door flanked by small windows. This entry is accessed by a wood ramp. The east elevation has a secondary entrance. The building does not appear in aerial imagery dated to 2001 and appears to have been completely rebuilt in approximately 2005 (Harrington, 1998b; MassGIS, 2001, 2005).
- The building at 19 Aquinnah Circle (early- to mid-twentieth century) is a single-story building with a rectangular footprint, a low gable roof clad in asphalt shingles, and exterior wood shingle wall cladding. The primary (south) elevation has a deep eave overhand and features a centered two-leaf

entry door flanked by paired one-over-one windows. The entry is raised three steps from the paved walkway. The doors and windows have been replaced since 1998 but retain their approximate size and position (Harrington, 1998b).

- The building at 21 Aquinnah Circle (circa 2005) is a single-story building with a rectangular footprint, a low gable roof clad in asphalt shingles, and exterior wood shingle wall cladding. The primary (south) elevation has three pairs of sliding service windows sheltered by an open porch. The building appears to have been completely rebuilt in approximately 2005 and does not appear in aerial imagery dated to 2001 (Harrington, 1998b; MassGIS, 2001, 2005).
- The building at 23 Aquinnah Circle (circa 1950s) is a single-story building with a rectangular footprint, a low gable roof clad in asphalt shingles, and exterior wood shingle wall cladding. The primary (south) elevation features a centered two-leaf entry door flanked by large windows. The entry is raised two steps form the paved walkway. The south elevation windows were replaced after 1998, when they consisted of paired three-light casement windows (Harrington, 1998b).
- The building at 25 Aquinnah Circle (circa 2013) is the smallest of the Gay Head – Aquinnah Shops buildings and is set back farther from the walkway than 17-23 and 29-33 Aquinnah Circle. It is a single-story building with an approximately square footprint, a low gable roof clad in wood shingle, and exterior wood shingle or bark wall cladding. It has been completely rebuilt since 1998 and does not appear in aerial imagery dated to 2011-2012 (Harrington, 1998b; MassGIS, 2011-2012, 2013-2014).
- The building at 27 Aquinnah Circle (mid-twentieth century) is the largest of the Gay Head – Aquinnah Shops buildings and occupies a separate tax parcel from the rest of the shops. It is a one-and-one-half-story building with a roughly rectangular footprint, a low gable roof clad in asphalt shingle, and exterior wood shingle wall cladding. It has two small shed additions and a shed dormer. The primary (east) elevation has an entrance within an inset porch and a pair of sliding service windows. The building houses a restaurant with indoor and outdoor seating areas, including a large wood deck and concrete patio. It does not appear to have been altered significantly since 1998 (Harrington, 1998b).
- The building at 29 Aquinnah Circle (circa 2015) is a single-story building with a rectangular footprint, a low gable roof clad in asphalt shingle, and exterior wood shingle wall cladding. It has been completely rebuilt since 1998 and does not appear in aerial imagery dated to 2015 (Harrington, 1998b; Town of Aquinnah, 2022).
- The building at 31 Aquinnah Circle (mid-twentieth century; rebuilt or enlarged circa 2008) is a single-story building with a rectangular footprint, a low gable roof clad in asphalt shingles, and exterior wood shingle wall cladding. The primary (north) elevation has double leaf, nine-light wood entry doors and a large fixed-sash window. The entry is raised two steps from the paved walkway. The building has been enlarged (or rebuilt) and the north elevation has been altered since 1998, when the entry doors were centered and flanked by two small windows (Harrington, 1998b; MassGIS, 2005, 2008).
- The building at 33 Aquinnah Circle (circa 1950s; possibly rebuilt circa 2000) is a single-story building with a rectangular footprint, a gable-on-hip roof clad in asphalt shingles, and exterior wood shingle wall cladding. The primary (north) elevation has four service windows. A single-light door and a

large window are located on the east elevation. The building has been substantially altered or possibly rebuilt since 1998, when it had a hipped roof and an inset porch with a door on the north elevation (Harrington, 1998b; MassGIS, 1990s, 2001).

The buildings were observed to be in fair to good condition when they were documented in 1998 (Harrington, 1998b). The apparent rebuilding or substantial remodeling of six of the buildings since that date, as well as the replacement of many of the remaining buildings' windows and doors, is likely due to the buildings' ongoing exposure to harsh seaside conditions.

### *3.10.2 Historic Context*

The Aquinnah Cliffs and Gay Head Light have been a tourist attraction since the nineteenth century. Several small shops and "tepees" catering to tourists were present along the cliffs by the early twentieth century but were relocated to the present site by the Town of Gay Head (now, the Town of Aquinnah) in order to preserve the setting of the overlook. The earliest extant building on the site was built in the early-to-mid-twentieth century, while the remaining buildings are believed to have been constructed from the mid-twentieth century to the early twenty-first century. The form, scale, and materials of the buildings have been consistent with the vernacular building traditions of coastal New England: modest in size, with low-to-moderate gable roofs, shallow roof eaves, simple doors and windows, and shingle cladding. Historically, the shops sold souvenir items including Wampanoag crafts and objects made from the local clay (Harrington, 1998b).

The Gay Head Cliffs, comprising 24 acres under municipal and Wampanoag trust ownership, were designated as a National Natural Landmark by the National Park Service in 1965 (NPS, 2021). Gay Head Cliffs, including the Gay Head – Aquinnah Shops, was designated as a District of Critical Planning Concern by the Martha's Vineyard Commission (Dukes County). Construction within the district is subject to limitations in order to preserve the natural, ecological, cultural, and historic resources of the district (Town of Aquinnah, 2022). The Gay Head – Aquinnah Shops were surveyed by the Massachusetts Historical Commission in 1998. The same year, the name of the town and its namesake cliffs were changed from Gay Head to Aquinnah, their original Wampanoag name.

Today, the buildings are used primarily as seasonal restaurants and gift shops catering to the tourists who visit the Clay Cliffs of Aquinnah Scenic Overlook. Many of the businesses are multigenerational family enterprises owned by members of the Wampanoag Tribe of Gay Head (Aquinnah). As of 2015, tribal members had the right of first refusal to lease the building lots from the Town of Aquinnah (Elvin, 2015). The buildings now appear to be under a mix of individual and tribal ownership (Town of Aquinnah, 2022).

### *3.10.3 NRHP/NHL Criteria and the Maritime Visual Setting*

As a historic district, the Gay Head – Aquinnah Shops meet National Register Criterion A for their association with the development of Aquinnah Cliffs as a tourist attraction during the late nineteenth and early twentieth centuries. The district also meets Criterion C as a group of intact twentieth-century commercial buildings in keeping with the characteristic scale, form, and materials of the vernacular building tradition of coastal New England. The natural landscape and maritime visual setting of the Aquinnah Cliffs, including expansive views of the Atlantic Ocean, are key to understanding the Gay Head-Aquinnah Shops' historic significance as a commercial development directly tied to seaside tourism.

## 3.11 Gay Head – Aquinnah Coast Guard Station Barracks

### *3.11.1 Physical Description and Existing Conditions*

The Gay Head – Aquinnah Coast Guard Station Barracks is currently located at 1147 State Road. The building is a one-and-a-half-story residential building set on a high stone foundation with stone support piers. The building is clad in wood shingles and two shed dormers are located on the north and south rooflines. A small, one-story addition is located to the east.

### *3.11.2 Historic Context*

The building's exact construction date is unknown; however, it was originally a barracks located at the Coast Guard Station near the Gay Head Light. In 1870, South Road was constructed, and multiple buildings were relocated to the new roadway. According to the MHC Form, the Gay Head – Aquinnah Coast Guard Station Barracks was moved to its present location after World War II and was converted to a residence (Harrington, 1998g).

### *3.11.3 NRHP/NHL Criteria and the Maritime Visual Setting*

As stated above, the Gay Head – Aquinnah Coast Guard Station Barracks was relocated from its original location, thus affecting its integrity of setting; however, the building retains its integrity of materials, workmanship, association, and design. The building is eligible for listing under Criterion A for its association with the United States Coast Guard Station in Aquinnah.

Although the Gay Head - Aquinnah Coast Guard Station Barracks was relocated from its original maritime setting, the building is currently sited on an elevated parcel of land with ocean views.

## 4.0 MITIGATION MEASURES

Mitigation measures at these historic properties are detailed in this section. These mitigation measures were developed in consultation with the Participating Parties by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change.

### 4.1 Americans with Disabilities Act-Compliant Access for The Aquinnah Shops

#### *4.1.1 Purpose and Intended Outcome*

The Town of Aquinnah, in consultation with Revolution Wind, has identified a need to improve ADA-compliant access to the Aquinnah Shops and adjacent Aquinnah Overlook properties. The Town will be replacing the existing wood steps linking the Aquinnah Shops with the Aquinnah Circle parking areas, but wheelchair accessible access will require additional planning and construction to ensure the physical and historic integrity of the Aquinnah Shops is maintained. Once completed, the access project will enhance public appreciation of the historic property by encouraging visitation from a broader spectrum of the resident community and tourists.

#### *4.1.2 Scope of Work*

The scope of work will consist of the following:

- Review existing town and county planning documents and regulations;
- Photograph and document (e.g. map) existing conditions;
- Draft ADA-compliant access plans that are consistent with the Secretary of the Interior's (SOI) *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*;
- Develop a final plan to include comments from the Participating Parties;
- Distribute the final plan to the Participating Parties;
- Photograph and document as-built conditions upon completion of construction.

#### *4.1.3 Methodology*

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the Scope of Work listed in Section 4.1.2. The chosen consultant should have a demonstrated knowledge of climate change and the treatment of historic properties. Public engagement sessions will be held to solicit comments, questions, and concerns from the residents of the Town of Aquinnah. The sessions will inform the preparation of the draft plan which will be distributed to the Participating Parties for review and comment. Additional sessions should be held as necessary to allow for public engagement. The comments shall be addressed and incorporated in the final document which will be distributed to the Participating Parties.

### *4.1.4 Standards*

The project will comply with the following standards:

- The Secretary of the Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (36 CFR 67.7);
- Martha's Vineyard Commission's planning and climate change guidance, as applicable;
- Town of Aquinnah Community Preservation Committee guidance, as applicable;
- Town of Aquinnah Planning Board Review Committee guidance, as applicable; and

### *4.1.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFP;
- Proposals by qualified consultants in response to the RFP;
- Existing conditions photography and documentation (e.g., mapping);
- Draft construction plans;
- Final construction plans;
- Final plans;
- As-Built photography and documentation.

### *4.1.6 Funds and Accounting*

Funding amounts are being determined in consultation with the consulting parties.

## 4.2 Weatherization of the Edwin D. Vanderhoop Homestead

### *4.2.1 Purpose and Intended Outcome*

The purpose of this mitigation measure is to fund weatherization improvements to the Edwin D. Vanderhoop Homestead property. The property houses the Aquinnah Cultural Center, a local museum operated by a local not-for-profit organization and staff by members of the Wampanoag Tribe of Gay Head (Aquinnah). The weatherization improvements are intended to maintain the physical and historic integrity of the property while reducing the costs of maintaining the building and collections.

### *4.2.2 Scope of Work*

The scope of work will consist of the following:

- Review existing town and county planning documents and regulations;
- Review existing energy efficiency guidance, including resources from the National Park Service's Technical Preservation Services and the National Trust for Historic Preservation;
- Photograph and document (e.g., map) existing conditions;
- Develop draft plans and specifications;

- Consult with Participating Parties;
- Develop draft plans and specifications to be distributed to the Participating Parties for review and comment;
- Develop a final plans and specifications to include comments from the Participating Parties;
- Distribute the final plans and specifications to the Participating Parties;
- Implement the improvements; and
- Develop as-built documentation to be distributed to the Participating Parties.

### *4.2.3 Methodology*

Revolution Wind will release an RFP for consultant and contracting services for the scope of work and select a consultant to perform the Scope of Work listed in Section 4.2.2. The preferred consultants and contractors will have experience in developing energy efficiency plans for historic buildings. The draft and final plans and specifications will be developed in consultation with the Participating Parties.

### *4.2.4 Standards*

The project will comply with following standards:

- The Town of Aquinnah Building Code, as applicable;
- The Town of Aquinnah Energy and Climate Committee guidance, as applicable;
- The Secretary of the Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (36 CFR 67.7); and
- National Park Service's *Improving Energy Efficiency in Historic Buildings* Preservation Brief 3.

### *4.2.5 Documentation*

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP.
- Preliminary draft plans and specifications;
- Final plans and specifications; and
- As-built documentation including photographs.

### *4.2.6 Funds and Accounting*

Funding amounts are being determined in consultation with the consulting parties.

# 5.0 IMPLEMENTATION

## 5.1 Timeline

The timeline for implementation of the mitigation measures is identified in the MOA.

## 5.2 Organizational Responsibilities

### *5.2.1 Bureau of Ocean Energy Management (BOEM)*

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required:

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

### *5.2.2 Revolution Wind, LLC*

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

### *5.2.3 Other Parties, as Appropriate*

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

## 5.3 Participating Party Consultation

This HPTP was provided by Revolution Wind for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. Participating Parties were provided the opportunity for review and comment on the HPTP concurrent with BOEM's NEPA substitution schedule for the Project. This HPTP was further refined through informational

and consultation meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information.

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## ATTACHMENT 14 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE GAY HEAD LIGHTHOUSE, TOWN OF AQUINNAH, DUKES COUNTY, MASSACHUSETTS

# Historic Property Treatment Plan

for the

# Revolution Wind Farm

## The Gay Head Lighthouse

## Town of Aquinnah, Dukes County, Massachusetts

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

**June 2023**

**ABSTRACT**

| | |
|---|---|
| Federal Undertaking: | Revolution Wind Farm and Revolution Wind Export Cable Project |
| Location: | Outer Continental Shelf and Rhode Island |
| Federal and State Agencies: | Bureau of Ocean Energy Management<br>National Park Service<br>U.S. Army Corps of Engineers<br>Massachusetts Historical Commission<br>Rhode Island Historical Preservation & Heritage Commission<br>New York Historic Preservation Office<br>Connecticut Historic Preservation Office<br>Advisory Council on Historic Preservation |
| Regulatory Process: | National Environmental Policy Act<br>Section 106 of the National Historic Preservation Act<br>Section 110(f) of the National Historic Preservation Act |
| Purpose: | This Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve adverse effects from the Revolution Wind Project. |
| Adverse Visual Effect Finding for: | The Gay Head Lighthouse |
| Submitted By: | Revolution Wind, LLC |
| Date: | June 2023 |

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## LIST OF ACRONYMS

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| ADLS | Aircraft Detection Lighting System |
| BOEM | Bureau of Ocean Energy Management |
| CFR | Code of Federal Regulations |
| COP | Construction and Operations Plan |
| DEIS | Draft Environmental Impact Statement |
| EDR | Environmental Design and Research, D.P.C. |
| FEIS | Final Environmental Impact Statement |
| FR | Federal Regulation |
| HPTP | Historic Property Treatment Plan |
| MHC | Massachusetts Historical Commission |
| MOA | Memorandum of Agreement |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act of 1966 |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| RIHPHC | Rhode Island Historical Preservation & Heritage Commission |
| ROD | Record of Decision |
| RWF | Revolution Wind Farm |
| SOI | Secretary of the Interior |
| USCG | United States Coast Guard |
| VERI | Vineyard Environmental Research Institute |
| WTG | Wind Turbine Generator |

## 1.0 EXECUTIVE SUMMARY

This Historic Property Treatment Plan (HPTP) for the Gay Head Lighthouse, which is listed on the National Register of Historic Places (NRHP) (the Historic Property) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2023) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) has provided in accordance with the Bureau of Ocean Energy Management's (BOEM) Findings of Adverse Effect (FoAE) for the Undertaking under the National Historic Preservation Act (NHPA).

BOEM has used the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has consulted with the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, federally recognized Native American Tribes, and other NHPA Section 106 consulting parties in accordance with this process. Revolution Wind has provided this HPTP to BOEM for inclusion in the Final Environmental Impact Statement (FEIS).

This HPTP describes the mitigation measures to resolve adverse effects on historic properties, the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS as well as outreach to consulting parties performed by BOEM. This HPTP document has undergone revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and other consulting parties throughout the NEPA substitution process. This HPTP is included in the Memorandum of Agreement (MOA) issued in accordance with 36 CFR §§ 800.8, 800.10.

This HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.
- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic property discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2023) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2022) that guided the development of this document.
- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.
- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder

engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

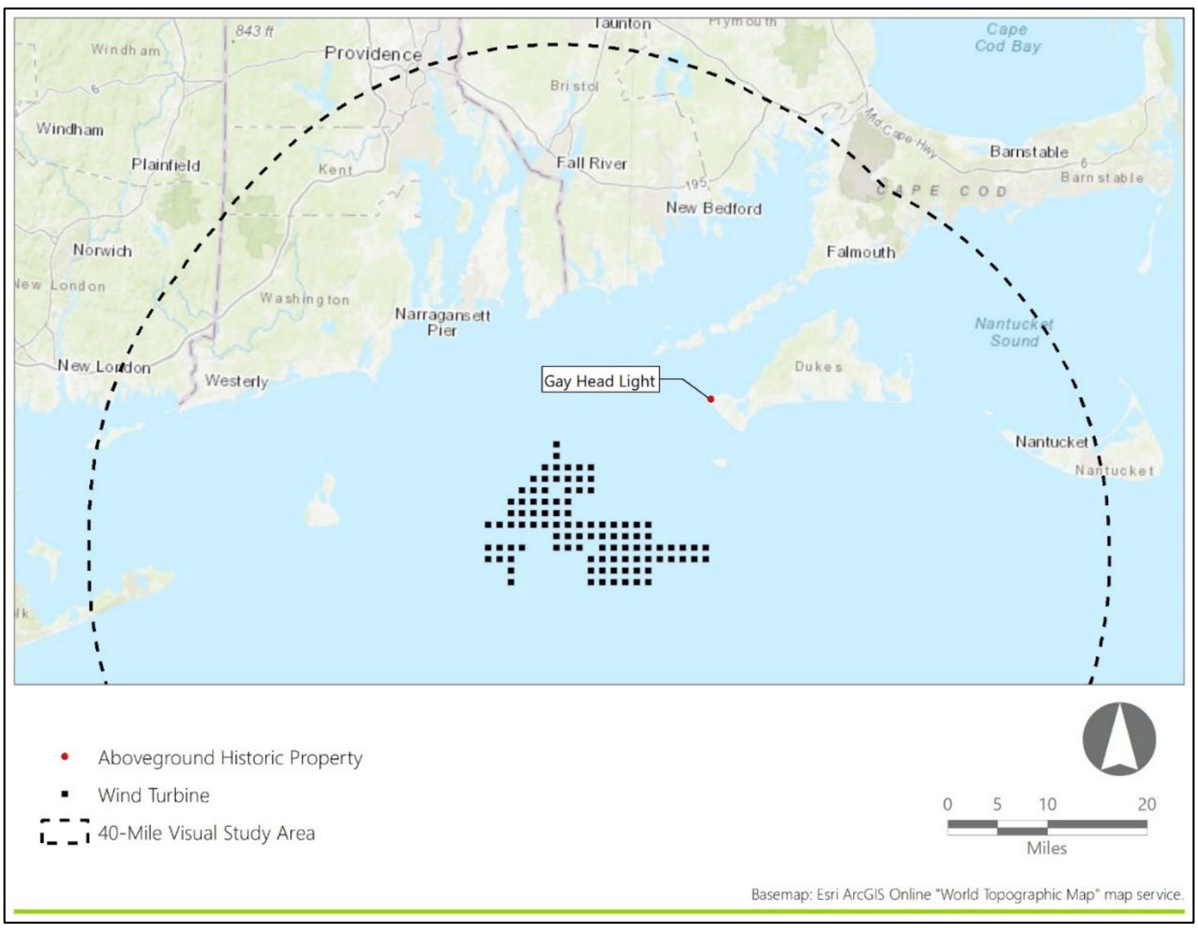
- **Section 6.0, References**, is a list of works cited in this HPTP.

## 2.0 BACKGROUND INFORMATION

### 2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

**Figure 2.1-1. Project Location**



## 2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

This HPTP was developed in accordance with the HRVEA and COP and reflects consultations conducted by BOEM with multiple consulting parties, including the Massachusetts State Historic Preservation Officer (MA SHPO), the Town of Aquinnah, and the Gay Head Lighthouse Advisory Board. The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB).

This HPTP addresses the mitigation requirements identified by BOEM to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect consultations among consulting parties to refine a conceptual mitigation framework proposed by Revolution Wind.

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2 – Organizational Responsibilities.

### *2.2.1 Municipal Regulations*

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historical commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

### *2.2.2 Preservation Easements and Restrictions*

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The State of Massachusetts preservation restrictions are outlined in Massachusetts General Law Chapter 184, Sections 31-33. The Massachusetts Historical Commission (MHC) holds a Historic Preservation Restriction, and the United States Coast Guard (USCG) holds an Aid to Navigation Easement on the historic property per 10 USC 2668 Easements for Rights of Way. Any mitigation work associated with the historic property will comply with the conditions of all extant historic preservation easements. Additional information regarding compliance with extant preservation restrictions appears in Section 5.0, Implementation.

## 2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Wampanoag Tribe of Gay-Head Aquinnah
- The Martha's Vineyard Commission
- The Gay Head Lighthouse Advisory Committee
- The Town of Aquinnah
- The Massachusetts Historical Commission.[1]

[1] MHC was invited to attend stakeholder outreach meetings regarding historic properties in Massachusetts; however, MHC has not participated in outreach meetings for Revolution Wind.

# 3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

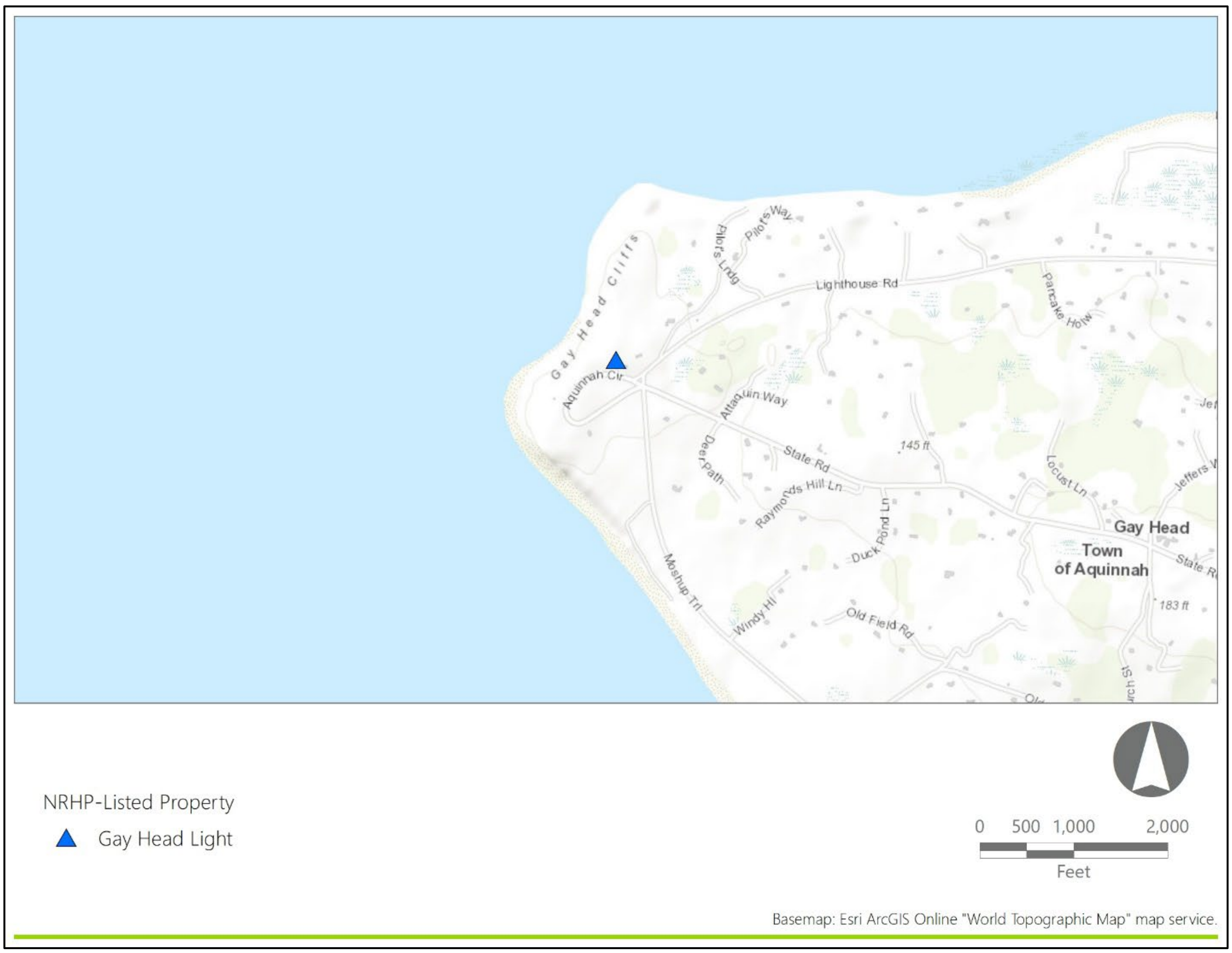
## 3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

**Table 3.1-1. Historic Properties included in the HPTP**

| Name | Property Designation | Municipality | State | Site No. (Agency) | Ownership | Historic Property Type |
|---|---|---|---|---|---|---|
| The Gay Head Lighthouse | NRHP-Listed | Town of Aquinnah | MA | MHC #GAY.900 (MHC); GSA 1-X-MA-0877 (USCG); 87001464 (NPS) | Public | Lighthouses and Navigational Aids |

**Figure 3.1-1. Historic Property Location**



In Section 3.3, the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

## 3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The Gay Head Lighthouse is considered within the HRVEA as historic property type "Lighthouses and Navigational Aids" which is defined by the historic associations with water-related transportation and defense, prominent views of the sea and dominance of the surrounding landscape, and common architectural forms. These structures present themselves as prominent and iconic features on the coastal landscape, possess elevated views of the ocean horizon, and are sited specifically for those elevated views.

Lighthouses and other historic navigation aids in the study area include properties that were intended to serve mariners plying large areas of open water and other properties that served specific navigation routes through the complex and treacherous waters of the region's bays. All of these properties have an obvious association with maritime settings, but the scale of those settings will vary due to the conformation of the local landscape and seas and the design and purpose of each navigation aid.

## 3.3 The Gay Head Lighthouse

### *3.3.1 Physical Description and Existing Conditions*

Sited on 1.35 acres off Aquinnah Circle at the southwestern point of the Town of Aquinnah, the conical 1856 brick lighthouse sits just east of clay cliffs which overlook Devil's Bridge rocks. The lighthouse marks the entrance to Vineyard Sound from the south. In 2015, the structure was relocated 134 feet from its original location, away from the cliffs due to erosion concerns (Gay Head Lighthouse, 2018). The structure was placed on a new granite sub-foundation, at the same elevation as its original location (Unnamed, 2015).

The red brick tower shaft houses interior stairs and measures 17.5 feet in diameter and 45.7 feet in height (DiStefano, 1981). A mid-level balcony, corresponding to the interior lamp room, rests on a sandstone entablature and has iron railings. The glazed lens room with black iron structure contains the optic and sits atop the masonry with its own iron balcony (Tait, 1987). The lens room is enclosed by an iron roof with ventilator and lightning rod. A series of square four-pane windows perforate the building envelope at various heights around the circumference of the lighthouse. Recent improvements include replacement iron railings that match the original set, and repair to masonry damage where the lens room and balcony meet the brick (Gay Head Lighthouse, 2018).

Following the relocation of the Gay Head Lighthouse in 2015, cliff erosion was no longer the biggest threat to the structure. Due to age and maritime siting, the poor condition of the Gay Head Lighthouse building materials is currently posing the largest risk to its long-term survival. The curtain wall of the lens room, as well as brick, sandstone, and mortar all display signs of deterioration (Gay Head Lighthouse, 2018).

### *3.3.2 Historic Context*

The extant circa 1856 Gay Head Lighthouse is the second lighthouse on this site, a replacement for the original wood structure authorized in 1799 by President John Adams (DiStefano, 1981). By 1854, the original structure was being confused with the Sankay Light on Nantucket, resulting in a shipwreck. As a response to the tragedy, Congress allocated $30,000 for a new brick lighthouse, a first-order Fresnel lens from France, and a keeper's residence (demolished circa 1961). Caleb King of Boston constructed the new Gay Head Lighthouse and keeper's house using brick from the nearby Chilmark Brick Works. The lighthouse's reopening in 1856 was well publicized and tours opened to the public shortly thereafter (Gay Head Lighthouse, 2018).

Between 1856 and 1952 the Fresnel lens served as the lighthouse beacon, under the care of 18 principal keepers and 10 assistant keepers. The first Wampanoag Tribe of Gay Head (Aquinnah) member to serve as the Gay Head Lighthouse Keeper was Charles W. Vanderhoop, Sr. who served in that position from 1930-1933 (Gay Head Lighthouse, 2018). Following the introduction of electricity and an upgraded optic at the lighthouse, the USCG donated the Fresnel lens to the Martha's Vineyard Museum, and the keeper's house was demolished. With a fully automated beacon, the USCG began its operation of the Gay Head Lighthouse in 1956.

Under USCG stewardship, and with insufficient funds for maintenance, the condition of the Gay Head Lighthouse began its slow decline in the 1960s, continuing into the early 1980s. In 1984, Congressional hearings to save the Gay Head Lighthouse from demolition resulted in the licensure of a 35-year lease to the Vineyard Environmental Research Institute (VERI) who were given control of the management and maintenance of the property (Gay Head Lighthouse, 2018). The USCG continued to operate the navigational aid beacon through an access easement (see Section 2.2.2). VERI commenced fundraising activities to make repairs and re-open the lighthouse to the public, which was done in 1986, 30 years after its closure. Once again keepers and assistant keepers were appointed, including Charles Vanderhoop, Jr. who was born in the keeper's house. In 1994, VERI transferred its license to the Martha's Vineyard Museum, and in 2009 the Museum provided President Barack Obama a private tour of the property with his family (Gay Head Lighthouse, 2018).

Though cliff erosion was a decades-old problem at the Gay Head Lighthouse, it became an increased threat in 2010 when a portion of the perimeter fence tumbled down the cliff face. By 2012, the Save the Lighthouse Committee was formed to research options for the continued safety of the structure, including a potential relocation which was determined to be the solution. In 2013, the Gay Head Lighthouse was featured on the National Trust of Historic Preservation's list of 11 Most Endangered Places. Its inclusion on the list put in motion a years-long fundraising campaign for its relocation by International Chimney Corporation who recommended it occur no later than 2015. With funding in place, the move began on May 28, 2015, and finished on May 30, 2015, with the Gay Head Lighthouse's safety assured for another century (Gay Head Lighthouse, 2018).

The Town of Aquinnah filed for ownership of the property in 2015, as it was determined to be excess to the needs of the UCSG (General Services Administration, 2013). The deed to the town included a preservation easement and access restrictions, described in Section 2.2.2. The Gay Head Lighthouse Advisory Committee is a municipal department board which manages the property.

### *3.3.3 NRHP Criteria and the Maritime Visual Setting*

In 1987, the Gay Head Lighthouse was listed on the NRHP as part of the Lighthouses of Massachusetts Thematic Resources Area (DiStefano, 1981). At the time of construction, it was considered one of the ten most important lights on the Atlantic Coast and contained one of the country's first Fresnel lenses. The Gay Head Lighthouse is significant under Criterion A as a historic maritime structure and aid to navigation. It is also significant under Criterion C as an outstanding example of nineteenth-century maritime architecture (Tait, 2017).

The site chosen for the lighthouse's 2015 relocation was consistent with the setting of the original, thereby allowing for the continued integrity of "association, setting, feeling and relationship to the Gay Head cliffs and to the ocean as an aid to navigation" (Unnamed, 2015). Therefore, the Gay Head Lighthouse continued to be NRHP-listed during and following its relocation. Since that time, physical improvements have been consistent with the Secretary of the Interior's (SOI) Standards (36 CFR 68) which have allowed the structure to retain integrity of materials, workmanship, and design.

As stated above, the Gay Head Light is located on the Gay Head Cliffs and "marks the Devil's Bridge rocks, the shoals of the south shore of the island and the entrance to Vineyard Sound from Buzzard's Bay" (Tait, 2017). Devil's Bridge extends over a mile from the cliffs and has been the site of numerous accidents. In 1838 the lighthouse was replaced, and the new light could be seen for more than 20 miles (D'Entremont, 2021). The need for a lighthouse at this location is evident, and despite the powerful and long-distance light, due to Devil's Bridge and the strong currents, shipwrecks continued to occur. The setting of the Gay Head Light is intrinsically linked to the water with its location high on the Gay Head Cliffs, marking Vineyard Sound and the Atlantic Ocean.

# 4.0 MITIGATION MEASURES

Mitigation measures at the historic property are detailed in this section. The mitigation measures for the Gay Head Lighthouse (detailed below) reflect consultations among consulting parties to refine a conceptual mitigation framework proposed by Revolution Wind. BOEM and Revolution Wind have identified steps to implement these measures in consultation with Participating Parties, led by individuals who meet the qualifications specified in the Secretary of the Interior's Qualifications Standards for History and Architectural History (36 CFR 61).

## 4.1 Historic Rehabilitation of the Gay Head Lighthouse

### *4.1.1 Purpose and Intended Outcome*

In consultation with the Town of Aquinnah and the Gay Head Lighthouse Advisory Board, this mitigation measure will contribute funds to the next phase of rehabilitation at the Gay Head Lighthouse, as discussed at the Revolution Wind stakeholder meetings on February 1, 15 and 18, 2022. The Gay Head Lighthouse Advisory Board, a municipal board in the Town of Aquinnah, has commissioned a report identifying preservation and restoration needs for the lighthouse, the ICC Commonwealth Corporation *Report of December 2021 Inspection Gay Head Lighthouse Aquinnah, MA* dated April 13, 2022. The intended outcome is to ensure the long-term preservation of the lighthouse by contributing funds for physical repairs and/or restoration of the historic building materials according to the priorities identified by the report. During consultation, the Town requested contracting support for the restoration effort at the Gay Head Lighthouse. Should sufficient funds be available for the next phase of restoration the Gay Head Lighthouse in the timeframe set forth in Section 4.1.3 below, Revolution Wind would provide contracting support for restoration of the curtain wall.

### *4.1.2 Scope of Work*

The scope of work includes the following:

- Revolution Wind will provide the funding amount identified in Attachment 7 of the MOA; and
- If sufficient funds are available to complete the full restoration project as defined in the previously referenced report, then Revolution Wind will provide additional support outlined below and in Sections 4.1.3 and 4.1.5 in consultation with the Participating Parties.
  - Contracting support for restoration of the curtain wall per the ICC Commonwealth Corporation *Report of December 2021 Inspection Gay Head Lighthouse Aquinnah, MA* dated April 13, 2022. Contracted work would include:
    - Prior to any work commencing, photographic and written documentation of the existing conditions will be recorded;
    - Development of draft specifications and construction drawings to be distributed to the Participating Parties for review and comment;
    - Final Specifications and construction drawings to be distributed to the Participating Parties for review and comment;
    - Progress reports as requested by the Participating Parties to be distributed to the Participating Parties for review and comment; and

- A Summary Report of the work completed including photographs and as-built documentation to be distributed to the Participating Parties.

### *4.1.3 Methodology*

Revolution Wind will deposit the funding stipulated in Attachment 7 in an escrow account. If notified by the Town of Aquinnah that sufficient funds are available for the defined scope of work within five years of the execution of the MOA, Revolution Wind will hire a qualified contractor to complete the next phase of restoration at the Gay Head Lighthouse. Prior to any work commencing, photographic and written documentation of the existing conditions will be recorded. Drawings and specifications supporting the scope of work (see Section 4.1.2 and 4.1.5) will be developed in compliance with applicable standards (see Section 4.1.4). The project will require the mobilization of a qualified contractor that is experienced in the repair and restoration of historic lighthouses.

### *4.1.4 Standards*

The scope of work will comply with following standards:

- Town of Aquinnah, MA Building Code;
- Martha's Vineyard Commission planning guidance, as applicable;
- Preservation Restriction (MGL Chapter 184, Section 31-33);
- United States Coast Guard Aid to Navigation (ATON) Access Easement (U. S. Department of Homeland Security and U. S. Coast Guard, 2005);
- The Town of New Shoreham Building, Zoning, Land Use & Planning guidance and regulations;
- The Town of New Shoreham Historic District Commission;
- United States Coast Guard Aid to Navigation (ATON) Access Easement (U. S. Department of Homeland Security and U. S. Coast Guard, 2005);
- *Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character* (Nelson, 1988);
- *Preservation Brief 47: Maintaining the Exterior of Small and Medium Size Historic Buildings;*
- *National Register Bulletin 34: Guidelines for Evaluating and Documenting Historic Aids to Navigation;*
- *Historic Lighthouse Preservation Handbook;*
- *IALA-AISM Lighthouse Conservation Manual;*
- Preservation Restriction (RIGL Title 42, Section 42-45-9); and
- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68);
- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable;
- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68); and
- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable.

### *4.1.5 Documentation*

The following documentation would be provided for review by the Participating Parties should the Town of Aquinnah notify Revolution Wind that sufficient funds are available for the defined scope of restoration:

- Proposed scopes of work including draft text, project plans, and design specifications;
- Photographic and written documentation of existing conditions;
- Draft specifications and construction drawings to be distributed to the Participating Parties for review and comment;
- Final Specifications and construction drawings to be distributed to the Participating Parties for review and comment;
- Progress reports as requested by the Participating Parties to be distributed to the Participating Parties for review and comment; and
- A Summary Report of the work completed including photographs and as-built documentation to be distributed to the Participating Parties.

#### *4.1.6 Funds and Accounting*

Funding amounts are being determined in consultation with the consulting parties. Revolution Wind will deposit the stipulated funding in an escrow account in accordance with the timeline for implementation of mitigation measures identified in the MOA. If insufficient funds are available to complete the restoration project (as defined in the Town's report) within five years of the execution of the Memorandum of Agreement, the escrowed funds shall be released to the Town of Aquinnah for sole use in the planning and implementation of repair and restoration work on the Gay Head Lighthouse property, provided such repair and restoration efforts comply with the standards listed in Section 4.1.4 and are reviewed and approved by the Massachusetts Historical Commission prior to implementation. Release of the escrowed funds to the Town of Aquinnah in this manner shall satisfy Revolution Wind's obligations as they relate to mitigation for the adverse visual effect to the Gay Head Lighthouse.

# 5.0 IMPLEMENTATION

## 5.1 Timeline

The timeline for implementation of the mitigation measures is identified in the MOA.

## 5.2 Organizational Responsibilities

### *5.2.1 Bureau of Ocean Energy Management (BOEM)*

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

### *5.2.2 Revolution Wind, LLC*

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Contributing funding for mitigation measures, as specified in Section 4;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

### *5.2.3 Massachusetts Historical Commission (MHC)*

Should the Town of Aquinnah notify Revolution Wind that sufficient funding is available to complete the scope of restoration identified in the Town's report, the scope of work would be submitted to the MHC under the terms of the Preservation Restriction.

### *5.2.4 Massachusetts State Historic Preservation Officer*

Should the Town of Aquinnah notify Revolution Wind that sufficient funding is available to complete the scope of restoration identified in the Town's report, the scope of work would be submitted to the Massachusetts State Historic Preservation Officer for compliance with the SOI Standards for Rehabilitation (36 CFR 68).

### *5.2.5 United States Coast Guard (USCG)*

Should the Town of Aquinnah notify Revolution Wind that sufficient funding is available to complete the scope of restoration identified in the Town's report, the scope of work will be submitted to the USCG for review to confirm that it complies with the terms of the ATON Access Easement.

### *5.2.6 Wampanoag Tribe of Gay Head (Aquinnah)*

The Wampanoag Tribe of Gay Head (Aquinnah) may, at their sole discretion, participate in consultations for the finalization of the HPTP in recognition of the traditional cultural and religious significance of the historic property to the Tribe.

### *5.2.7 Other Parties, as Appropriate*

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

## 5.3 Participating Party Consultation

This HPTP was provided by Revolution Wind for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. Participating Parties were provided the opportunity for review and comment on the HPTP concurrent with BOEM's NEPA substitution schedule for the Project. This HPTP was further refined through informational and consultation meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information.

## 6.0 REFERENCES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**ATTACHMENT 15 – REVOLUTION WIND EXPORT CABLE ONSHORE SUBSTATION AND INTERCONNECTION FACILITY, NORTH KINGSTOWN, RHODE ISLAND: PROCEDURES GUIDING THE DISCOVERY OF UNANTICIPATED CULTURAL RESOURCES AND HUMAN REMAINS**

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Public Archaeology Laboratory

# Revolution Wind Export Cable Onshore Substation and Interconnection Facility

North Kingstown, Rhode Island

## *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains*

*March 2023*

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Revolution Wind, LLC (Revolution Wind), a 50/50 joint venture between Orsted North America Inc. (Orsted NA) and Eversource Investment LLC (Eversource), proposes to construct and operate the Revolution Wind Farm Project (Project). The wind farm portion of the Project will be located in federal waters on the Outer Continental Shelf (OCS) in the designated Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0486. The Project also includes up to two submarine export cables (RWEC), generally co-located within a single corridor through both federal waters and state waters of Rhode Island. The RWEC will make landfall at Quonset Point in North Kingstown, Rhode Island and will interconnect to an existing electric transmission system via the Davisville Substation, which is owned and operated by The Narragansett Electric Company (TNEC), located in North Kingstown, Rhode Island.

Revolution Wind is committed to the protection and preservation of cultural resources, in accordance with federal and state legislation, and is continuing that commitment as part of the onshore components of the Project. Revolution Wind recognizes that despite intensive cultural resource field investigations that were performed in the spring and summer of 2021 (Forrest and Waller 2021), it is nonetheless possible that potentially significant archaeological resources could be discovered during onshore Project construction, particularly during excavation. Revolution Wind also recognizes the requirement for compliance with federal, state, and municipal laws and regulations regarding the treatment of human remains, if any are discovered.

The procedures guiding the unanticipated discovery of cultural resources and human remains detailed herein ("Procedures") were developed on behalf of Revolution Wind and in consultation with the Rhode Island Historical Preservation and Heritage Commission (RIHPHC)/office of the State Historic Preservation Officer (SHPO), and federally recognized Native American tribes. These Procedures summarize the approach that Revolution Wind will use to address any unanticipated discoveries of archaeological resources or human remains during construction activities within the onshore portion of the Project's area of potential effect (APE).

The purpose of archaeological investigations is to determine the presence or absence of historic properties, including archaeological sites, within a project APE. These archaeological investigations are conducted in accordance with standards set forth in Section 106 of the National Historic Preservation Act of 1966, as amended, (54 USC 36018) and its implementing regulations (36 CFR 800), specifically, those procedures regarding "post-review discoveries" as outlined in 36 CFR 800.13. All work is undertaken pursuant to the Secretary of the Interior *Standards for Archaeology and Historic Preservation* (48 FR 44716-44742); the *Performance Standards and Guidelines for Archaeology in Rhode Island* (RIHPHC 2021); and the applicable laws and regulations pertaining to the cultural resources and human remains including the Rhode Island Historical Cemeteries Act (Rhode Island General Law [R.I.G.L.] 23-18-11 *et seq.*) and the Antiquities Act of Rhode Island (R.I.G.L. 42–45.1).

## Cultural Sensitivity Training

Revolution Wind acknowledges the sensitivity of the Project and surrounding area to potentially contain significant archaeological sites including Native American burials. The Public Archaeology Laboratory Inc. (PAL) Principal Investigator will give Revolution Wind and its contractor construction supervisors cultural and archaeological sensitivity training before the start of construction. The purpose of this training will be to review Revolution Wind's commitments to cultural resource compliance, review the general results of the archaeological investigations conducted within the onshore portions of the Project APE, and to provide an overview of the general cultural history of the area so that Revolution Wind and their contractors are aware of the types of archaeological resources that may be encountered during construction. The training program will outline the procedures that will be followed if a significant cultural resource or archaeological deposit is discovered during construction.

## Notification Procedures

The identification of archaeological resources requires experience in recognizing and identifying potentially and significant archaeological sites and deposits. Revolution Wind is committed to having qualified archaeological monitors onsite during any ground disturbing construction activities. Revolution Wind will provide the Narragansett Indian Tribe, the Wampanoag Tribe of Gay Head/Aquinnah, Mashpee Wampanoag Tribe, the Mohegan Tribe, the Shinnecock Indian Nation, the Delaware Tribe of Indians, the Delaware Nation, and the Mashantucket Pequot Tribal Nation Tribal Historic Preservation Offices (THPOs) the opportunity to have their tribal monitors and cultural resource specialists onsite during archaeological or construction activities.

The following details the plan that Revolution Wind and their contractors will follow if archaeological resources or human remains are identified during construction.

*During Construction*

<u>Archaeological Discoveries</u>

1. Possible archaeological remains may be discovered by archaeological and tribal monitors during construction. If anyone including construction personnel identify suspected cultural or archaeological resources, the archaeologist on site should immediately be notified such that the qualified archaeological monitor can issue a stop-work order. If suspected artifacts or archaeological features are uncovered during a construction activity, qualified archaeological monitors will have the authority to stop work in the vicinity of the discovery until it can be determined if the materials are cultural and whether they represent a potentially significant site or archaeological deposit.

2. Archaeological monitors will immediately notify Revolution Wind's Environmental Compliance Manager. Notification will include the activity, specific work area including location/address and construction site (onshore substation, interconnection facility, export cable route, etc.), and provide digital photographs of the find.

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3. Revolution Wind will issue a Stop Work order and direct the contractor to secure the area by flagging or fencing off the area of the archaeological discovery. Any discovery made on a weekend or overnight hours will be protected until all necessary parties have been notified of the discovery. The contractor will not resume work in the vicinity of the find until Revolution Wind's Environmental Compliance Manager has granted clearance.

4. PAL, in consultation with the onsite tribal monitors, will determine if the site is potentially significant and notify the RIHPHC and BOEM. Revolution Wind, their contractors, and PAL will work with the RIHPHC and the THPOs to develop and implement a site treatment plan.

5. Since the area of any potential discovery will have been partially disturbed by construction, the objective of cultural resource investigations will be to evaluate data quickly so that notifications are made and consultation can proceed. If archaeological investigations are required, Revolution Wind will inform the construction supervisor that no construction work in the immediate vicinity of the discovery can proceed until archaeological fieldwork is complete. The area will be flagged as being off-limits for work but will not be identified as an archaeological site *per se* to protect the resource(s).

6. The duration of any work stoppages will be contingent upon the significance of the identified cultural resource(s) and consultation among Revolution Wind, BOEM, RIHPHC, THPOs, and other parties to determine treatment to avoid, minimize, or mitigate any adverse effects to the identified site.

7. Once all treatment measures are complete, Revolution Wind will notify the contractor that construction work may proceed.

## Human Remains Discoveries

If human remains are encountered during Project construction, they will be handled in accordance with the Rhode Island Historic Cemeteries Act (Appendix A) and North Kingstown Code of Ordinances, Part III, Chapter 12, Section 12–15 (Appendix B) and guided by the policy statement adopted by the Advisory Council on Historic Preservation ([Advisory Council]; see *Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects*, (Appendix C). Human remains, if present, are likely to be found in deeply buried or areas unimpacted by previous construction.

Human remains will be treated with the utmost dignity and respect at all times. Skeletal remains and/or associated artifacts will be left in place and not disturbed. No remains or associated materials will be collected or removed until all notifications have been made, appropriate consultation has taken place, and a plan of action has been determined. The procedures that will be followed in the event that human remains are discovered during Project construction are:

1. If PAL and/or tribal monitors identify human remains or possible human remains, all construction work in the vicinity of the find that could affect the integrity of the remains will cease. The remains will not be touched, moved, or further disturbed. PAL will notify Revolution Wind and with the assistance of onsite contractors take measures to ensure site security.

2. PAL/Revolution Wind will record the exact location of the find, its time of discovery, and will immediately notify the RI State Police and the Town of North Kingstown's Building Inspector in accordance with Rhode Island Historic Cemeteries Act and the North Kingstown Code of Ordinances. BOEM will also be notified as soon as practicable.

3. The Town will notify the Office of the State Medical Examiner (OSME). If the OSME determines the remains are less than 100 years old, then their treatment becomes the responsibility of the State Police and the Town. If the OSME determines the remains are more than 100 years old, the OCME will notify the RIHPHC State Archaeologist. The State Archaeologist, PAL and tribal monitors will determine if the remains are Native American.

4. The Town of North Kingstown, State Archaeologist, and if the remains are Native American, the THPOs will discuss whether there are prudent and feasible alternatives to protect the remains. The results of this consultation will be made in writing. If it is not possible to protect the remains, they may be excavated only under a permit issued by the RIHPHC after the review of a recovery plan that specifies a qualified research team, research design, and plan for the disposition of the remains consistent with the results of consultation and permission from the North Kingstown Town Council.

5. In all cases, due care will be taken in the excavation, transport, and storage of any remains to ensure their security and respectful treatment.

## Applicable Laws

*Federal*

- Section 106 of the National Historic Preservation Act of 1966, as amended (54 USC 306108) and its implementing regulations “Protection of Historic Properties” (36 CFR part 800).

*Rhode Island*

- Rhode Island Historic Cemeteries Act: Rhode Island General Law 23-18-11 *et seq*. (Appendix A)

*North Kingstown*

- North Kingstown Code of Ordinances, Part III, Chapter 12, Section 12–15 (Appendix B)

## LIST OF CONTACTS

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*Sterling, Virginia 20166*
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48 Orms Street
Providence, RI 02904
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***Rhode Island State Police, Wickford Barracks***
7875 Post Road
North Kingstown, RI 02852
**Contact:** Tel: (401) 444-1064

***North Kingstown Police Department***
8166 Post Road
North Kingstown, RI 02852
**Contact:** Tel: (401) 294-3316

***The Public Archaeology Laboratory, Inc.***
26 Main Street
Pawtucket, RI 02860
Contact: Deborah Cox

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## TRIBAL HISTORIC PRESERVATION OFFICES

**Narragansett Indian Tribe Tribal Historic Preservation Office**

[redacted]

**Mashantucket Pequot Tribal Nation Tribal Historic Preservation Office**

[redacted]

**Mashpee Wampanoag Tribe Tribal Historic Preservation Office**

[redacted]

**Mohegan Tribe Tribal Historic Preservation Office**

[redacted]

**Shinnecock Indian Nation Tribal Historic Preservation Office**

[redacted]

**Wampanoag Tribe of Gay Head/Aquinnah Tribal Historic Preservation Office**

[redacted]

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**Delaware Tribe of Indians Tribal Historic Preservation Office (PA)**

[redacted]

**Delaware Nation Tribal Historic Preservation Office**

[redacted]

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## APPENDIX A: RHODE ISLAND GENERAL LAWS TITLE 23 - HEALTH AND SAFETY - CHAPTER 23-18 CEMETERIES

***SECTION 23-18-11***

**§ 23-18-11 Regulation of excavation around cemeteries. –** (a) The city or town council of any municipality may by ordinance prescribe standards regulating any construction or excavation in the city or town, when those standards are reasonably necessary to prevent deterioration of or damage to any cemetery or burial ground, or to any structures or gravesites located in any cemetery or burial ground. The rules and regulations shall not apply to the ordinary installation of gravesites or of monuments, markers, or mausoleums.

(b) No city or town shall permit construction, excavation or other ground disturbing activity within twenty-five feet (25') of a recorded historic cemetery except in compliance with the following provisions:

(1) The boundaries of the cemetery are adequately documented and there is no reason to believe additional graves exist outside the recorded cemetery and the proposed construction or excavation activity will not damage or destructively alter the historic cemetery through erosion, flooding, filling, or encroachment; or

(2) The proposed construction or excavation activity has been reviewed and approved by the city or town in accordance with § 23-18-11.1.

(c) Whenever an unmarked cemetery or human skeletal material is inadvertently located during any construction, excavation, or other ground disturbing activity, including archaeological excavation, the building official of the city or town where the unmarked cemetery or human skeletal material is located shall be immediately notified. The building official shall, in turn, notify the state medical examiner and the Rhode Island historical preservation and heritage commission if the grave, cemetery, or skeletal material appears to be historic. Prior to the continuation of any further construction, excavation, or other ground disturbing activity, and unless the provisions of § 23-18-7 shall apply, the property owner shall undertake an archaeological investigation to determine the boundaries of the unmarked cemetery and shall so inform the building official. In the event that the cemetery meets the criteria for a historic cemetery, the building official shall so advise the recorder of deeds of the city or town who shall record and register the cemetery in accordance with the provisions of § 23-18-10.1.

***SECTION 23-18-11.1***

**§ 23-18-11.1 Permit required to alter or remove historic cemetery – Powers of city or town council – Appeal. –** (a) Before an agency or a property owner may authorize or commence alteration or removal of any historic cemetery, the agency or owner must apply to the city or town council where the historic cemetery is located for a permit to alter or remove. The city or town council shall prescribe by ordinance standards to regulate the alteration or removal of any historic cemetery within its municipal limits, but shall at a minimum provide that:

(1) The applicant will examine all alternatives, and demonstrate that no prudent or feasible alternative to the proposed alteration is possible;

(2) The city or town provide for notification and participation in the permitting process of parties which may be interested in the proposed alteration or removal by virtue of their status as a governmental health or historic preservation authority, or as a private or nonprofit historical, genealogical or civic

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organization, or, in the case of American Indian cemeteries and burial grounds, the appropriate tribal organization; and
(3) The city or town provide for due consideration of the rights of descendants in any application to substantially alter or remove a historic cemetery.

(b) When an application for alteration or removal of a historic cemetery has been made and the boundary is unknown or in doubt, the city or town may require that the applicant, at its own expense, conduct an archaeological investigation to determine the actual size of the cemetery prior to final consideration by the city or town of the application to alter or remove.

(c) After due consideration, the city or town council may grant the application to alter or remove the historic cemetery in whole or in part, under the supervision of an archaeologist and with any restrictions and stipulations that it deems necessary to effectuate the purposes of this section, or deny the application in its entirety. Any person or persons aggrieved by a decision of the city or town council shall have the right of appeal concerning the decision to the superior court and from the superior court to the supreme court by writ of certiorari.

(d) Nothing in this section shall be deemed to contravene the authority of municipal bodies under § 45-5-12 to hold, manage, repair, or maintain any neglected burial ground.

***SECTION 23-18-11.2***

**§ 23-18-11.2 Regulation of excavation – Removal and transfer of graves and cemeteries – Penalties. –** (a) The city or town council of any municipality may by ordinance prescribe standards, in addition to those required by § 23-18-10, regulating the excavation, removal, and transfer of any graves, grave sites, and cemeteries in the municipality so as to provide an accurate record of any activity and to ensure that any remains removed are properly re-interred and the location of the new interment is recorded. In the absence of a local ordinance establishing standards, regulations adopted by the historical preservation and heritage commission shall govern. A report of any grave removal and relocation from one cemetery or burial ground to another shall be filed in the clerk's office for each municipality and shall, to the extent permitted by law, be available for public inspection. In instances where there is a headstone or other burial marker identifying the original grave, the headstone or burial marker shall be erected on the site to which any remains are transferred.

(b) To the extent not promulgated pursuant to § 23-3-5.1, the state registrar of vital records shall promulgate regulations to establish a system of record-keeping to allow descendants to locate their ancestors' graves in Rhode Island.

(c) Any person convicted of violating this section shall be subject to a fine of not more than one thousand dollars ($1,000) and such fine shall be deemed civil in nature and not a criminal penalty.

(d) The provisions of this section shall be considered to be in addition to any other penalties provided for desecration or vandalism to cemeteries.

***SECTION 23-18-13***

**§ 23-18-13 Notification of historical preservation and heritage commission. –** The historical preservation and heritage commission shall be notified whenever an ancient burial place contains or is suspected to contain the remains of one or more persons.

## APPENDIX B: NORTH KINGSTOWN CODE OF ORDINANCES, PART III, CHAPTER 12, SECTION 12-15 – HISTORICAL AND ARCHAEOLOGICAL BURIAL SITES

a) *Authority*. In compliance with RIGL 1956, § 23-18-1 et seq., the town adopts this section to govern the preservation of historic and archaeological burial sites in the town.
b) *Purpose.* The town council recognizes that historic and archeological gravesites possess archaeological and scientific value and are often of great artistic, cultural and religious significance and represent for all cultures a respect for the sanctity of human life. It is, therefore, the policy of the town that marked or unmarked historic cemeteries are to be preserved and are not to be altered or removed except as provided for in this section.
c) *Definitions*. The following words, terms and phrases, when used in this section, shall have the meanings ascribed to them in this subsection, except where the context clearly indicates a different meaning:

*Applicant* means the owner of the land on which an archeological burial site or family cemetery is located for which a permit must be sought for alteration or removal.

*Archaeological burial site* means an area of land which has been designated and/or used for the interment of human remains in the prehistoric or distant past. Archaeological burial sites may include American Indian or other ethnic groupings.

*Family cemetery* means a historic cemetery which is not associated with a specific religious organization but which is the site of burial for persons related by blood, marriage or household.

*Historic cemetery* means any tract of land which has been used for a period in excess of 100 years as a burial place, whether or not marked with a historic marker or gravestone, including but not limited to ancient burial places known to contain the remains of one or more American Indians. For the purposes of this section, the term "historic cemetery" also includes an area 25 feet in width around the perimeter of the cemetery.

*Human remains* means any parts or remains of deceased persons including skeletal remains or cremated ashes.

*Grave* means any site where human remains have been purposefully interred. The term also includes gravemarkers, funerary objects and associated cultural remains and artifacts. A grave includes mausoleums, crypts or other structures designed to house human remains.

*Least disruptive means* means a means of construction, excavation, removal or other activity which, in the opinion of the state historic preservation commission, has the least overall destructive impact on the grave, human remains or cemetery.

*Owner* means the owner of a parcel of land.

*Religious cemetery* means any cemetery owned or maintained by a religious organization.

*Religious organization* means the organization representing the adherents of any religious society.

*Site alteration plan* means a document showing in written text and by illustration the proposed alteration of a historic cemetery, an archaeological burial site or a family cemetery, including detailed specifications for alteration, removal and reinterment of human remains.

*Town* means the town, its agents or its officers.

d) Procedures. Procedures regarding disturbance of historic cemeteries or archaeological burial sites shall be as follows:

1) It shall be unlawful for any person to disturb, disrupt, excavate, deposit, fill in or on, remove or destroy gravemarkers, burial objects or buried human remains or conduct any other activities that would damage or diminish the integrity of any historic cemetery or archaeological burial site or family cemetery without first obtaining a permit to alter or remove such historic cemetery, archaeological burial site or family cemetery from the town council.

2) Once a discovery of a previously unknown burial site is made, the owner or contractor shall immediately notify the building inspector who in turn shall contact the state medical examiner and state historical preservation commission pursuant to RIGL 1956, § 23-18-1 et seq.

3) The town shall require the cessation of construction activities pending preliminary verification of the property as a human burial site by the state medical examiner or historic preservation commission. If the site is verified as a human burial site, work within 25 feet of the site shall be halted unless or until a permit to alter or remove is issued by the town pursuant to this section.

4) The owner shall be required, at the owner's expense, to conduct an archaeological investigation of the area to establish the boundaries of the cemetery/burial site using the least disruptive means feasible. The least disruptive means shall be determined by the town through the town's consultation with the state historic preservation commission (RIHPC). A survey report shall be produced incorporating the findings of the investigation in test and graphic form.

5) The applicant shall then submit the report and a detailed engineering plan, as required and identified in subsection (d)(8)a of this section of the proposed construction project and all other proposed activities on the property that in any manner might lead to or necessitate any disruption of the cemetery/burial site.

6) The applicant shall also submit a detailed site alteration plan proposal of the extent and method of removal of human remains and a reburial plan in text and drawing of the new gravesite.

7) The town council may issue a permit to allow the alteration or removal of historic cemeteries, archaeological cemeteries or family cemeteries only after concluding, based on evidence submitted to the council at a public hearing, that all alternatives to the proposed activity have been examined and that no prudent and feasible alternative to the proposed activity exists or that the alteration serves the interests, health, welfare and safety of the public and is not solely for commercial expediency.

8) The applicant shall submit the following to the town council prior to the consideration of any application for a permit to remove and/or alter a historic cemetery or an archaeological burial site:

   a. Detailed site plans drawn to scale by a licensed professional registered land surveyor or professional engineer, as applicable, at a minimum scale of 1″=50′, showing the boundaries of the property in question, topographical contour intervals of no more than one foot, a surveyed boundary of the cemetery and a setback area of no less than 25 feet, and a proposed plan of all improvements proposed on the site that would necessitate disturbance of the cemetery.

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b. If known, a written description of the cemetery, its age and condition, and historical importance; whether the cemetery is religious, family, organization, publicly owned or other kind of cemetery; a listing of names and vital dates of those interred as may be determined from gravemarkers on site; and a cemetery plan indicating position of graves and to the extent possible the identities of those interred.

c. A detailed site alteration plan indicating the extent of disruption of the cemetery, methods of construction or removal of human remains, reburial plan, including in text and illustration the relocation of graves.

d. If a family cemetery, a genealogical study to identify whether decedents of the families of the interred still reside in the state.

e. If a religious cemetery, a listing of the religious organization that owns or maintains the cemetery.

f. Any further information and study the town council deems necessary to complete its consideration of the request to alter a cemetery in compliance with RIGL 1956, § 23-18-1 et seq.

e) *Hearing.* A hearing shall be conducted in accordance with the following:

1) *Public notice*. Once the required documents are submitted by an applicant and published, the town council shall set the date for a public hearing. Notice of the date, time and location of the public hearing shall be at the applicant's expense, in a local newspaper, for a period of not less than two weeks prior to the hearing. The state historic preservation commission shall be notified not less than two weeks prior to the scheduled hearing, and an advisory opinion shall be requested by pertinent town staff.

2) *Notice to interested parties.* Notice to interested parties shall be given as follows:

a. For archaeological burials and historic Native American graves, the town shall cause the tribal council of the Narragansett Tribe to be notified by regular mail of the subject, date and time of the scheduled hearing.

b. If an application involves the cemetery of an extant religious society, such society shall be so notified by regular mail of the scheduled hearing.

c. If the application involves a family cemetery, the interred of which have living lineal descendants, the applicant, at the applicant's expense, shall make all reasonable efforts to notify the lineal descendants as to the scheduled hearing, which efforts may include sending notice to the descendants via first class mail or publication of the notice in a newspaper of statewide circulation at least once per week for two successive weeks prior to the scheduled hearing.

3) *Burden of proof.* At the hearing, the applicant shall prove to the satisfaction of the town council that:

a. The applicant has examined all possible alternatives and conclusively demonstrated that no prudent and feasible alternative to the proposed alteration is possible; or

b. The proposed alteration serves the interests of health, welfare and safety of the public and is not solely for commercial expediency.

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f) *Final action.* The town council shall conduct a public hearing on the proposed project and shall render a decision approving, denying or approving with reasonable conditions the proposed site alteration plan and may set other conditions and/or requirements necessary to carry out the purposes of RIGL 1956, § 23-18-1 et seq.

g) *Legal status.* Nothing in this section shall be construed to prohibit the routine maintenance and repair of historical gravesites or the use of historic cemeteries as places of interment, nor shall it be construed to preclude the town boards or commissions or agents from otherwise acting within their authority to regulate and protect historical and archaeological cemeteries.

h) *Severability.* If any subsection, clause, provision or portion of this section shall be held invalid or unconstitutional by a court of competent jurisdiction, such decision shall not affect the validity or constitutionality of any other subsection, clause, provision or portion of this section.

i) *Appeal.* Any person aggrieved by the decision of the town council shall have a right to appeal the decision to the superior court pursuant to RIGL 1956, § 23-18-11.1.

(Ord. No. 94-25, § 1, 11-14-1994)

**Cross reference—** Historical zoning, § 21-331 et seq.

**State Law reference—** Historical and archaeological burial sites, RIGL 1956, § 23-18-1 et seq.; historic burial sites, RIGL 1956, § 23-18-10.1; historic preservation, RIGL 1956, § 42-45-1 et seq.

## APPENDIX B: ADVISORY COUNCIL ON HISTORIC PRESERVATION POLICY STATEMENT REGARDING TREATMENT OF BURIAL SITES, HUMAN REMAINS AND FUNERARY OBJECTS

REDACTED

Preserving America s Heritage

**ADVISORY COUNCIL ON HISTORIC PRESERVATION**

**POLICY STATEMENT**
**REGARDING**
**TREATMENT OF BURIAL SITES, HUMAN REMAINS AND FUNERARY OBJECTS**

**Preamble**: This policy offers leadership in resolving how to treat burial sites, human remains, and funerary objects in a respectful and sensitive manner while acknowledging public interest in the past. As such, this policy is designed to guide federal agencies in making decisions about the identification and treatment of burial sites, human remains, and funerary objects encountered in the Section 106 process, in those instances where federal or state law **does not prescribe a course of action.**

This policy applies to all federal agencies with undertakings that are subject to review under Section 106 of the National Historic Preservation Act (NHPA; 16 U.S.C. § 470f), and its implementing regulations (36 CFR Part 800). To be considered under Section 106, the burial site must be or be a part of a historic property, meaning that it is listed, or eligible for listing, in the National Register of Historic Places.

The Advisory Council on Historic Preservation (ACHP) encourages federal agencies to apply this policy throughout the Section 106 process, including during the identification of those historic properties. In order to identify historic properties, federal agencies must assess the historic significance of burial sites and apply the National Register criteria to determine whether a property is eligible. Burial sites may have several possible areas of significance, such as those that relate to religious and cultural significance, as well as those that relate to scientific significance that can provide important information about the past. This policy does not proscribe any area of significance for burial sites and recognizes that the assessment must be completed on a case-by-case basis through consultation.

The policy is not bound by geography, ethnicity, nationality, or religious belief, but applies to the treatment of all burial sites, human remains, and funerary objects encountered in the Section 106 process, as the treatment and disposition of these sites, remains, and objects are a human rights concern shared by all.

This policy also recognizes the unique legal relationship between the federal government and tribal governments as set forth in the Constitution of the United States, treaties, statutes and court decisions, and acknowledges that, frequently, the remains encountered in Section 106 review are of significance to Indian tribes.

Section 106 requires agencies to seek agreement with consulting parties on measures to avoid, minimize, or mitigate adverse effects to historic properties. Accordingly, and consistent with Section 106, this policy does not recommend a specific outcome from the consultation process. Rather, it focuses on issues and perspectives that federal agencies ought to consider when making their Section 106 decisions. In many cases, federal agencies will be bound by other applicable federal, tribal, state, or local laws that do



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prescribe a specific outcome, such as the Native American Graves Protection and Repatriation Act (NAGPRA). The federal agency must identify and follow applicable laws and implement any prescribed outcomes.

For undertakings on federal and tribal land that encounter Native American or Native Hawaiian human remains and funerary objects, NAGPRA applies. NHPA and NAGPRA are separate and distinct laws, with separate and distinct implementing regulations and categories of parties that must be consulted.[1] Compliance with one of these laws does not mean or equal compliance with the other. Implementation of this policy and its principles does not, in any way, change, modify, detract or add to NAGPRA or other applicable laws.

**Principles:** When burial sites, human remains, or funerary objects will be or are likely to be encountered in the course of Section 106 review, a federal agency should adhere to the following principles:

**Principle 1:** Participants in the Section 106 process should treat all burial sites, human remains and funerary objects with dignity and respect.

**Principle 2:** Only through consultation, which is the early and meaningful exchange of information, can a federal agency make an informed and defensible decision about the treatment of burial sites, human remains, and funerary objects.

**Principle 3:** Native Americans are descendants of original occupants of this country. Accordingly, in making decisions, federal agencies should be informed by and utilize the special expertise of Indian tribes and Native Hawaiian organizations in the documentation and treatment of their ancestors.

**Principle 4:** Burial sites, human remains and funerary objects should not be knowingly disturbed unless absolutely necessary, and only after the federal agency has consulted and fully considered avoidance of impact and whether it is feasible to preserve them in place.

**Principle 5**: When human remains or funerary objects must be disinterred, they should be removed carefully, respectfully, and in a manner developed in consultation.

**Principle 6:** The federal agency is ultimately responsible for making decisions regarding avoidance of impact to or treatment of burial sites, human remains, and funerary objects. In reaching its decisions, the federal agency must comply with applicable federal, tribal, state, or local laws.

**Principle 7**: Through consultation, federal agencies should develop and implement plans for the treatment of burial sites, human remains, and funerary objects that may be inadvertently discovered.

**Principle 8:** In cases where the disposition of human remains and funerary objects is not legally prescribed, federal agencies should proceed following a hierarchy that begins with the rights of lineal descendants, and if none, then the descendant community, which may include Indian tribes and Native Hawaiian organizations.

[1] The ACHP's publication *Consulting with Indian Tribes in the Section 106 Process* and the National Association of Tribal Historic Preservation Officers' publication *Tribal Consultation: Best Practices in Historic Preservation* provide additional guidance on this matter.

**DISCUSSION:**

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| **Principle 1: Participants in the Section 106 process should treat all burial sites, human remains and funerary objects with dignity and respect.** |

Because the presence of human remains and funerary objects gives a historic property special importance as a burial site or cemetery, federal agencies need to consider fully the values associated with such sites. When working with human remains, the federal agency should maintain an appropriate deference for the dead and the funerary objects associated with them, and demonstrate respect for the customs and beliefs of those who may be descended from them.

Through consultation with descendants, culturally affiliated groups, descendant communities, and other parties, federal agencies should discuss and reach agreement on what constitutes respectful treatment.

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| **Principle 2: Only through consultation, which is the early and meaningful exchange of information, can a federal agency make an informed and defensible decision about the treatment of burial sites, human remains, and funerary objects.** |

Consultation is the hallmark of the Section 106 process. Federal agencies must make a "reasonable and good faith" effort to identify consulting parties and begin consultation early in project planning, after the federal agency determines it has an undertaking and prior to making decisions about project design, location, or scope.

The NHPA, the ACHP's regulations, and Presidential Executive Orders set out basic steps, standards, and criteria in the consultation process, including:

- Federal agencies have an obligation to seek out all consulting parties [36 CFR § 800.2(a)(4)], including the State Historic Preservation Officer (SHPO)/Tribal Historic Preservation Officer (THPO) [36 CFR § 800.3(c)].

- Federal agencies must acknowledge the sovereign status of Indian tribes [36 CFR § 800.2(c)(2)(ii)]. Federal agencies are required to consult with Indian tribes on a government-to-government basis in recognition of the unique legal relationship between federal and tribal governments, as set forth in the Constitution of the United States, treaties, statutes, court decisions, and executive orders and memoranda.

- Consultation on a government-to-government level with Indian tribes cannot be delegated to non-federal entities, such as applicants and contractors.

- Federal agencies should solicit tribal views in a manner that is sensitive to the governmental structures of the tribes, recognizing their desire to keep certain kinds of information confidential, and that tribal lines of communication may argue for federal agencies to provide extra time for the exchange of information.

- Properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization may be determined eligible for inclusion on the National Register [16 U.S.C. § 470a(d)(6)(A)], and federal agencies must consult with any Indian tribe or Native Hawaiian organization that attaches religious and cultural significance to such historic properties [16 U.S.C. § 470a(d)(6)(B) and 36 CFR § 800.2(c)(2)(ii)(D)].

**Principle 3: Native Americans are descendants of original occupants of this country. Accordingly, in making decisions, federal agencies should be informed by and utilize the special expertise of Indian tribes and Native Hawaiian organizations in the documentation and treatment of their ancestors.**

This principle reiterates existing legal requirements found in federal law, regulation and executive orders, and is consistent with positions that the ACHP has taken over the years to facilitate enfranchisement and promote broad participation in the Section 106 process. Federal agencies must consult with Indian tribes on a government-to-government basis because they are sovereign nations.

Indian tribes and Native Hawaiian organizations bring a special perspective on how a property possesses religious and cultural significance to them. Accordingly, federal agencies should utilize their expertise about, and religious and cultural connection to, burial sites, human remains, and associated funerary objects to inform decision-making in the Section 106 process.

**Principle 4: Burial sites, human remains and funerary objects should not be knowingly disturbed unless absolutely necessary, and only after the federal agency has consulted and fully considered avoidance of impact and whether it is feasible to preserve them in place.**

As a matter of practice, federal agencies should avoid impacting burial sites, human remains, and funerary objects as they carry out their undertakings. If impact to the burial site can be avoided, this policy does not compel federal agencies to remove human remains or funerary objects just so they can be documented.

As this policy advocates, federal agencies should always plan to avoid burial sites, human remains, and funerary objects altogether. When a federal agency determines, based on consultation with Section 106 participants, that avoidance of impact is not appropriate, the agency should minimize disturbance to such sites, remains, and objects. Accordingly, removal of human remains or funerary objects should occur only when other alternatives have been considered and rejected.

When a federal agency determines, based on consultation with Section 106 participants, that avoidance of impact is not appropriate, the agency should then consider any active steps it may take to preserve the burial site in place, perhaps through the intentional covering of the affected area, placement of markers, or granting of restrictive or other legal protections. In many cases, preservation in place may mean that, to the extent allowed by law, the locations of burial sites, human remains, and funerary objects should not be disclosed publicly. Alternatively and consistent with the Section 106 regulations [36 CFR § 800.5(a)(2)(vi)], natural deterioration of the remains may be the acceptable or preferred outcome of the consultation process.

**Principle 5: When human remains or funerary objects must be disinterred, they should be removed carefully, respectfully, and in a manner developed in consultation.**

When the federal agency decides that human remains or funerary objects must be disturbed, they should be removed respectfully and dealt with according to the plan developed by the federal agency in consultation. "Careful" disinterment means that those doing the work should have, or be supervised by people having, appropriate expertise in techniques for recognizing and disinterring human remains.

This policy does not endorse any specific treatment. However, federal agencies must make a reasonable and good faith effort to seek agreement through consultation before making its decision about how human remains and/or funerary objects shall be treated.

The plan for the disinterment and treatment of human remains and/or funerary objects should be negotiated by the federal agency during consultation on a case-by-case basis. However, the plan should provide for an accurate accounting of federal implementation. Depending on agreements reached through the Section 106 consultation process, disinterment may or may not include field recordation. In some instances, such recordation may be so abhorrent to consulting parties that the federal agency may decide it is inappropriate to carry it out. When dealing with Indian tribes, the federal agency must comply with its legal responsibilities regarding tribal consultation, including government-to-government and trust responsibilities, before concluding that human remains or funerary objects must be disinterred.

**Principle 6: The federal agency is ultimately responsible for making decisions regarding avoidance of impact to or treatment of burial sites, human remains, and funerary objects. In reaching its decisions, the federal agency must comply with applicable federal, tribal, state, or local laws.**

Federal agencies are responsible for making final decisions in the Section 106 process [36 CFR § 800.2(a)]. The consultation and documentation that are appropriate and necessary to inform and support federal agency decisions in the Section 106 process are set forth in the ACHP's regulations [36 CFR Part 800].

Other laws, however, may affect federal decision-making regarding the treatment of burial sites human remains, and funerary objects. Undertakings located on federal or tribal lands, for example, are subject to the provisions of NAGPRA and the Archaeological Resources Protection Act (ARPA). When burial sites, human remains, or funerary objects are encountered on state and private lands, federal agencies must identify and follow state law when it applies. Section 106 agreement documents should take into account the requirements of any of these applicable laws.

**Principle 7: Through consultation, federal agencies should develop and implement plans for the treatment of burial sites, human remains, and funerary objects that may be inadvertently discovered.**

Encountering burial sites, human remains, or funerary objects during the initial efforts to identify historic properties is not unheard of. Accordingly, the federal agency must determine the scope of the identification effort in consultation with the SHPO/THPO, Indian tribes and Native Hawaiian organizations, and others before any archaeological testing has begun [36 CFR § 800.4(a)] to ensure the full consideration of avoidance of impact to burial sites, human remains, and funerary objects.

The ACHP's regulations provide federal agencies with the preferred option of reaching an agreement ahead of time to govern the actions to be taken when historic properties are discovered during the implementation of an undertaking. In the absence of prior planning, when the undertaking has been approved and construction has begun, the ACHP's post-review discovery provision [36 CFR § 800.13] requires the federal agency to carry out several actions:

(1) make reasonable efforts to avoid, minimize, or mitigate adverse effects to such discovered historic properties;
(2) notify consulting parties (including Indian tribes and Native Hawaiian organizations that might attach religious and cultural significance to the affected property) and the ACHP within 48 hours of the agency's proposed course of action;
(3) take into account the recommendations received; and then
(4) carry out appropriate actions.

NAGPRA prescribes a specific course of action when Native American and Native Hawaiian human remains and funerary objects are discovered on federal or tribal lands in the absence of a plan—cessation of the activity, protection of the material, notification of various parties, consultation on a course of action and its implementation, and then continuation of the activity. However, adherence to the plan under Principle 5 would cause new discoveries to be considered "intentional excavations" under NAGPRA because a plan has already been developed, and can be immediately implemented. Agencies then could avoid the otherwise mandated 30 day cessation of work for "inadvertent discoveries."

**Principle 8: In cases where the disposition of human remains and funerary objects is not legally prescribed, federal agencies should proceed following a hierarchy that begins with the rights of lineal descendants, and if none, then the descendant community, which may include Indian tribes and Native Hawaiian organizations.**

Under the ACHP's regulations, "descendants" are not identified as consulting parties by right. However, federal agencies shall consult with Indian tribes and Native Hawaiian organizations that attach religious and cultural significance to burial sites, human remains and associated funerary objects, and be cognizant of their expertise in, and religious and cultural connection to, them. In addition, federal agencies should recognize a biological or cultural relationship and invite that individual or community to be a consulting party [36 CFR § 800.3(f)(3)].

When federal or state law does not direct disposition of human remains or funerary objects, or when there is disagreement among claimants, the process set out in NAGPRA may be instructive. In NAGPRA, the "ownership or control" of human remains and associated funerary objects lies with the following in descending order: specific lineal descendants; then tribe on whose tribal lands the items were discovered; then tribe with the closest cultural affiliation; and then tribe aboriginally occupying the land, or with the closest "cultural relationship" to the material.

## Definitions Used for the Principles

- **Burial Site**: Any natural or prepared physical location, whether originally below, on, or above the surface of the earth, into which as a part of the death rite or ceremony of a culture, individual human remains are deposited [25 U.S.C. 3001.2(1)].
- **Consultation:** The process of seeking, discussing, and considering the views of other participants, and, where feasible, seeking agreement with them regarding matters arising in the Section 106 review process [36 CFR § 800.16(f)].
- **Consulting parties:** Persons or groups the federal agency consults with during the Section 106 process. They may include the State Historic Preservation Officer; the Tribal Historic Preservation Officer; Indian tribes and Native Hawaiian organizations; representatives of local governments; applicants for federal assistance, permits, licenses, and other approvals; and/or any additional consulting parties [based on 36 CFR § 800.2(c)]. Additional consulting parties may include individuals and organizations with a demonstrated interest in the undertaking due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties [36 CFR § 800.2(c)(6)].
- **Disturbance:** Disturbance of burial sites that are listed in or eligible for listing in the National Register of Historic Places will constitute an adverse effect under Section 106. An adverse effect occurs when "an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, setting, materials, workmanship, feeling, or association" [36 CFR § 800.5(a)(1)].
- **Federal land:** Lands under a federal agency's control. Mere federal funding or permitting of a project does not turn an otherwise non-federal land into federal land (see *Abenaki Nation of Mississquoi* v. *Hughes*, 805 F. Supp. 234 (D. Vt. 1992), aff'd, 990 F. 2d 729 (2d Cir. 1993) (where the court found that a Clean Water Act permit issued by the US Army Corps of Engineers did not place the relevant land under federal "control" for NAGPRA purposes).
- **Funerary objects:** "items that, as part of the death rite or ceremony of a culture, are reasonably believed to have been placed intentionally at the time of death or later with or near individual human remains" [25 U.S.C. 3001(3)(B)].
- **Historic property:** "Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. It includes artifacts, records, and remains that are related to and located within such properties, and it includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register of Historic Places criteria" [36 CFR § 800.16(1)].
- **Human remains:** The physical remains of a human body. The term does not include remains or portions of remains that may reasonably be determined to have been freely given or naturally shed by the individual from whose body they were obtained, such as hair made into ropes or nets [see 43 CFR § 10.2(d)(1)].
- **Indian Tribe**: "An Indian tribe, band, nation, or other organized group or community, including a Native village, Regional Corporation or Village Corporation, as those terms are defined in Section 3 of the Alaska Native Claims Settlement Act [43 U.S.C. 1602], which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians" [36 CFR § 800.16(m)].
- **Native American:** Of, or relating to, a tribe, people, or culture that is indigenous to the United States [25 U.S.C. 3001 (9)]. Of, or relating to, a tribe, people, or culture indigenous to the Unites States, including Alaska and Hawaii [43 CFR 10.2(d)].

- **Native Hawaiian:** Any individual who is a descendant of the aboriginal people who, prior to 1778, occupied and exercised sovereignty in the area that now constitutes the state of Hawaii [36 CFR § 800.16(s)(2)].
- **Native Hawaiian Organization:** Any organization which serves and represents the interests of Native Hawaiians; has as a primary and stated purpose the provision of services to Native Hawaiians; and has demonstrated expertise in aspects of historic preservation that are significant to Native Hawaiians [36 CFR § 800.16(s)].
- **Policy statement:** A formal statement, endorsed by the full ACHP membership, representing the membership's collective thinking about what to consider in reaching decisions about select issues, in this case, human remains and funerary objects encountered in undertakings on federal, tribal, state, or private lands. Such statements do not have the binding force of law.
- **Preservation in place:** Taking active steps to ensure the preservation of a property.
- **Protection of Historic Properties**: Regulations [36 CFR Part 800] implementing Section 106 of the National Historic Preservation Act.
- **Section 106**: That part of the National Historic Preservation Act which establishes a federal responsibility to take into account the effects of undertakings on historic properties and to provide the Advisory Council on Historic Preservation a reasonable opportunity to comment with regard to such action.
- **State Historic Preservation Officer:** The official appointed or designated pursuant to Section 101(b)(1) of NHPA to administer the state historic preservation program.
- **Tribal Historic Preservation Officer**: The official appointed by the tribe's chief governing authority or designated by a tribal ordinance or preservation program who has assumed the responsibilities of the SHPO for purposes of Section 106 compliance on tribal lands in accordance with Section 101(d)(2) of NHPA.
- **Treatment:** Under Section 106, "treatments" are measures developed and implemented through Section 106 agreement documents to avoid, minimize, or mitigate adverse effects to historic properties.

**Acronyms Used for the Policy Statement**
- **ACHP**: Advisory Council on Historic Preservation.
- **ARPA**: Archaeological Resources Protection Act [16 U.S.C. 470aa-mm].
- **NHPA**: National Historic Preservation Act [16 U.S.C. § 470f].
- **NAGPRA**: The Native American Graves Protection and Repatriation Act [25 U.S.C. 3001 et seq].
- **SHPO**: State Historic Preservation Officer
- **THPO**: Tribal Historic Preservation Officer

*[The members of the Advisory Council on Historic Preservation unanimously adopted this policy on February 23, 2007]*

REDACTED

**ATTACHMENT 16 – UNANTICIPATED DISCOVERIES PLAN FOR SUBMERGED ARCHAEOLOGICAL SITES, HISTORIC PROPERTIES, AND CULTURAL RESOURCES INCLUDING HUMAN REMAINS: REVOLUTION WIND FARM FOR LEASE AREA OCS A-0486 CONSTRUCTION AND OPERATIONS PLAN**

REDACTED

# UNANTICIPATED DISCOVERIES PLAN FOR SUBMERGED ARCHAEOLOGICAL SITES, HISTORIC PROPERTIES, AND CULTURAL RESOURCES INCLUDING HUMAN REMAINS, REVOLUTION WIND FARM FOR LEASE AREA OCS A-0486 CONSTRUCTION AND OPERATIONS PLAN

PREPARED FOR

| | | |
|---|---|---|
| REVOLUTION WIND LLC<br>56 EXCHANGE TERRACE<br>SUITE 300<br>PROVIDENCE, RI 02903 | AND | VHB ENGINEERING<br>99 HIGH ST # 10<br>BOSTON, MA 02110 |

AUTHORED BY


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SEARCH

WWW.SEARCHINC.COM


MARCH 2023

# INTRODUCTION

Revolution Wind LLC (Revolution Wind) proposes to construct and operate the Revolution Wind Farm Project (Project) within the Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS A-0486 (Lease Area). The Project consists of the Revolution Wind Farm (RWF) and the Revolution Wind Farm Export Cable (RWEC) route, which traverses federal and state waters. The RWEC has a proposed landfall near Quonset Point in North Kingstown, Rhode Island. Revolution Wind has submitted a Construction and Operations Plan (COP) for the Project to BOEM to support the development, operation, and eventual decommissioning of Project infrastructure, including offshore wind turbines, offshore substations, array cables, substation interconnector cables, and offshore export cables. SEARCH provided technical expertise to Revolution Wind's environmental consultant, VHB Engineering (VHB), by providing a Qualified Marine Archaeologist (QMA) in accordance with Lease Agreement Stipulation Addendum C Section 2.1.1.2.

SEARCH developed this Unanticipated Discoveries Plan (UDP) to assist Revolution Wind and its contractors to preserve and protect potential cultural resources from adverse impacts caused by Project construction, operation and maintenance, and decommissioning activities. The UDP sets forth guidelines and procedures to be used in the event potential submerged cultural resource are encountered during bottom disturbing activities and assists Revolution Wind in its compliance with Section 106 of the National Historic Preservation Act (NHPA) (Title 54 U.S.C. § 306108), Native American Graves Protection and Repatriation Act (Title 25 U.S.C. § 3001 et seg.), Lease OCS A-0486 Lease Stipulations, and other relevant state and local laws as applicable. This UDP is subject to revisions based on consultations with interested parties pursuant to Section 106 of the National Historic Preservation Act or the Act's implementing regulations at 36 CFR Part 800.

# ROLES AND RESPONSIBILITIES

Implementation of the provisions and procedures in the UDP will require the coordinated efforts of Revolution Wind and their contractors during all construction, operations and maintenance, and decommissioning activities with the potential to impact the seafloor. The following sections identify key participants in the UDP and outlines their roles and responsibilities.

## REVOLUTION WIND

Implementation of the provisions and procedures outlined in this plan is ultimately the responsibility of Revolution Wind or its designee, who will be responsible for the following:

- Ensuring procedures and policies outlined in the UDP and UDP training materials are implemented;
- Identifying a responsible party within Revolution Wind tasked with overseeing implementation of the UDP during all project and contractor activities;
- Developing cultural resource and UDP awareness training programs for all project staff and contractors;
- Requiring all project and contractor staff complete cultural resource and UDP awareness training;
- Coordinating and facilitating communication between the QMA, project staff, and contractors if a potential cultural resource is encountered during project activities; and
- Participating in and/or facilitating consultations with state and federal agencies (BOEM, Naval History and Heritage Command [NHHC], Rhode Island Historical Preservation & Heritage Commission [RIHPHC], etc…), federally recognized Tribes'/Tribal Nations' Tribal Historic Preservation Offices (THPOs), and other consulting parties, as appropriate.

## QUALIFIED MARINE ARCHAEOLOGIST

Revolution Wind will retain the services of a QMA to provide cultural resource advisory services during implementation of the UDP. The QMA will be responsible for the following:

- Assist Revolution Wind with the development and implementation of the procedures outlined in the UDP;
- Assist Revolution Wind in developing a cultural resource and UDP awareness training program and informational graphic;
- Review and document potential submerged cultural resources identified by the project and/or contractor staff;

- Assist Revolution Wind with the Section 106 consultation process that may arise as a result of an unanticipated submerged cultural resource; and
- Conduct archaeological investigation of unanticipated submerged cultural resources following coordination with appropriate consulting parties.

# TRAINING AND ORIENTATION

As described in the previous section, Revolution Wind will be responsible for ensuring Project and contractor staff complete a cultural resources and UDP awareness training program prior to the start of bottom disturbing activities. The training will be sufficient to allow Project and contractor staff to identify common types of marine cultural resources and implement the UDP procedures. The training will be delivered as a standalone training and/or combined with the Project's or contractors' general health and safety (H&S) or environment, health, and safety (EHS) induction training.

The training program will include, but not be limited to, the following elements:

- A review of applicable state and federal cultural resource laws and regulations;
- Characteristics of common types of submerged cultural resources found on the Atlantic Outer Continental Shelf (e.g. wooden shipwrecks, metal shipwrecks, downed aircraft, post-Contact artifacts, pre-Contact artifacts, bone and faunal remains, etc.);
- How to identify potential submerged cultural resources during bottom disturbing activities; and
- Procedures to follow and parties to notify if potential submerged cultural resources/materials are encountered during project activities.

The SEARCH QMA will develop draft cultural resources and UDP awareness training in coordination with Revolution Wind. The training program will be provided to BOEM and the RIHPhC for review and comment before the training program is finalized.

In additional to the training program, the SEARCH QMA will generate an informational graphic summarizing the UDP and the materials discussed in the cultural resources and UDP awareness training program. The informational graphic will include:

- Images of common types of submerged cultural resources and materials;
- A flow chart depicting the UDP reporting process;
- A notice to all employees of their stop work authority if potential cultural resources are encountered; and
- Contact information for the Revolution Wind staff responsible for overseeing implementation of the UDP and the QMA.

The informational graphic will be placed in a conspicuous location on each project and contractor vessel where workers can see it and copies will be made available to project and/or contractor staff upon request.

# PROCEDURES WHEN CULTURAL MATERIAL ARE OBSERVED

As part of its COP submission, Revolution Wind conducted an extensive marine archaeological resources assessment (MARA) of the Project's preliminary area of potential effects (PAPE). The MARA identified 19 potential submerged cultural resources (Targets 01-11 and Targets 13-20) and 13 geomorphic features of archaeological interest (Targets 21-33) within the PAPE. Revolution Wind anticipates avoidance of Targets 01-11 and Targets 13-20 and their associated recommended avoidance buffers. Additionally, Revolution Wind has committed to avoidance of Target 27 and Targets 31-33. Revolution Wind has developed a Mitigation Framework and Historic Properties Treatment Plan to aid in avoiding, minimizing, and/or mitigating adverse effects upon the remaining historic properties (Targets 21-26 and Targets 28-30).

Even with the extensive preconstruction marine archaeological surveys, it is impossible to ensure that all cultural resources have been identified within the PAPE. Even at sites that have been previously identified and assessed, there is a potential for the discovery of previously unidentified archaeological components, features, or human remains that may require investigation and assessment. Furthermore, identified historic properties may sustain effects that were not originally anticipated. Therefore, a procedure has been developed for the treatment of unanticipated discoveries that may occur during site development.

The procedure also will be implemented should an unanticipated archaeological find occur during investigations to ground-truth potential unexploded ordnance (pUXO). In addition, Revolution Wind will involve the QMA during pUXO investigations to consult and monitor. Revolution Wind has agreed to a protocol for inspections that includes a decision tree for contacting the QMA; providing the QMA with inspection reports, including video footage, still photographs, multibeam echosounder imagery, and pUXO specialist observations; and real-time video monitoring for inspections that occur atop shallowly buried geomorphic features of archaeological interest.

The implementation of the final UDP will be overseen by Revolution Wind and a QMA who meets or exceeds the Secretary of the Interior's *Professional Qualifications Standards for Archaeology* [48 FR 44738-44739] and has experience in conducting HRG surveys and processing and interpreting data for archaeological potential [BOEM 2020]. See **Figure 1** for a flow chart of the communications and notification plan for unanticipated discoveries.

If unanticipated submerged cultural resources are discovered, the following steps should be taken:

(1) Per Lease Stipulation 4.2.7.1, all bottom-disturbing activities in the immediate area of the discovery shall cease and every effort will be made to avoid or minimize impacts to the potential submerged cultural resource(s).
(2) The project or contractor staff will immediately notify Revolution Wind of the discovery.
(3) Revolution Wind will notify the QMA and provide them with sufficient information/documentation on the potential find to allow the QMA to evaluate the discovery and determine if the find is a cultural resource. If necessary, the QMA may request to visit the find site or the vessel that recovered the cultural material to inspect

the find. If the find is a cultural resource, the QMA will provide a preliminary assessment as to its potential to be a historic property as defined in 36 CFR Part 800.

(4) Per Lease Stipulation 4.2.7.1, BOEM shall be notified of the potential submerged cultural resource within 24 hours of the discovery. Revolution Wind shall also notify the State Historic Preservation Officer (SHPO) of Rhode Island and/or Massachusetts, the State Archaeologist(s), and the Tribal Historic Preservation Officers (THPOs) or other designated representatives of the consulting tribal governments. If the potential submerged cultural resource could be a sunken military craft under the jurisdiction of the Department of the Navy, then Revolution Wind additionally will notify the NHHC.

(5) Within 72 hours of being notified of the discovery, Revolution Wind shall issue a report in writing to BOEM providing available information concerning the nature and condition of the potential submerged cultural resource and observed attributes relevant to the resource's potential eligibility for listing in the National Register of Historic Places (NRHP).

(6) Revolution Wind shall consult with BOEM, as feasible, to obtain technical advice and guidance for the evaluation of the discovered cultural resource.

(7) If the impacted resource is determined by BOEM, in consultation with the NHHC if applicable to a sunken military craft, to be NRHP eligible, a mitigation plan shall be prepared by Revolution Wind for the discovered cultural resource. This plan must be reviewed by BOEM prior to submission to the RI/MA SHPO and representatives from consulting federally recognized Tribes/Tribal Nations for their review and comment, as well as provided to the NHHC for review and approval if the potential cultural resource falls under the jurisdiction of the Department of the Navy. The RI/MA SHPO and Tribes/Tribal Nations will review the plan and provide comments and recommendations within one week, with final comments to follow as quickly as possible.

(8) Per Lease Stipulation 4.2.6, Revolution Wind may not impact a known archaeological resource in federal waters without prior approval from BOEM. If the potential resource falls under the jurisdiction of the Department of the Navy, then similar approval will be provided from the NHHC. No development activities in the vicinity of the cultural resource will resume until either a mitigation plan is executed or, if BOEM, or the NHHC if applicable, determines a mitigation plan is not warranted, BOEM provides written approval to Revolution Wind to resume bottom disturbing activities. For discoveries in state waters, Revolution Wind will not impact a known archaeological resource with prior approval from BOEM and the RI/MA SHPO.

If suspected human remains are encountered, the below procedures, which comply with the Advisory Council on Historic Preservation's (ACHP) *Policy Statement Regarding Treatment of Burial Sites, Human Remains and Funerary Objects*, should be followed.

(1) All work in the near vicinity of the human remains shall cease and reasonable efforts should be made to avoid and protect the remains from additional impact. Encountered potential material shall be protected, which may include keeping the remains submerged in an onboard tank of sea water or other appropriate material.

(2) The Onboard Representative shall immediately notify the County Medical Examiner, State Archaeologist, the Forensic Anthropology Unit of the Rhode Island State Police, and Revolution Wind as to the findings.

(3) Revolution Wind will notify the QMA and provide them with sufficient information/documentation on the potential find to allow the QMA to evaluate the discovery and determine if the find is a cultural resource. If necessary, the QMA may request to visit the vessel to inspect the potential human remains. If the find is a cultural resource, the QMA will provide a preliminary assessment. The QMA will document and inventory the remains and any associated artifacts, and assist in coordinating with federal, state, and local officials.
(4) A plan for the avoidance of any further impact to the human remains and/or mitigative excavation, reinternment, or a combination of these treatments will be developed in consultation with the State Archaeologist; the RI/MA SHPO; BOEM; the NHHC, if the potential human remains could be associated with a sunken military craft under the jurisdiction of the Department of the Navy; and appropriate Tribes or closest lineal descendants. All parties will be expected to respond with advice and guidance in an efficient time frame. Once the plan is agreed to by all parties, the plan will be implemented.
(5) If suspected human remains are encountered in RI State Waters, Revolution Wind will additionally adhere to the requirements of the Rhode Island Historic Cemeteries Act (Attachment A).

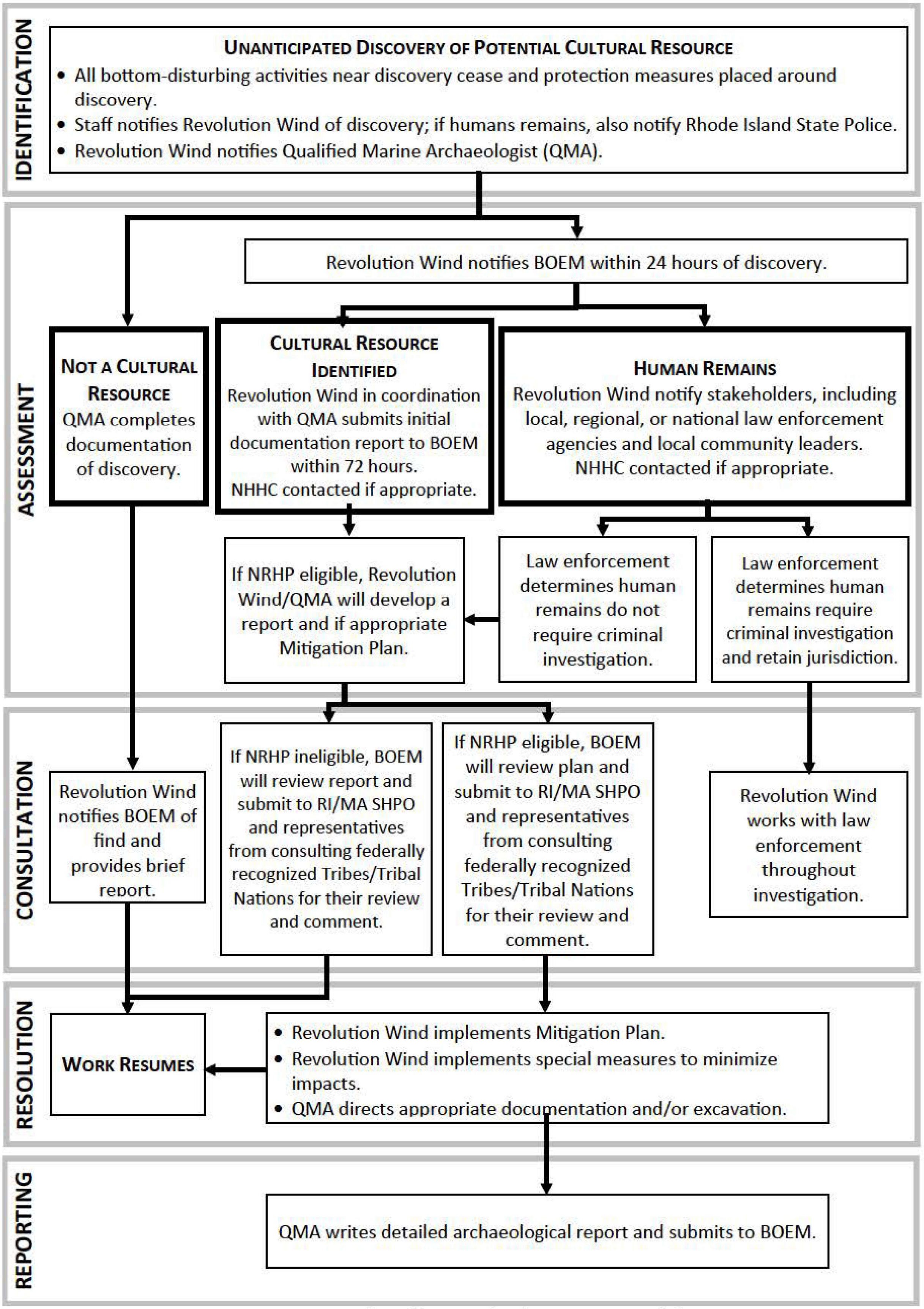


**Figure 1. Communications and notification plan for unanticipated discoveries.**

# ARCHAEOLOGICAL INVESTIGATION OF A SUBMERGED UNANTICIPATED DISCOVERY

Archaeological investigation of a submerged unanticipated discovery may be necessary in order to evaluate the find, determine its eligibility for listing in the NRHP, and/or assess any construction impacts that may have occurred. The following is a recommended procedure for complying with the UDP and providing BOEM; NHHC, if applicable; and RI/MA SHPO with the necessary information to make informed decisions to approve continuation of bottom disturbing activities. After each step, consultation among the appropriate parties will occur.

(1) Initial assessment of unanticipated discovery via a refined HRG survey and/or ROV investigation (Phase Ia reconnaissance survey).
   a. May result in no further recommended action (i.e., target is not a historic property) or additional investigation.

(2) Develop an avoidance zone based upon Step 1.
   a. Minimally, construction activity will remain outside of the avoidance zone for a period of time necessary to allow archaeological investigation, if required.
   b. Determine whether construction activity can remain outside of the avoidance zone permanently.

(3) Identify the source, delineate the site boundary, and assess potential impacts that led to the unanticipated discovery (Phase Ib identification).
   a. Accomplished utilizing archaeological/scientific diving and/or ROV investigation.
   b. May result in no further recommended action (i.e., target is not a historic property) or additional investigation.

(4) Determine eligibility for listing in the NRHP (Phase II NRHP evaluation).
   a. Accomplished utilizing archaeological/scientific diving.
   b. May require extensive excavation.
   c. May require archival research.

(5) Develop a strategy to resolve adverse effects to the historic property that occurred as a result of the unanticipated discovery and to minimize or mitigate potential future adverse effects as construction proceeds.

(6) On-site monitoring of bottom disturbing activities at the location.

Not all of these steps may be necessary, and the appropriate course of action will be determined at the time of discovery and in consultation with BOEM and if applicable, RI/MA SHPO.

REDACTED



# NOTIFICATION LIST

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**Mashpee Wampanoag Tribe**
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**Wampanoag Tribe of Gay Head (Aquinnah)**
[redacted]

## Mashantucket Pequot Tribal Nation

[redacted]

## The Narragansett Indian Tribe

[redacted]

## Mohegan Tribe of Indians in Connecticut

[redacted]

## The Shinnecock Indian Nation

[redacted]

# REFERENCES CITED

Advisory Council on Historic Preservation's (ACHP)

2007 *Policy Statement Regarding Treatment of Burial Sites, Human Remains and Funerary Objects*.https://www.achp.gov/sites/default/files/policies/2018-06/ACHPPolicyStatementRegardingTreatmentofBurialSitesHumanRemainsandFuneraryObjects0207.pdf, Digital article accessed December 9, 2021.

Bureau of Ocean Energy Management (BOEM)

2020 *Guidelines for Providing Archaeological and Historical Property Information Pursuant to 30 CFR Part 585.* United States Department of the Interior, Office of Renewable Energy Programs.

# APPENDIX K

## Supplemental Information on Alternatives Development

# Contents



# Figures

# Tables

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# Introduction

The Bureau of Ocean Energy Management (BOEM) considered alternatives to the Proposed Action that were identified through coordination with cooperating and participating agencies and through public comments received during the public scoping period for the environmental impact statement (EIS). BOEM evaluated the alternatives and excluded from further consideration alternatives that did not meet the purpose and need, did not meet the screening criteria, or both. The screening criteria are presented below. Alternatives that were considered and carried forward for detailed analysis are presented in Section 2.1 of the EIS, Alternatives, and alternatives excluded from further consideration, are presented in Section 2.1.8, Alternatives Considered but Dismissed from Detailed Analysis.

The sections below provide more detail on BOEM's screening criteria followed by additional background on the evolution of the layouts carried forward for Alternatives C1, C2, E1, and E2.

# Alternatives Screening Criteria

An alternative would be considered but not analyzed in detail if it meets any of the following criteria (BOEM 2022)[1]:

- It does not respond to BOEM's purpose and need:
    - It results in activities that are prohibited under the lease, e.g., requiring locating part, or all, of the wind energy facility outside of the Lease Area, or constructing and operating a facility for another form of energy.
    - It is inconsistent with the following federal and state policy goals:
        - The United States' policy under the Outer Continental Shelf Lands Act to make Outer Continental Shelf (OCS) energy resources available for the expeditious and orderly development, subject to environmental safeguards
        - Executive Order 14008 (Tackling the Climate Crisis at Home and Abroad) issued on January 27, 2021
        - The shared goal of the U.S. Departments of Interior, Energy, and Commerce to deploy 30 gigawatts (GW) of offshore wind in the United States by 2030, while protecting biodiversity and promoting ocean co-use
        - The goals of affected states, including state laws that establish renewable energy goals and mandates, where applicable
    - It is inconsistent with existing law, regulation, or policy; a state or federal agency would be prohibited from permitting activities required by the alternative.
- It does not meet most of the applicant's goals:
    - It proposes relocating most of the Project outside of the area proposed by the applicant.

[1] BOEM's Process for Identifying Alternatives for Environmental Reviews of Offshore Wind Construction and Operations Plans pursuant to the National Environmental Policy Act (NEPA) published June 22, 2022, is available at this link: https://www.boem.gov/sites/default/files/documents/renewable-energy/BOEM%20COP%20EIS%20Alternatives-2022-06-22.pdf

    - It results in the development of a project that would not allow the developer to satisfy contractual offtake obligations.

- There is no scientific evidence that the alternative would avoid or substantially lessen one or more significant socioeconomic or environmental effects of the Project.
- It is technically infeasible or impractical, meaning implementation of the alternative is unlikely given past and current practice, technology, and/or site conditions as determined by BOEM's technical experts.
- It is economically infeasible or impractical, meaning implementation of the alternative is unlikely due to unreasonable costs as determined by BOEM's technical and economic experts.
- It is environmentally infeasible, meaning implementation of the alternative would not be allowed by another agency from which a permit or approval is required, or implementation results in an obvious and substantial increase in impacts on the human environment that outweighs potential benefits.
- The implementation of the alternative is remote or speculative, or it is too conceptual in that it lacks sufficient detail to meaningfully analyze impacts; or there is insufficient available information to determine whether the alternative is technically feasible.
- It has a substantially similar design to another alternative that is being analyzed in detail.
- It would have a substantially similar effect as an alternative that is analyzed in detail.

## Alternative C: Habitat Impact Minimization Alternative (Habitat Alternative)

The Revolution Wind Renewable Energy Lease OCS-A 0486 (Lease Area), partially located on Cox Ledge, is dominated by complex benthic habitats, with large contiguous areas of complex habitats located centrally and throughout the entire southern portion of the Lease Area. Smaller, patchy areas of complex habitats also occur throughout the northern portion of the Lease Area (see Appendix X2 [Inspire Environmental 2023] in the *Construction & Operations Plan Revolution Wind Farm* [COP] [VHB 2023] for the benthic habitat mapping report).

BOEM received scoping comments from the U.S. Environmental Protection Agency (EPA), the New England and Mid-Atlantic Fisheries Management Councils, the Defenders of Wildlife, the Nature Conservancy, and National Marine Fisheries Service (NMFS) that supported the creation of an EIS alternative focused on reducing impacts to complex benthic habitat that may support important commercial and recreational fisheries species in the Lease Area (SWCA Environmental Consultants 2022). Some of these comments specifically cited the importance of Cox Ledge and surrounding complex habitat areas for Atlantic cod (*Gadus morhua*) spawning and survival of juvenile cod. The extensive boulders and cobbles in the area also provide habitat for other structure-oriented fish species, such as black sea bass (*Centropristis striata*).

Micrositing,[2] in which the installation location of a wind turbine generator (WTG) foundation is altered slightly from the proposed location to avoid sensitive habitat or seabed hazards, allows for the reduction of impacts to complex habitats at some WTG locations. However, given the density of complex habitats throughout the Lease Area, it would not be feasible to fully avoid impacts to these habitats and meet the existing power purchase agreements (PPAs) with the largest turbine size considered in the project design envelope (PDE). Therefore, Alternative C considers and prioritizes contiguous areas of complex habitat that should be excluded from development to avoid and minimize impacts to complex habitats to the greatest extent possible while meeting BOEM's purpose and need. Alternative C seeks to reduce impacts to sensitive benthic habitats within the Lease Area that are most vulnerable to permanent and long-term impacts from the Proposed Action. The number of WTGs that could be removed in Alternative C is based on the minimum power output for Revolution Wind, LLC (Revolution Wind) (704 megawatts [MW]) using the largest-capacity WTG in the PDE (12 MW). BOEM determined a maximum of 36 WTG locations could be eliminated from the proposed 100 locations, which include a minimum of five "spare" WTG positions to allow for installation and engineering flexibility.

## Preliminary Screening and Rationale

BOEM sought NMFS's Greater Atlantic Regional Fisheries Office (GARFO) input on determining which WTG positions should be removed to most effectively reduce impacts to complex benthic habitats in the Lease Area. GARFO provided BOEM with four priority areas for potential avoidance (Figure K-1). In order of descending priority, GARFO identified Area 1 (eight WTG positions), Area 2 (38 WTG positions), Area 3a (six WTG positions), and Area 3b (nine WTG positions). The identification and ranking of these priority areas were based on multibeam backscatter data and the presence of identified large boulders (i.e., > 0.5–1.0 meters [m] in diameter) within the Lease Area; their proximity to Cox Ledge; and the importance of these habitats as EFH, particularly for spawning Atlantic cod. The estimated importance of these areas to Atlantic cod is supported by recent acoustic, telemetry, and fisheries-dependent biological sample data (Van Hoeck et al. 2022; Van Parijs 2022). Based on the COP and additional feedback from the applicant, BOEM continues to assume no change to the offshore substation locations due to feasibility constraints that would delay the Project to the extent that it would no longer meet the PPA obligations or BOEM's purpose and need as described in Section 1.2 of the EIS. The scientific rationale for the prioritization of the four priority areas is provided in the following paragraphs.

[2] In accordance with 30 Code of Federal Regulations 585.634(C)(6), micrositing of WTG foundations may occur within a 500-foot (152-meter [m]) radius around each proposed WTG location. The micrositing allowance for the Project is a diamond-shaped area within the 500-foot (152-m) radius circle surrounding foundation locations, ensuring 1.15-mile (1-nautical mile [nm]) spacing on the cardinal directions and no less than 0.7 mile (0.6 nm) on the inter-cardinal directions.

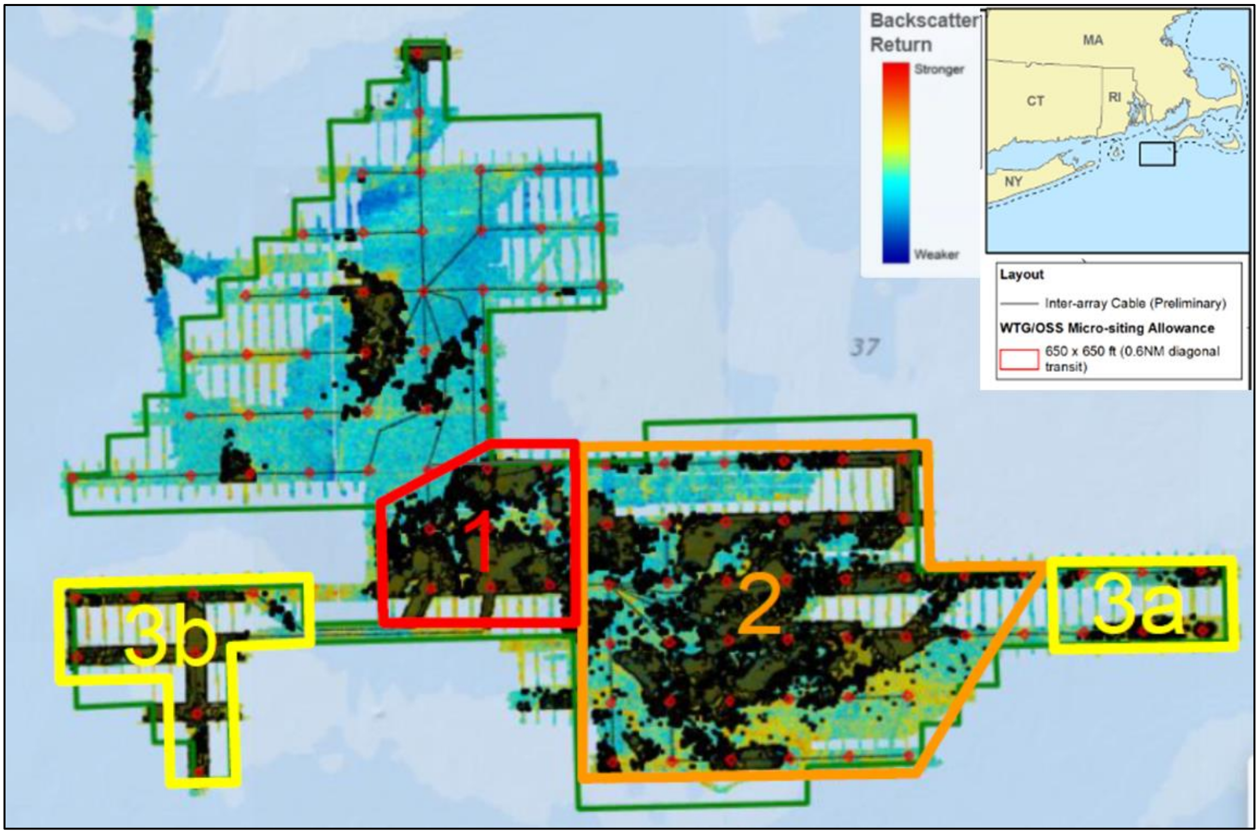


**Figure K-1. Alternative C development. Revolution Wind Lease Area with multi-beam backscatter and boulder presence (dark green with black outlines; data from construction and operations plan Appendix X2) shown in relation to the four priority areas identified for avoidance by the Greater Atlantic Regional Fisheries Office on November 5, 2021.**

Area 1 contains contiguous complex habitat illustrated by high multibeam backscatter return and a high density of large boulders (> 0.5–1.0 m in diameter). This area overlaps documented cod spawning activity based on recent acoustic, telemetry, and fisheries-dependent biological sample data (Van Hoeck et al. 2022; Van Parijs 2022). GARFO requested no modification in the shape of this area targeted for removal.

Area 2 contains large areas of contiguous complex habitat illustrated by high multibeam backscatter return and a high density of large boulders (> 0.5–1.0 m in diameter). Acoustic and telemetry data for Atlantic cod in this area are limited (Van Parijs 2022). Ongoing research and emerging data will assist in evaluating the importance of this area for cod spawning. GARFO requested that any modification of this area be limited to modifying the boundaries of the area rather than selection of particular turbine locations within the area and should prioritize maintaining the largest contiguous complex habitat area feasible.

Areas 3a and 3b are areas of complex habitat illustrated by high multibeam backscatter return and identified large boulders (> 0.5–1.0 m in diameter). Data for Atlantic cod in this area are limited (Inspire Environmental 2019, 2020). Ongoing research and emerging data will assist in evaluating the importance of this area for cod spawning. GARFO requested that any development of these areas be considered only if it would allow for the protection and conservation of higher priority areas.

If BOEM omitted all turbines within the identified priority areas (a total of 61 WTGs) from Alternative C, then Alternative C would not meet the purpose and need. A discussion of the further reduction of impacts to these habitats through the selection of Alternative C in conjunction with Alternative F is provided in EIS Section 3.13.2. BOEM developed the layouts for Alternative C based on the following criteria:

- GARFO's identified priority areas (see Figure K-1)
- Maintaining continuity of complex habitat
- Boulder density (higher density areas were avoided over lower density areas.)
- Multibeam backscatter data (high backscatter areas were avoided over lower backscatter areas.)
- Engineering considerations such as maintaining linearity of inter-array cable (IAC) layouts and maintaining offshore substation locations

BOEM identified two layouts for Alternative C that aim to address these criteria. Alternative C1 removes all WTG positions from Area 1 and 27 WTG positions from Area 2 leaving 65 WTG positions remaining (Figure K-2). Alternative C2 removes all WTG positions from Area 1 and 28 WTG positions from Area 2 leaving 64 WTG positions remaining (Figure K-3). Alternative C1 reduces development in areas of contiguous complex habitat slightly more than Alternative C2. Alternative C2 shifts exclusion of three WTG positions from the southeastern portion to areas further north to reduce development in or adjacent to known cod spawning areas, however, resulting in slightly less complex habitat avoided when compared to Alternative C1. See EIS Section 3.6.2.4 for more information on differences in impacts to complex habitats.

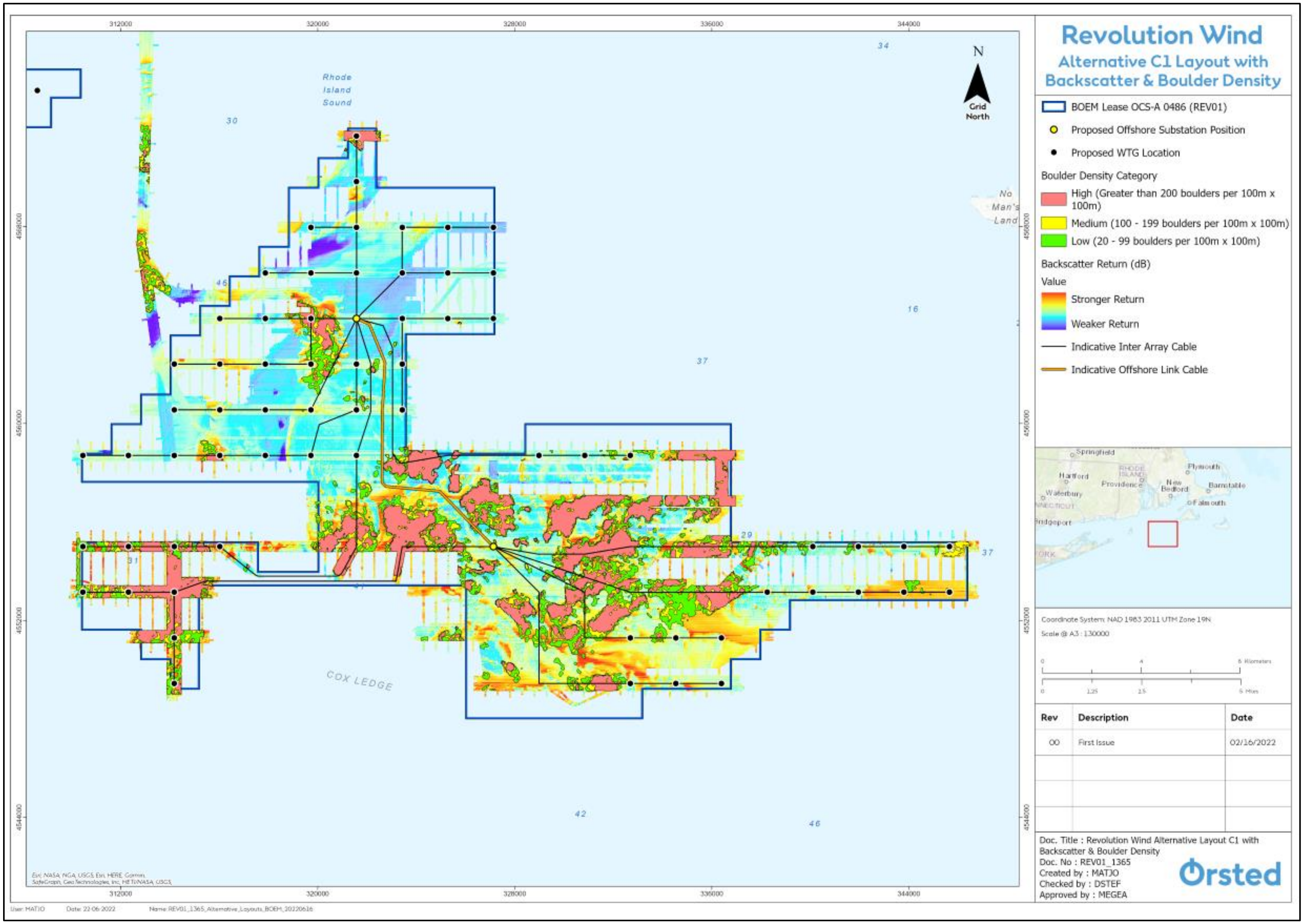


**Figure K-2. Alternative C1 layout overlaid with backscatter and boulder density data. Image courtesy of Orsted.**

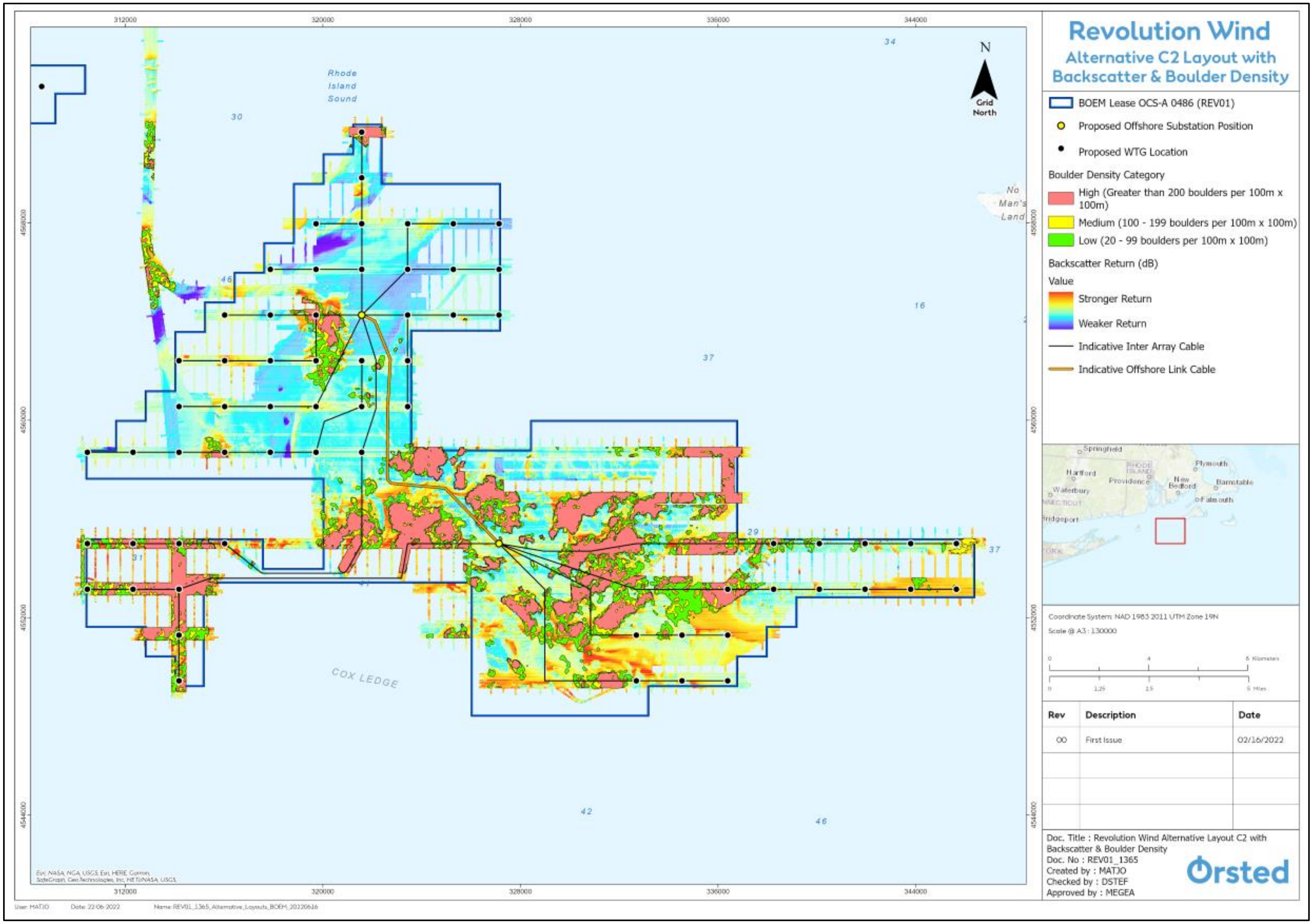


**Figure K-3. Alternative C2 layout overlaid with backscatter and boulder density data. Image courtesy of Orsted.**

# Alternative E: Reduction of Surface Occupancy to Reduce Impacts to Culturally Significant Resources Alternative (Viewshed Alternative)

The federally recognized Wampanoag Tribe of Gay Head (Aquinnah) has identified certain unencumbered views from the Gay Head Cliffs (i.e., Aquinnah Cliffs) on Martha's Vineyard as important to their oral history, traditions, cultural practices, and as a traditional cultural place (TCP) associated with the Wampanoag cultural hero Moshup. Through scoping and ongoing government-to-government consultation, the northernmost WTGs nearest to the Gay Head Cliffs were identified of the highest concern to the Wampanoag Tribe of Gay Head (Aquinnah), especially at sunset when these WTGs would be backlit and silhouetted. In a letter to BOEM on July 12, 2021, the tribe's historic preservation office noted the importance of the tribe's ancestral lands on the west side of Martha's Vineyard that include Gay Head Cliffs, designated as a national natural landmark by the National Park Service (Washington 2021). The letter also provided a map of the wind development area with an east to west line in which the Wampanoag Tribe of Gay Head (Aquinnah) opposes any development north thereof (Figure K-4). The tribe has expressed concerns that the introduction of offshore wind infrastructure will adversely affect the recently identified Vineyard Sound and Moshup's Bridge TCP and the Gay Head Cliffs National Natural Landmark (which is also part of the TCP). Factoring in the information and concerns of the Wampanoag Tribe of Gay Head (Aquinnah) and other stakeholders, along with balancing the purpose and need in EIS Section 1.2, BOEM considered a suite of options for removing WTG positions aimed at reducing impacts to viewsheds on and surrounding Martha's Vineyard.

Given the proximity of the Project to Martha's Vineyard, visibility of the offshore components cannot be completely eliminated under any action alternative or layout alternatives, while maintaining the minimum positions needed to fulfill the PPA obligations (i.e. 704 MW). To determine which WTG positions could be removed to reduce visual impacts most effectively to these cultural resources, while still meeting the purpose and need, BOEM developed multiple layout alternatives for Alternatives E1 and E2 and directed the Project applicant, Revolution Wind, to produce visual simulations of these layouts. BOEM shared these simulations with the Wampanoag Tribe of Gay Head (Aquinnah) and requested feedback on these potential layouts on September 10, 2021, and again on October 12, 2021, after an additional layout alternative was simulated.

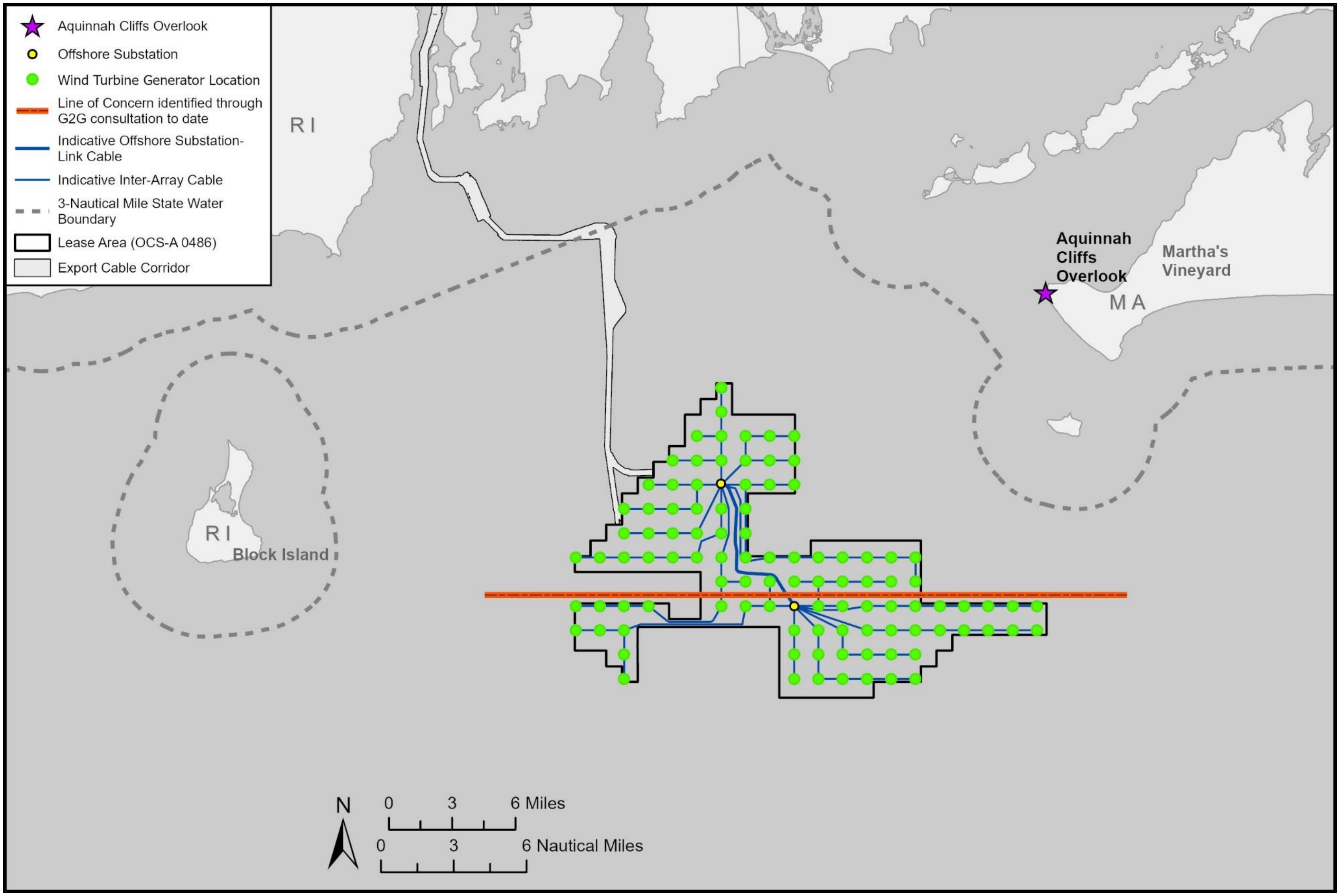


**Figure K-4. The line of concern provided by the Wampanoag Tribe of Gay Head (Aquinnah) overlaid with the Lease Area as proposed in Revolution Wind's construction and operations plan.**

## Preliminary Screening and Rationale

BOEM directed Revolution Wind to simulate eight potential WTG layouts for Alternative E (four for Alternative E1 and four for Viewshed Alternative E2). Figures K-5 through K-12 outline the layouts that were simulated and reviewed by BOEM's subject-matter experts and shared with the Wampanoag Tribe of Gay Head (Aquinnah) for input. No specific responses were received from the tribe; however, applying best professional judgement and input previously received by the tribe and other stakeholders, BOEM's subject-matter experts concluded that Alternatives E1-3 (see Figure K-7) and E2-4 (see Figure K-12) were most effective at reducing the visual impacts of concern at or near the Gay Head Cliffs, as well as other national historic landmarks and culturally important resources in Rhode Island and Massachusetts. Therefore, Alternatives E1-3 and E2-4 were carried forward for detailed analysis as Alternatives E1 and E2 in the EIS, acknowledging that neither alternative completely eliminates the visual impacts of concern for the reasons outlined above but offer a reasonable range of alternatives for consideration by stakeholders and the decisionmaker.

Layout Alternative E1-3 (see Figure K-7) was carried forward because the WTGs on the northwest end appear further apart, reducing the visual clutter and "curtain effect" from the visual overlapping of WTG towers and blades. The horizontal field-of-view of the Project is also less in layout Alternative E1-3 than in all other layouts simulated except for layout Alternative E2-4, with enough positions remaining to fulfill the PPA agreements (i.e. 704 MW).

Layout Alternative E2-4 (see Figure K-12) was carried forward because it reduces the number of WTGs that occupy the northwest end of the field-of-view within the sunset views from the Gay Head Cliffs overlook. Although this layout does not decrease visual prominence of WTGs further east in the Lease Area, it allows for a larger unobstructed sunset view within the northwestern portion of the Lease Area with enough positions remaining to fulfill the PPA agreements (i.e. 704 MW) up to the maximum potential output of the Project (880 MW). Figure K-13 provides a sunset simulation overlaid with the WTG positions that would be removed north-northwest of the northernmost offshore substation under layout Alternative E2-4.

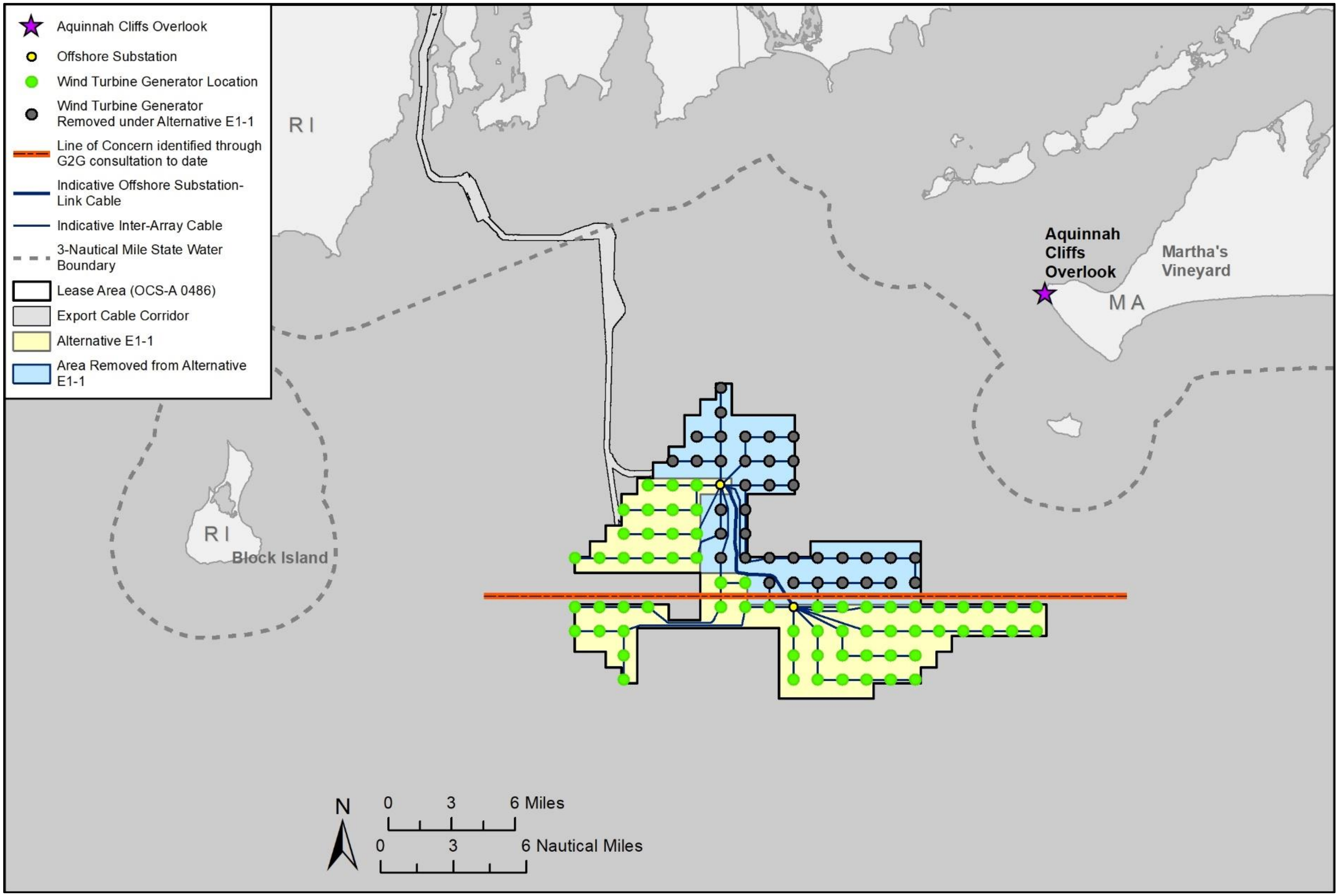


**Figure K-5. Layout Alternative E1-1. Gray shaded wind turbine generator positions in the blue field are those that would be eliminated from consideration. 704-megawatt maximum output; removal of 36 wind turbine generator positions (leaves 64 positions available).**

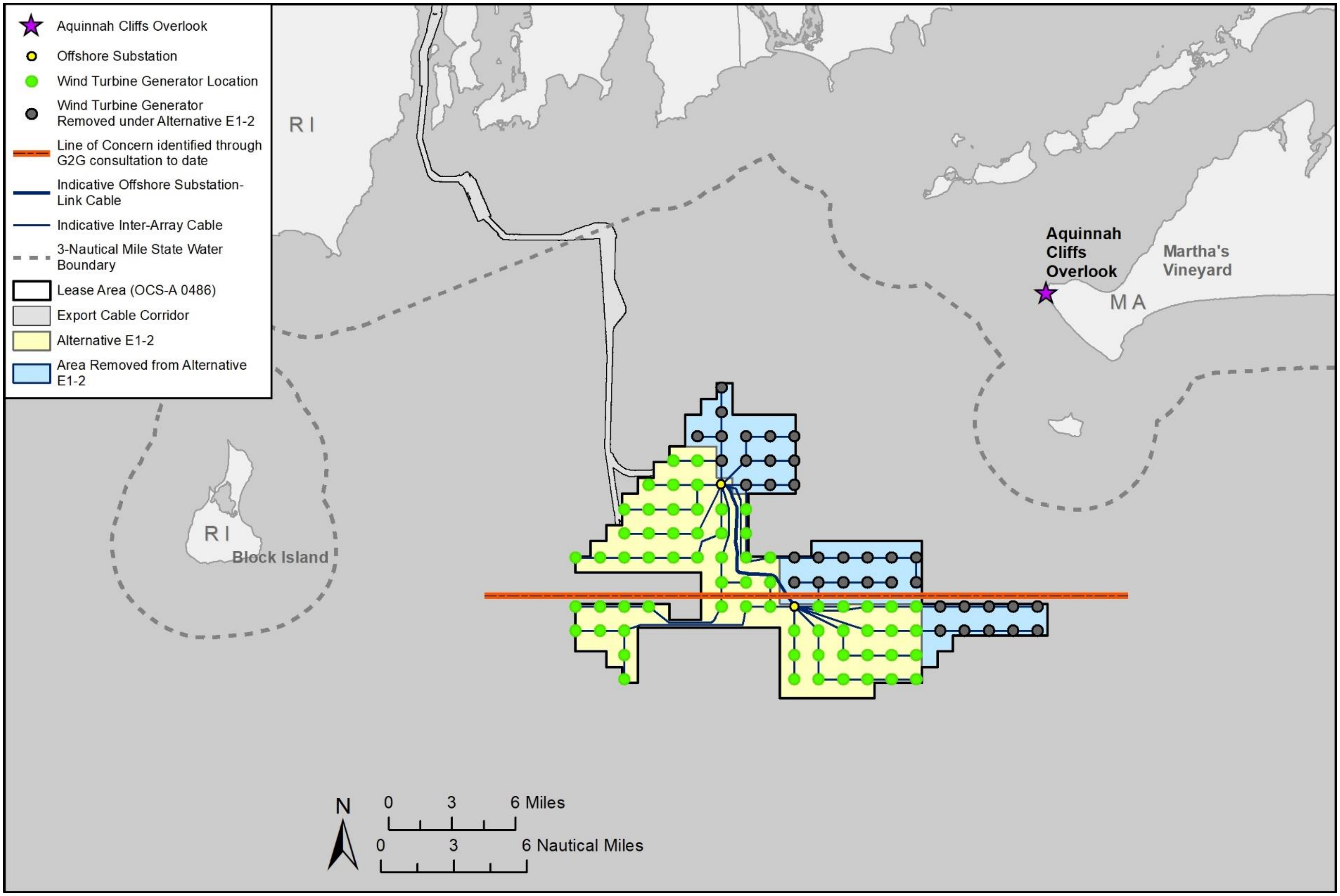


**Figure K-6. Layout Alternative E1-2. Gray shaded wind turbine generator positions in the blue field are those that would be eliminated from consideration. 704-megawatt maximum output; removal of 36 wind turbine generator positions (leaves 64 positions available).**

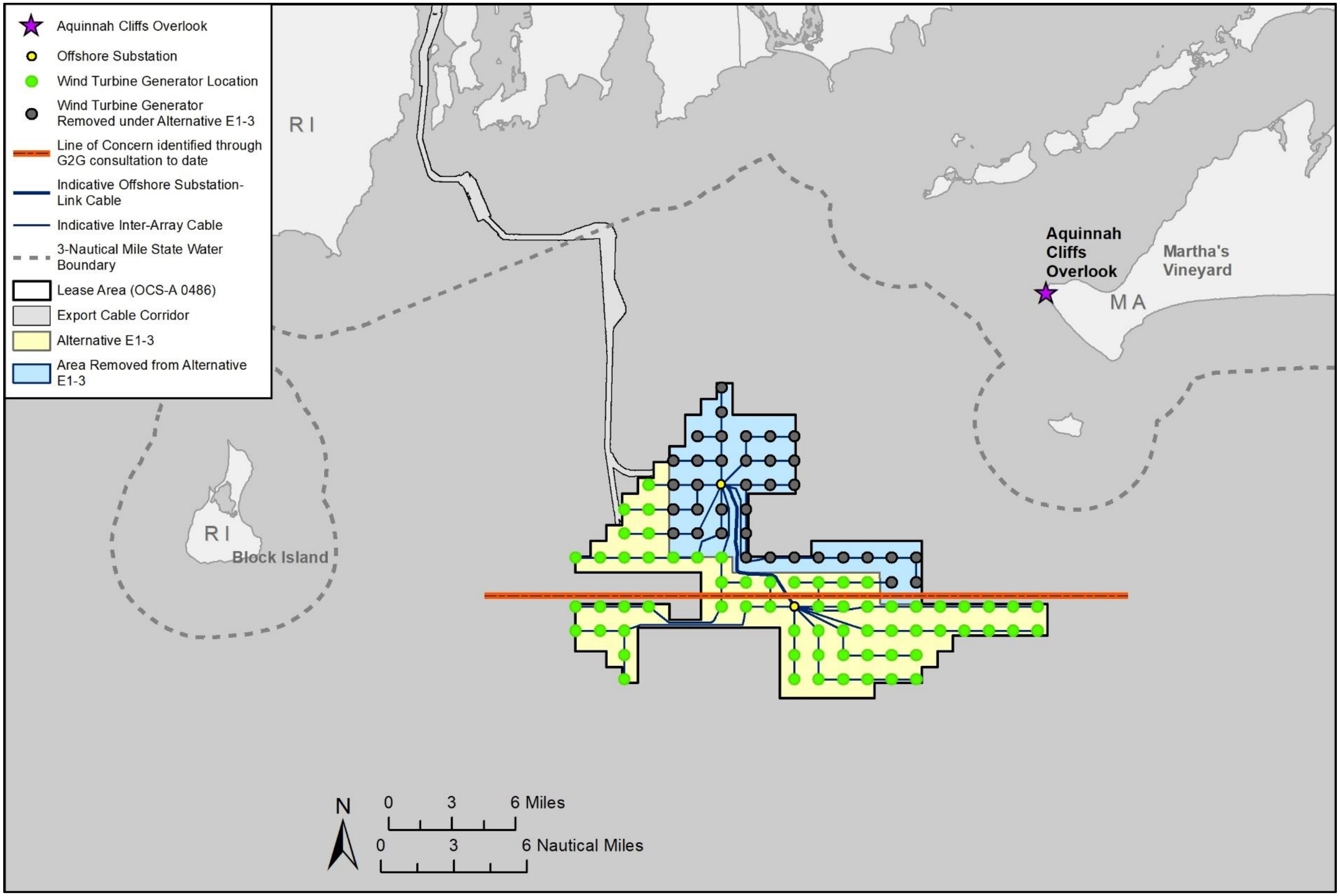


**Figure K-7. Layout Alternative E1-3. Gray shaded wind turbine generator positions in the blue field are those that would be eliminated from consideration. 704-megawatt maximum output; removal of 36 wind turbine generator positions (leaves 64 positions available).**

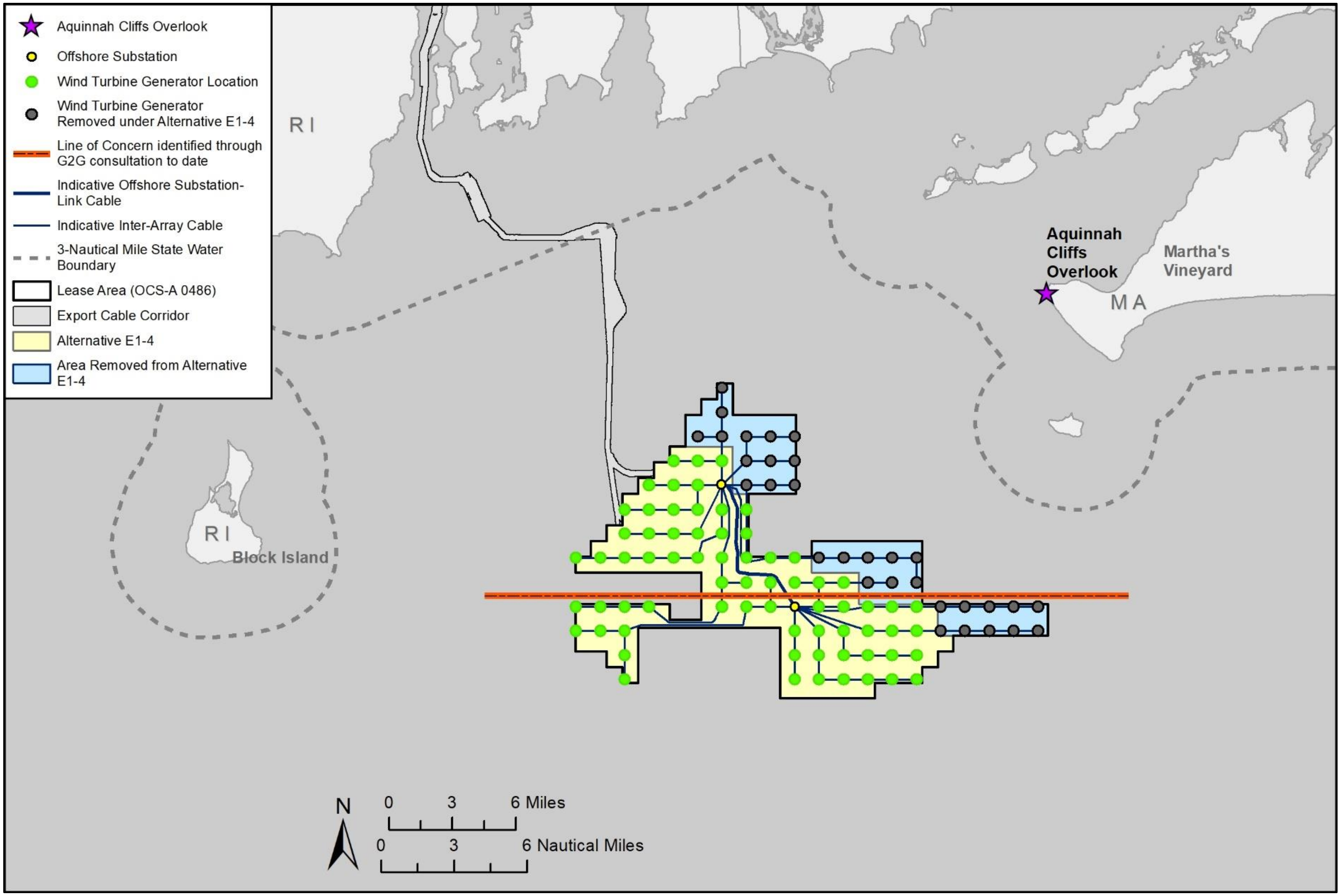


**Figure K-8. Layout Alternative E1-4. Gray shaded wind turbine generator positions in the blue field are those that would be eliminated from consideration. 828-megawatt maximum output; removal of 31 wind turbine generator positions (leaves 69 positions available).**

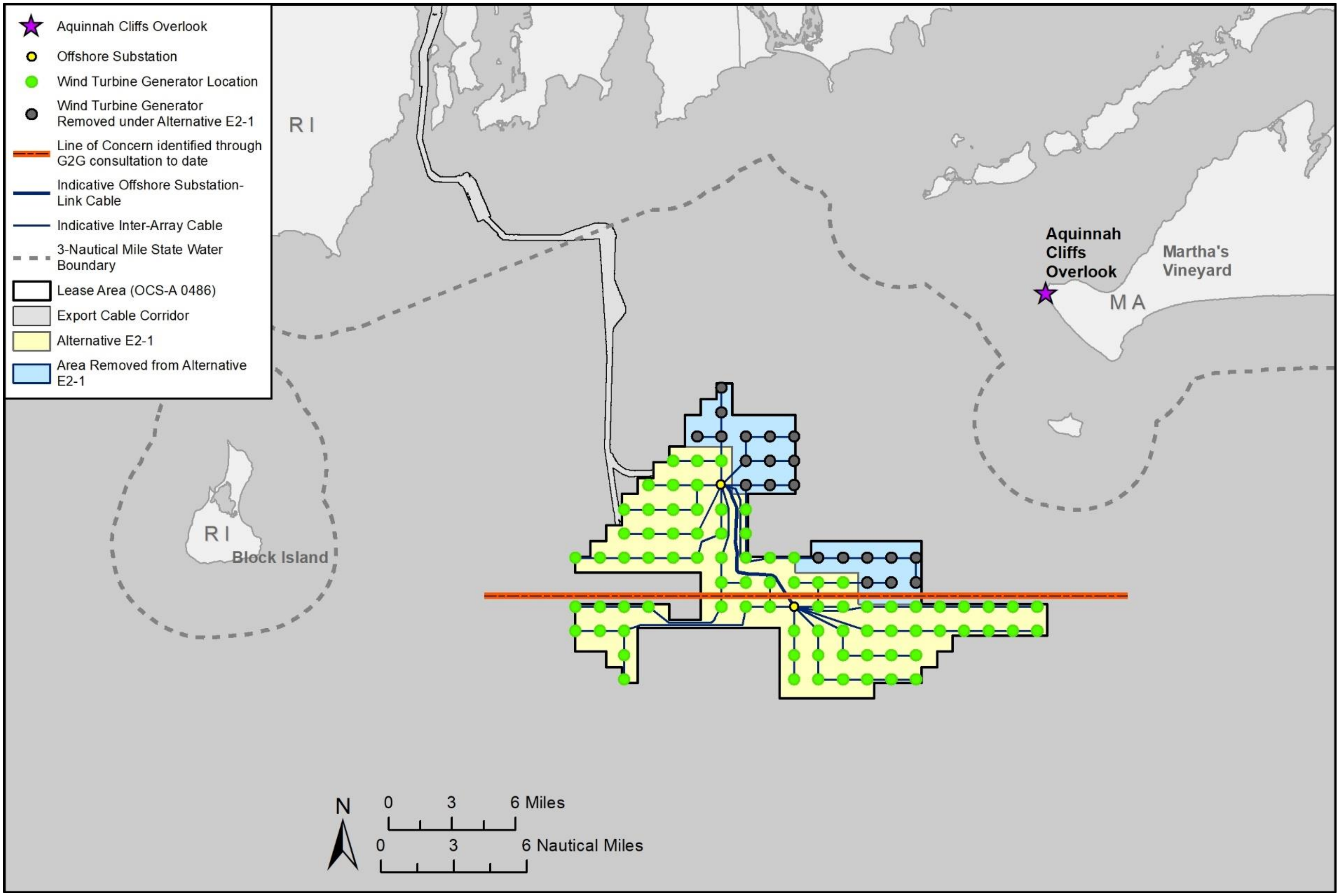


**Figure K-9. Layout Alternative E2-1. Gray shaded wind turbine generator positions in the blue field are those that would be eliminated from consideration. 880-megawatt maximum output; removal of 21 wind turbine generator positions (leaves 79 positions available).**

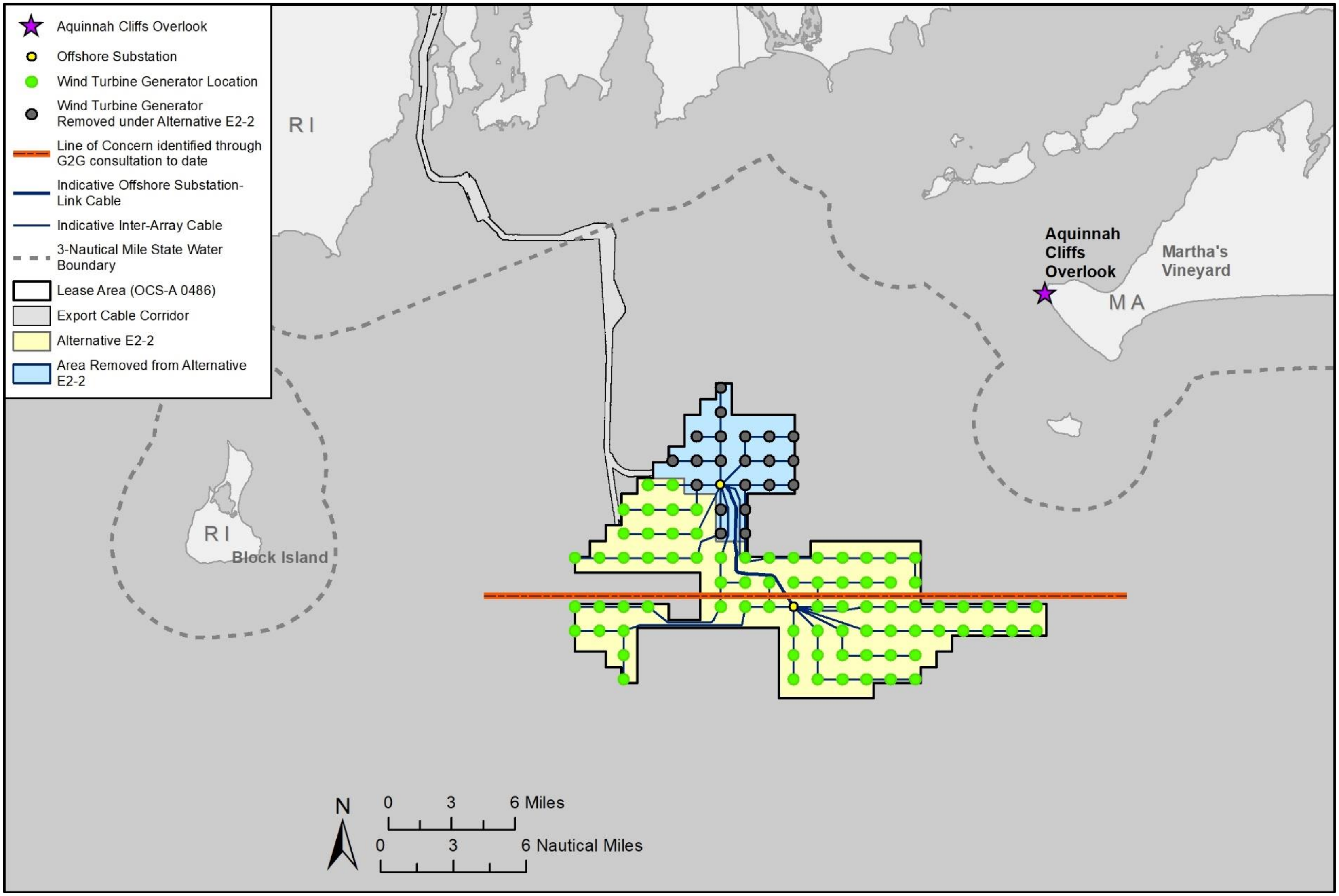


**Figure K-10. Layout Alternative E2-2. Gray shaded wind turbine generator positions in the blue field are those that would be eliminated from consideration. 880-megawatt maximum output; removal of 21 wind turbine generator positions (leaves 79 positions available).**

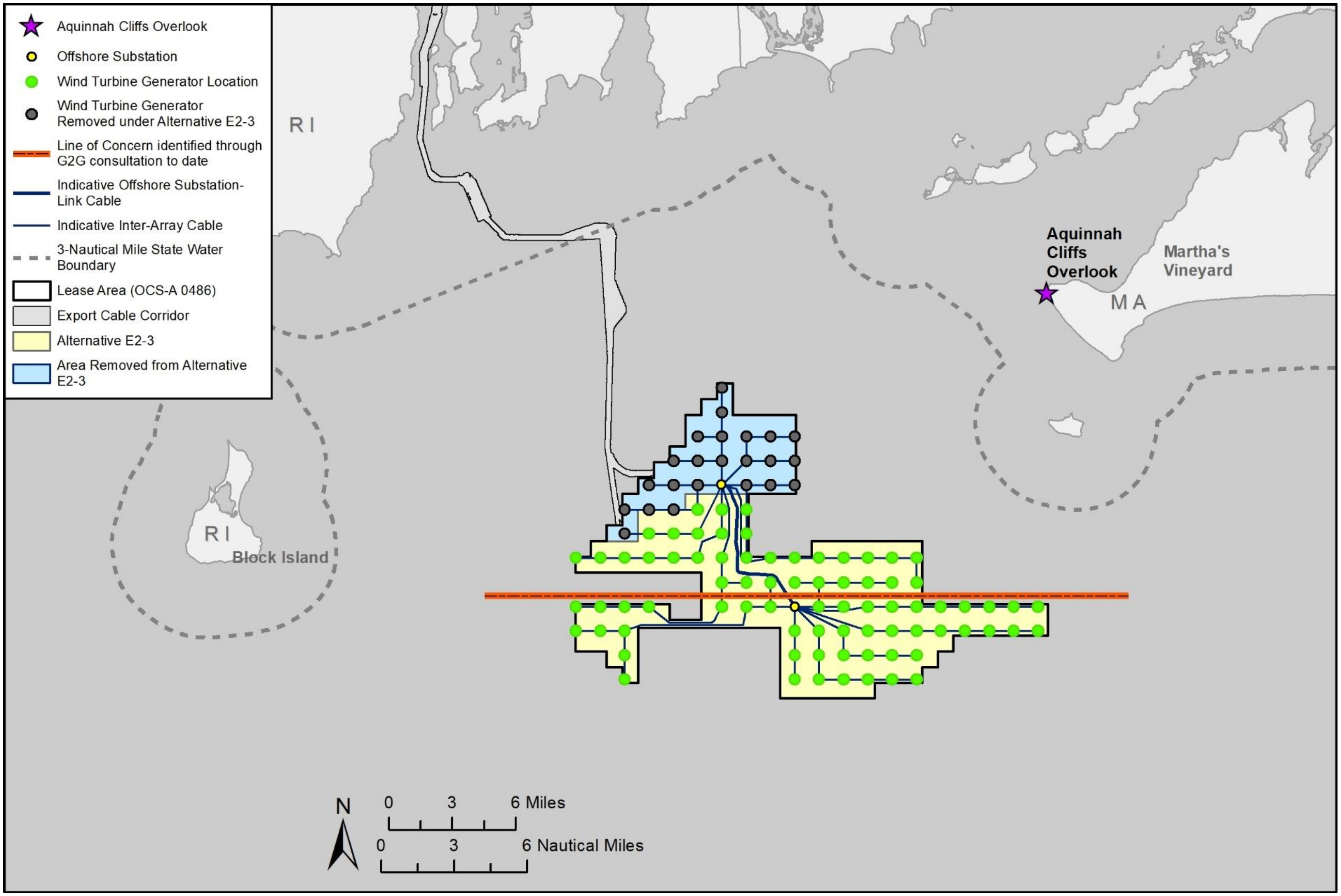


**Figure K-11. Layout Alternative E2-3. Gray shaded wind turbine generator positions in the blue field are those that would be eliminated from consideration. 880-megawatt maximum output; removal of 23 wind turbine generator positions (leaves 77 positions available).**

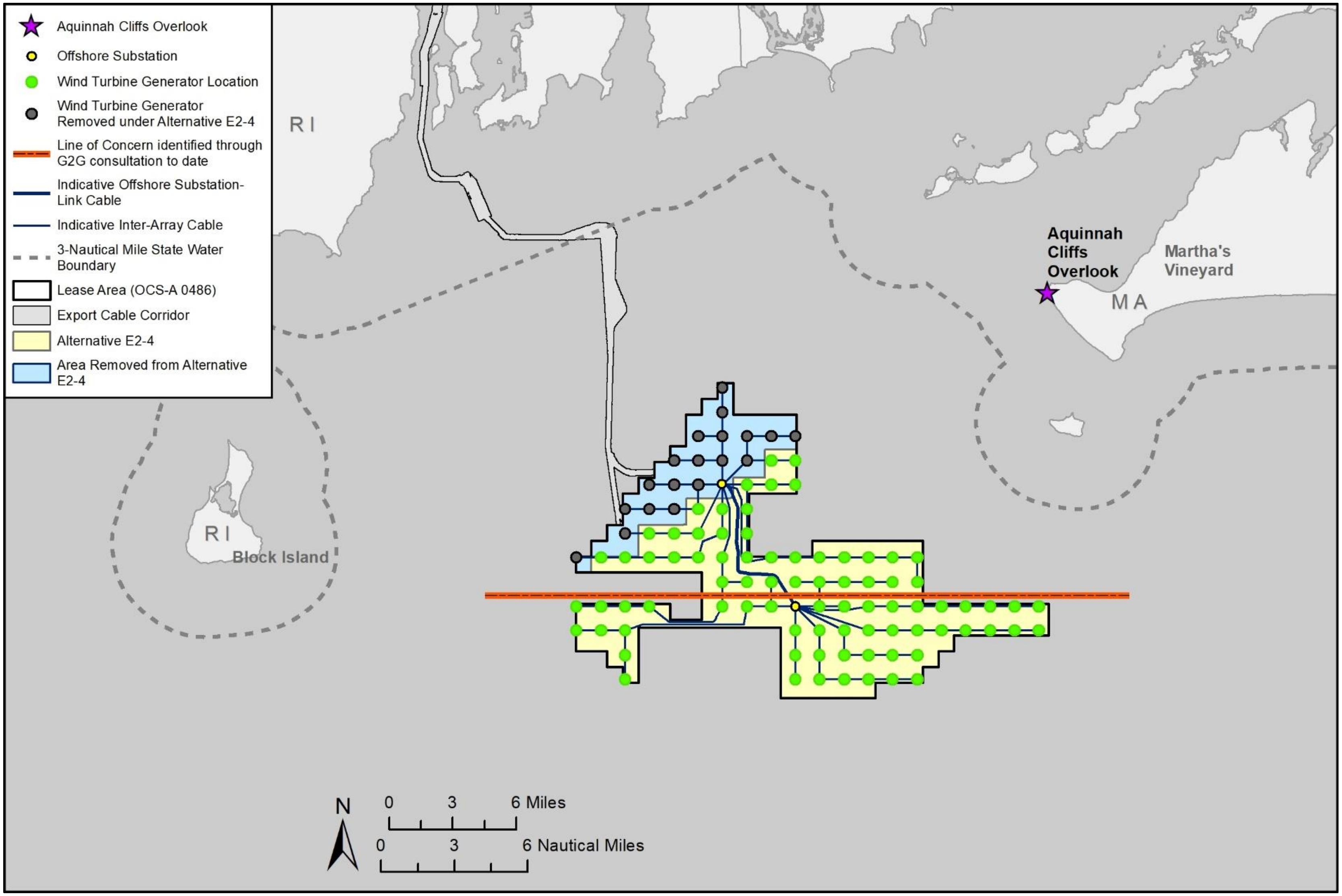


**Figure K-12. Layout Alternative E2-4. Gray shaded wind turbine generator positions in the blue field are those that would be eliminated from consideration. 880-megawatt maximum output; removal of 23 wind turbine generator positions (leaves 77 positions available).**

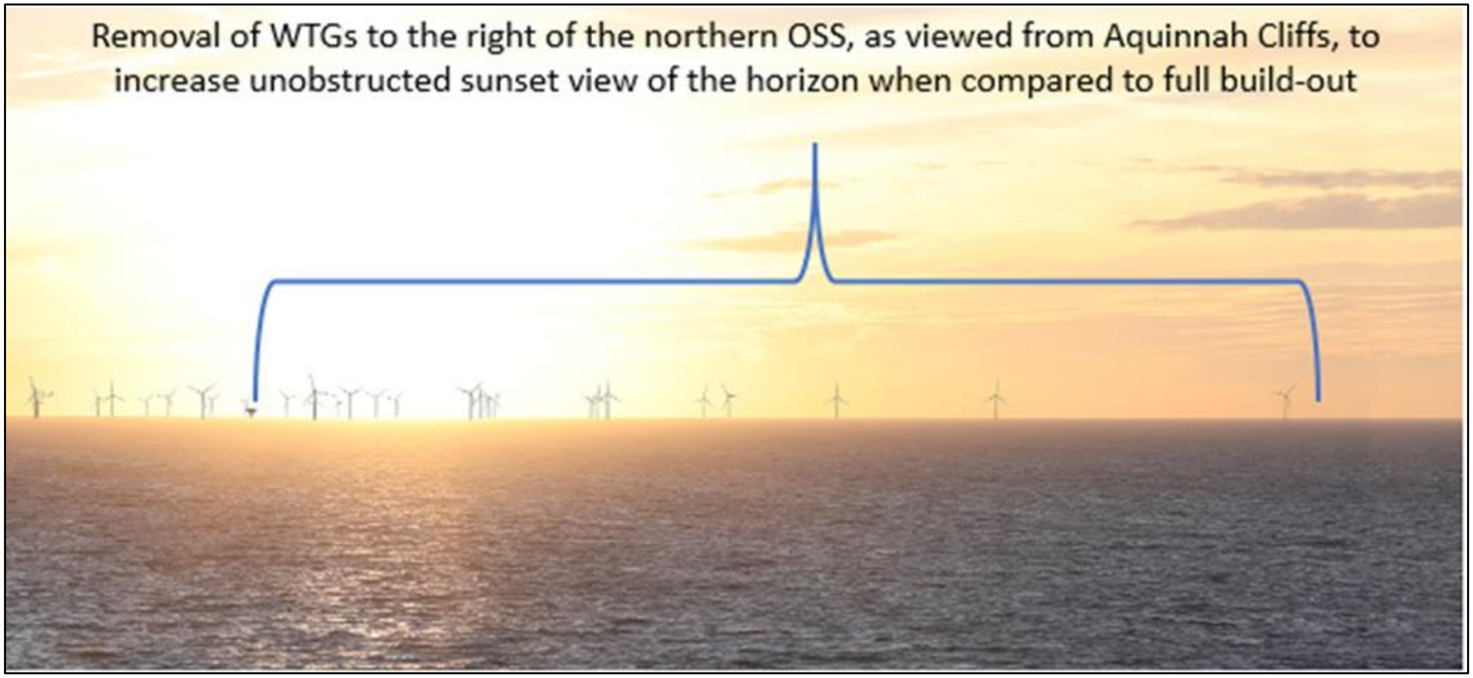


**Figure K-13. Simulated sunset view facing the Project from Aquinnah Cliffs, indicating the wind turbine generator positions that would be removed under layout Alternative E2-4.**

## Alternative G: Habitat and Viewshed Minimization Hybrid Alternative (Preferred Alternative)

After carefully considering the EIS alternatives, including feedback and information received from the public, cooperating agencies, tribal nations, key stakeholder groups (e.g., commercial fishermen), and the applicant, BOEM has identified Alternative G (Habitat and Viewshed Minimization Hybrid Alternative), as the Preferred Alternative. Alternative G is a hybrid alternative combining elements of Alternatives C, D, and E. BOEM engaged their subject-matter experts within the Environmental Branch for Renewable Energy and the Engineering and Technical Review Branch, as well as the National Renewable Energy Laboratory, to review and advise on data and information received and considered in the development of Alternative G.

BOEM eliminated 21 WTG positions under Alternative G due to infeasibility (see gray dots in Figure K-14); 79 WTG positions remain from the up to 100 WTG positions available under the Proposed Action (see green dots in Figure K-14). Table K-1 provides latitude and longitude coordinates for the 79 WTG positions of Alternative G shown in Figure K-14.

Alternative G in comparison to the Proposed Action would reduce benthic habitat impacts in areas deemed critical by the NMFS (Alternative C), reduce transit and access impacts in areas of active marine use (Alternative D), reduce visual impacts to culturally important resources (Alternative E), and address design concerns voiced by the applicant, striking a reasonable balance between these varied resources.

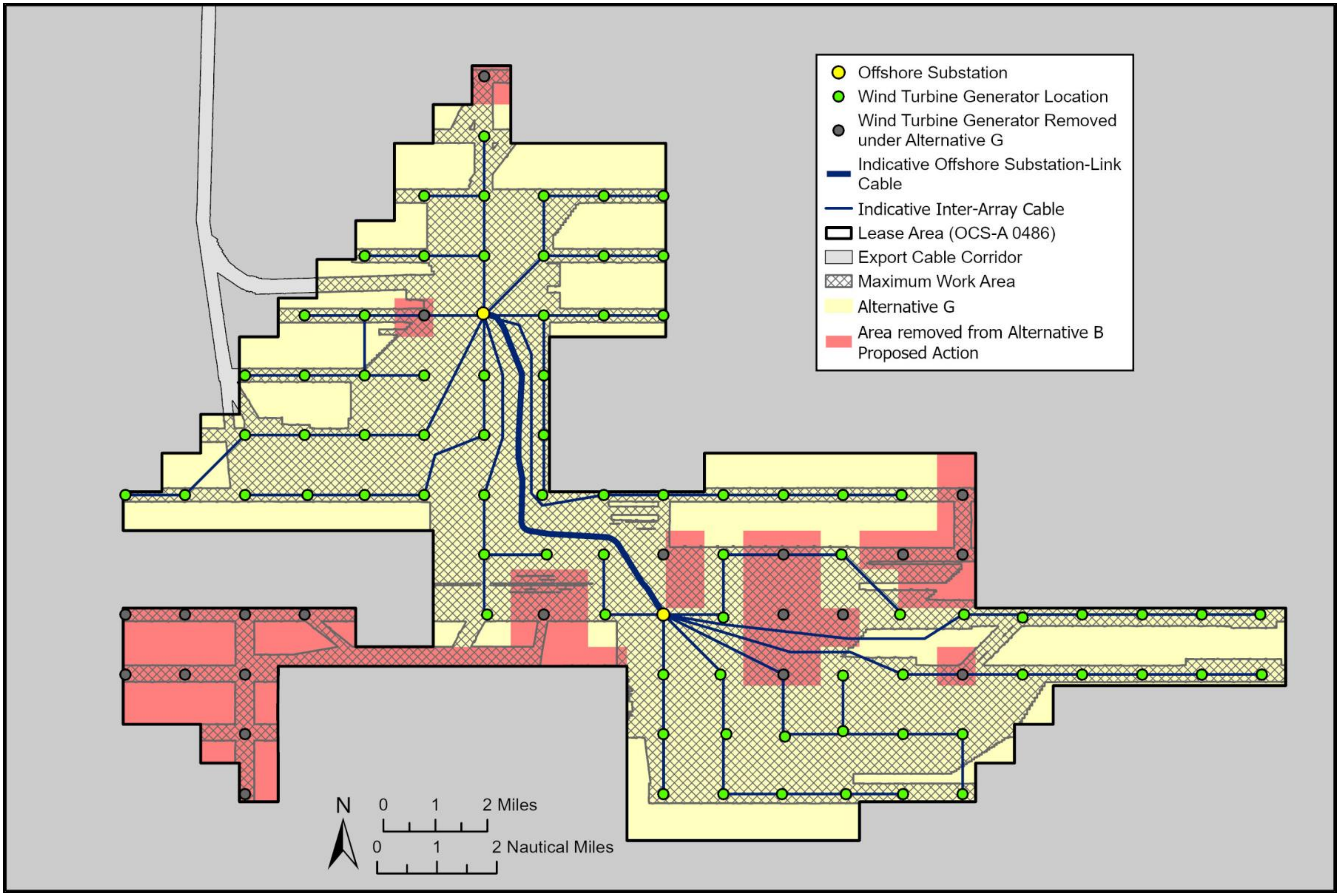


**Figure K-14. Alternative G with 79 possible wind turbine generator positions.**

**Table K-1. Applicant Wind Turbine Generator Identification, Longitude and Latitude, and U.S. Coast Guard Wind Turbine Generator Identification for Alternative G**

| Applicant WTG Identification (ID) | Applicant WTG Short ID | Longitude (decimal degrees) | Latitude (decimal degrees) | U.S. Coast Guard Wind WTG ID |
|---|---|---|---|---|
| L045_65 | 65 | -70.905013 | 41.130564 | AL18 |
| L045_66 | 66 | -70.882961 | 41.130927 | AL19 |
| L045_67 | 67 | -70.860908 | 41.131285 | AL20 |
| L045_73 | 73 | -70.97067 | 41.112778 | AM15 |
| L045_75 | 75 | -70.926578 | 41.113524 | AM17 |
| L045_76 | 76 | -70.904531 | 41.113891 | AM18 |
| L045_77 | 77 | -70.882484 | 41.114253 | AM19 |
| L045_78 | 78 | -70.860437 | 41.114611 | AM20 |
| L045_79 | 79 | -70.838389 | 41.114965 | AM21 |
| L045_62M | 62M | -70.97224 | 41.129433 | AL15 |
| L045_63M | 63M | -70.948582 | 41.129835 | AL16 |
| L045_64M | 64M | -70.927042 | 41.129387 | AL17 |
| L045_68M | 68M | -70.83939 | 41.131631 | AL21 |
| L045_72M | 72M | -70.992703 | 41.111993 | AM14 |
| L055_2 | 2 | -71.129836 | 41.260075 | AC08 |
| L055_3 | 3 | -71.151382 | 41.242993 | AD07 |
| L055_4 | 4 | -71.129295 | 41.243404 | AD08 |
| L055_6 | 6 | -71.085119 | 41.244213 | AD10 |
| L055_8 | 8 | -71.172916 | 41.225908 | AE06 |
| L055_9 | 9 | -71.150835 | 41.226322 | AE07 |
| L055_10 | 10 | -71.128754 | 41.226733 | AE08 |
| L055_11 | 11 | -71.106672 | 41.227139 | AE09 |
| L055_12 | 12 | -71.08459 | 41.227541 | AE10 |
| L055_14 | 14 | -71.194439 | 41.208818 | AF05 |
| L055_15 | 15 | -71.172364 | 41.209237 | AF06 |
| L055_17 | 17 | -71.106137 | 41.210468 | AF09 |
| L055_18 | 18 | -71.08406 | 41.21087 | AF10 |
| L055_20 | 20 | -71.215951 | 41.191725 | AG04 |
| L055_21 | 21 | -71.193882 | 41.192148 | AG05 |
| L055_22 | 22 | -71.171813 | 41.192566 | AG06 |

| Applicant WTG Identification (ID) | Applicant WTG Short ID | Longitude (decimal degrees) | Latitude (decimal degrees) | U.S. Coast Guard Wind WTG ID |
|---|---|---|---|---|
| L055_24 | 24 | -71.127673 | 41.193391 | AG08 |
| L055_25 | 25 | -71.105602 | 41.193796 | AG09 |
| L055_26 | 26 | -71.215389 | 41.175055 | AH04 |
| L055_28 | 28 | -71.171262 | 41.175896 | AH06 |
| L055_29 | 29 | -71.149198 | 41.17631 | AH07 |
| L055_30 | 30 | -71.127133 | 41.176719 | AH08 |
| L055_31 | 31 | -71.105068 | 41.177125 | AH09 |
| L055_32 | 32 | -71.258941 | 41.157528 | AJ02 |
| L055_33 | 33 | -71.236884 | 41.157958 | AJ03 |
| L055_34 | 34 | -71.214827 | 41.158385 | AJ04 |
| L055_36 | 36 | -71.170711 | 41.159225 | AJ06 |
| L055_37 | 37 | -71.148653 | 41.159639 | AJ07 |
| L055_5 | 5 | -71.107207 | 41.24381 | AD09 |
| L055_7 | 7 | -71.063031 | 41.244611 | AD11 |
| L055_13 | 13 | -71.062507 | 41.227939 | AE11 |
| L055_19 | 19 | -71.061983 | 41.211267 | AF11 |
| L055_23 | 23 | -71.149743 | 41.192981 | AG07 |
| L055_27 | 27 | -71.193325 | 41.175477 | AH05 |
| L055_38 | 38 | -71.126594 | 41.160048 | AJ08 |
| L055_40 | 40 | -71.082474 | 41.160855 | AJ10 |
| L055_41 | 41 | -71.060414 | 41.161251 | AJ11 |
| L055_42 | 42 | -71.038353 | 41.161644 | AJ12 |
| L055_43 | 43 | -71.016292 | 41.162033 | AJ13 |
| L055_44 | 44 | -70.99423 | 41.162417 | AJ14 |
| L055_47 | 47 | -71.126055 | 41.143377 | AK08 |
| L055_49 | 49 | -71.081946 | 41.144183 | AK10 |
| L055_51 | 51 | -71.037836 | 41.144972 | AK12 |
| L055_69 | 69 | -71.058849 | 41.111235 | AM11 |
| L055_80 | 80 | -71.058328 | 41.094563 | AN11 |
| L055_84 | 84 | -70.970171 | 41.096105 | AN15 |
| L055_85 | 85 | -70.948131 | 41.09648 | AN16 |
| L055_86 | 86 | -71.057807 | 41.077891 | AP11 |

| Applicant WTG Identification (ID) | Applicant WTG Short ID | Longitude (decimal degrees) | Latitude (decimal degrees) | U.S. Coast Guard Wind WTG ID |
|---|---|---|---|---|
| L055_87 | 87 | -71.035774 | 41.078282 | AP12 |
| L055_90 | 90 | -70.969673 | 41.079432 | AP15 |
| L055_91 | 91 | -70.947638 | 41.079806 | AP16 |
| L055_39M | 39M | -71.10507 | 41.160444 | AJ09 |
| L055_45M | 45M | -70.972704 | 41.162788 | AJ15 |
| L055_53M | 53M | -70.994261 | 41.145735 | AK14 |
| L055_56M | 56M | -71.124445 | 41.126725 | AL08 |
| L055_58M | 58M | -71.080883 | 41.127521 | AL10 |
| L055_35M | 35M | -71.191727 | 41.158827 | AJ05 |
| L055_48M | 48M | -71.102959 | 41.143801 | AK09 |
| L055_70M | 70M | -71.037846 | 41.111609 | AM12 |
| L055_81M | 81M | -71.035248 | 41.094973 | AN12 |
| L055_82M | 82M | -71.013444 | 41.09476 | AN13 |
| L055_83M | 83M | -70.992235 | 41.096513 | AN14 |
| L055_88M | 88M | -71.014276 | 41.07866 | AP13 |
| L055_59M | 59M | -71.037296 | 41.127512 | AL12 |
| L055_89M | 89M | -70.990666 | 41.079071 | AP14 |

## Alternatives G1, G2, and G3

In further considering the implementation of 11-MW WTGs under Alternative G, BOEM has deemed that up to an additional 14 WTG positions could be feasibly removed from the Project, resulting in 65 WTGs constructed, and the applicant would still be capable of meeting the capacity requirement of the PPAs, which would meet the purpose and need under the National Environmental Policy Act (NEPA). The 14 WTG positions would remain as part of Alternative G as "spares" for contingency and would only be constructed on a case-by-case basis to accommodate unforeseen siting conditions that render any of the 65 WTG installations impractical in terms of technical feasibility or due to environmental impact or safety concerns.

Two of the 65 WTGs have the flexibility to be located in three different spots within the 79 WTG positions (see Figures K-15, K-16, and K-17). As a result, Alternative G includes the analysis of three layouts (Alternatives G1, G2, and G3) for installation of the 65 WTGs as described below and shown in Figures K-15, K-16, and K-17. This flexibility in design could allow for further refinement for visual resources impact reduction or habitat impact reduction.

Alternative G1 maximizes the avoidance of complex benthic habitat and cod spawning areas within NMFS priority areas (see Figure K-16). Alternative G2 provides the greatest reduction of impacts to the sunset viewshed from key observation points on Martha's Vineyard, as well as to points along the Rhode

Island coastline (see Figure K-17). Alternative G3 provides the greatest reduction of impacts to the proximity to shore viewshed from Martha's Vineyard, as well as to points along the Rhode Island coastline (Figure K-18). All three configurations of Alternative G (G1, G2, G3) include the same reduction in WTGs to minimize navigation risks and conflicts with other competing space uses.

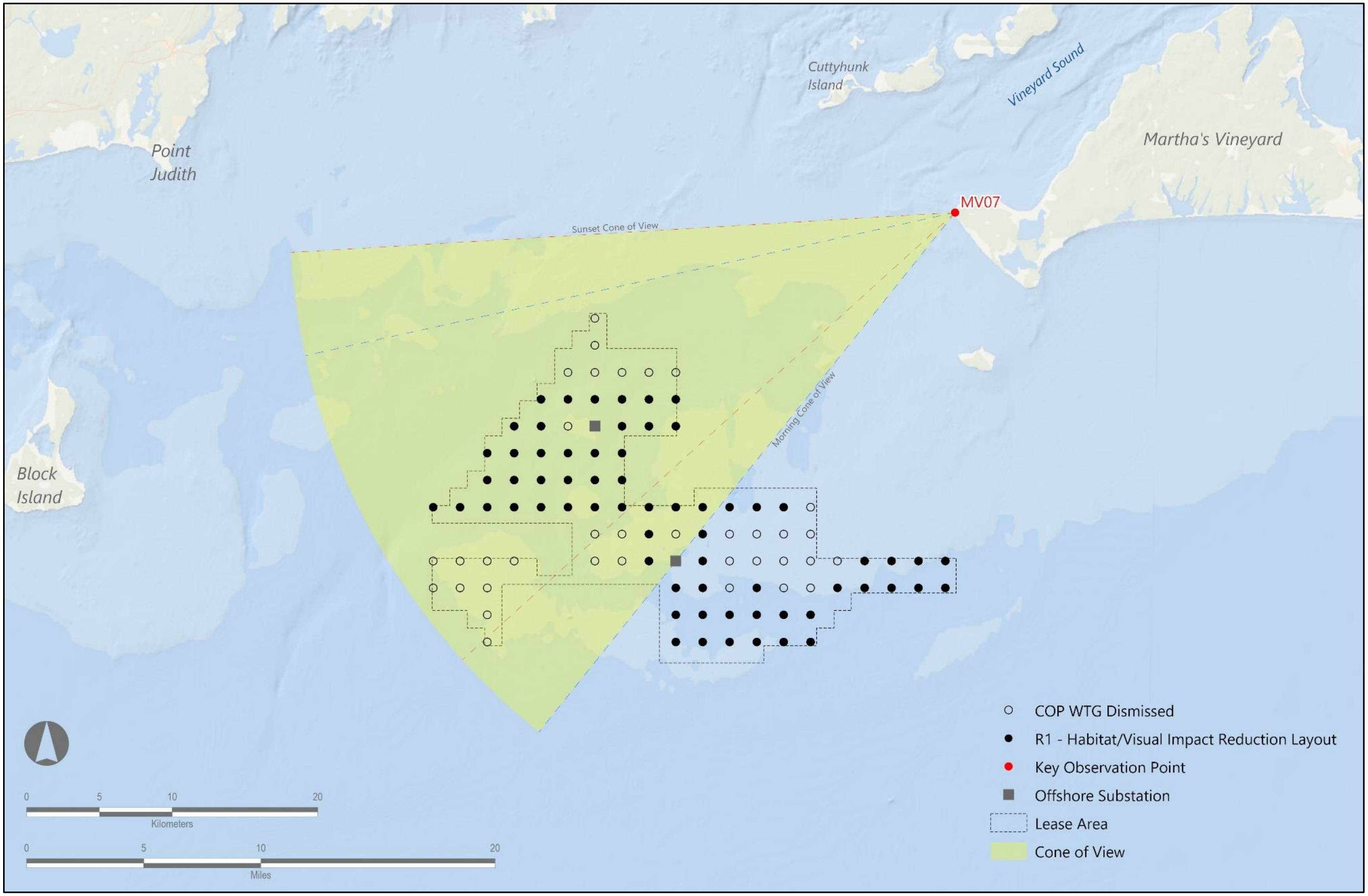


**Figure K-15. Alternative G1 includes the installation of 65 wind turbine generators placed to maximize avoidance of complex habitat.**

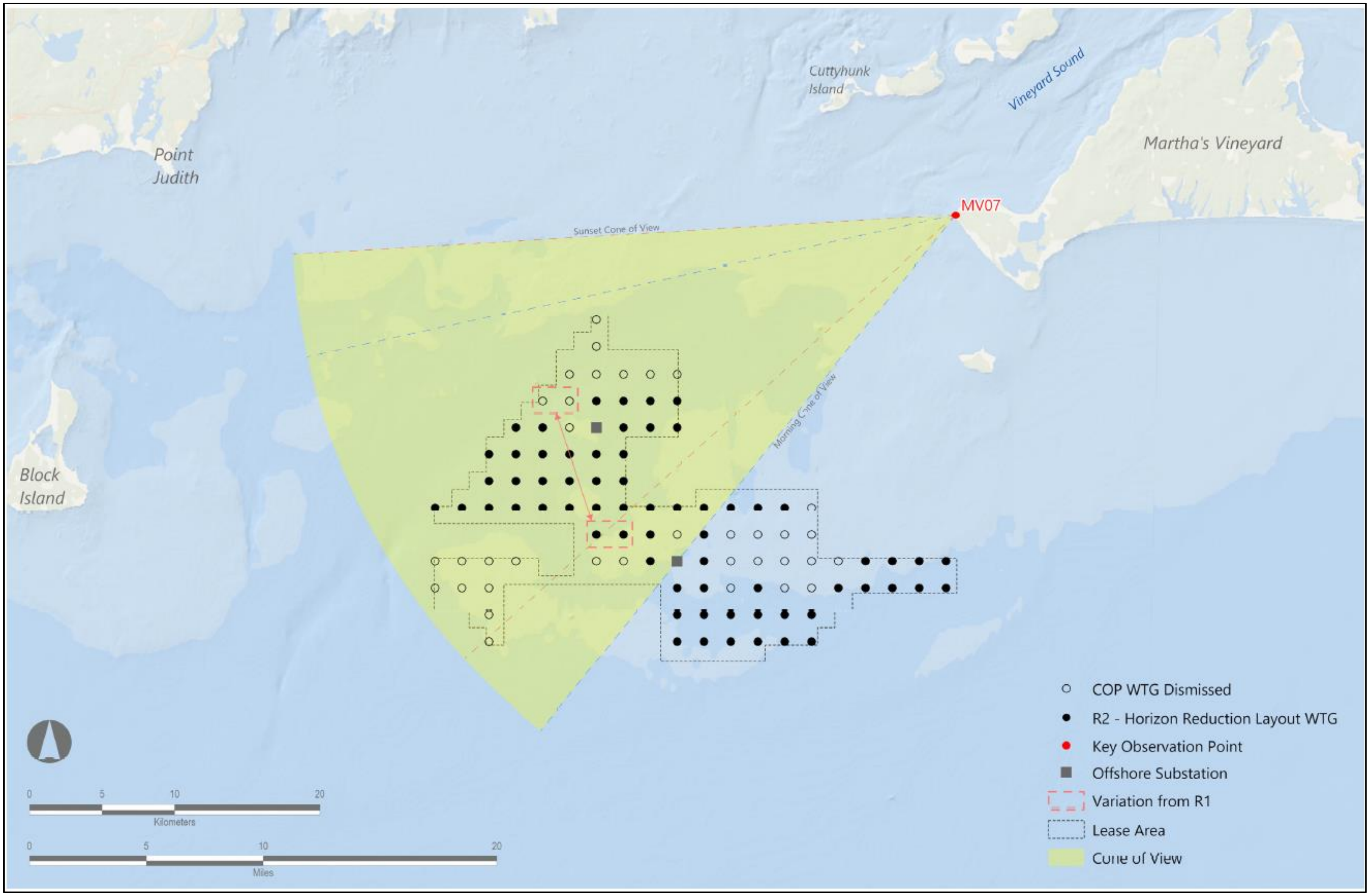


**Figure K-16. Alternative G2 includes the installation of 65 wind turbine generators placed to reduce impacts on the sunset viewshed from Martha's Vineyard and from areas along the Rhode Island coastline.**

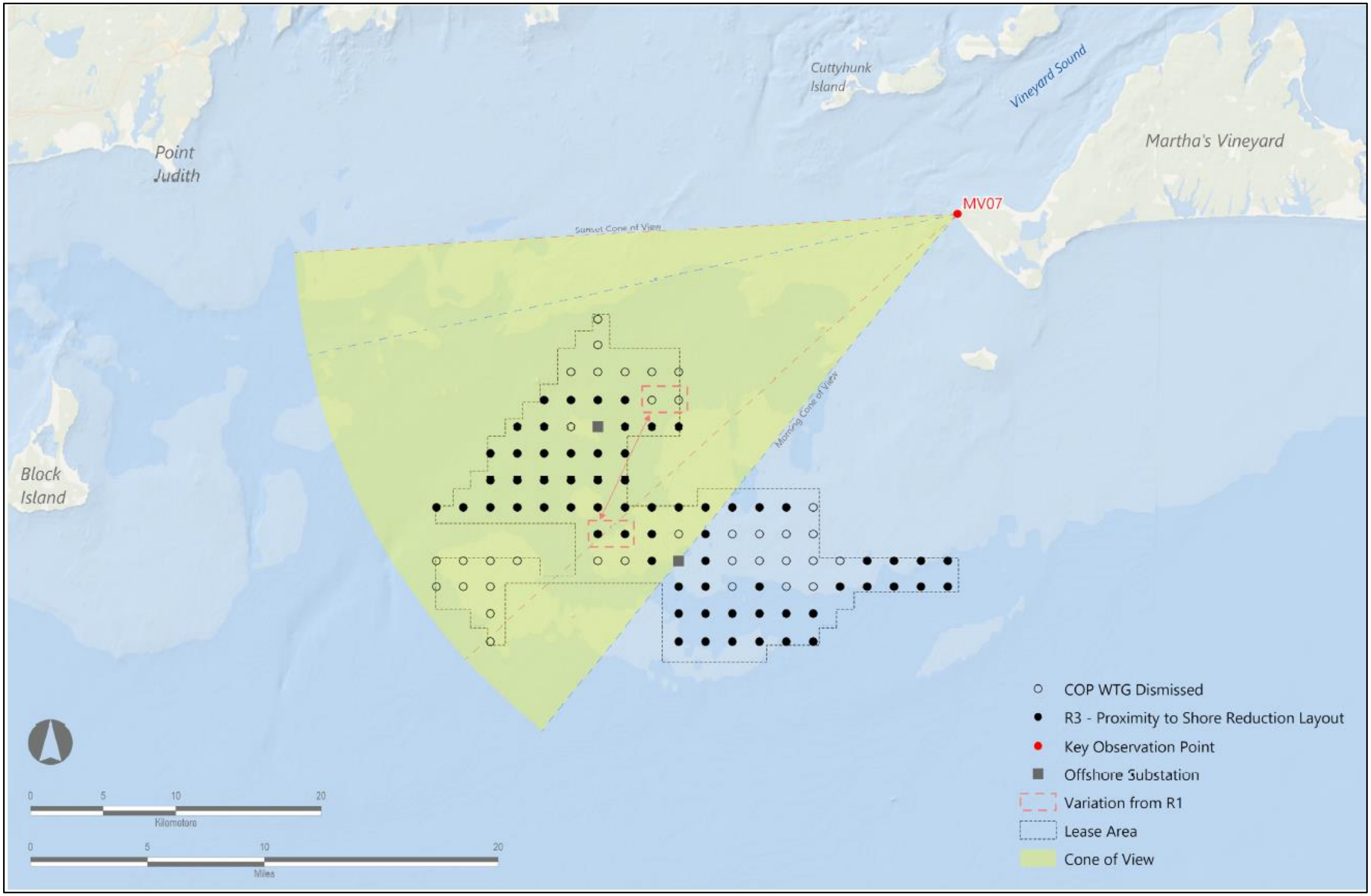


**Figure K-17. Alternative G3 includes the installation of 65 wind turbine generators placed to reduce impacts to the proximity to shore viewshed from Martha's Vineyard and from areas along the Rhode Island coastline.**

Alternatives G1, G2 and G3 strike a reasonable balance of addressing the primary environmental, socioeconomic, and technical feasibility concerns raised in public comments and identified during Draft and Final EIS development, including the following:

- Disturbance to essential fish habitat (EFH), including Cox Ledge, as well as disruption to Atlantic cod spawning
- Maximize the avoidance and minimization principles for habitat and species protection
- Navigation safety
- Visual impacts to culturally important resources
- Lost revenues to certain commercial and for-hire fisheries due to displacement from preferred fishing grounds, as well as concerns on damaged or lost fishing gear
- Timely implementation of the Project to promote economic growth and create jobs
- Implementation of mitigation and monitoring measures to reduce impacts to fisheries, threatened and endangered species, birds, bats, cultural, and tribal resources

Across all action alternatives, including Alternatives G1, G2 and G3, the WTGs and IAC routes would be microsited to avoid boulder fields, large individual boulders, unexploded ordnance and marine archaeological exclusion zones, difficult terrain and soil conditions, survey coverage, existing infrastructure, and other offshore installation and operation activities to the maximum extent practicable. Figure K-18 provides an example layout with microsited WTGs and IACs.

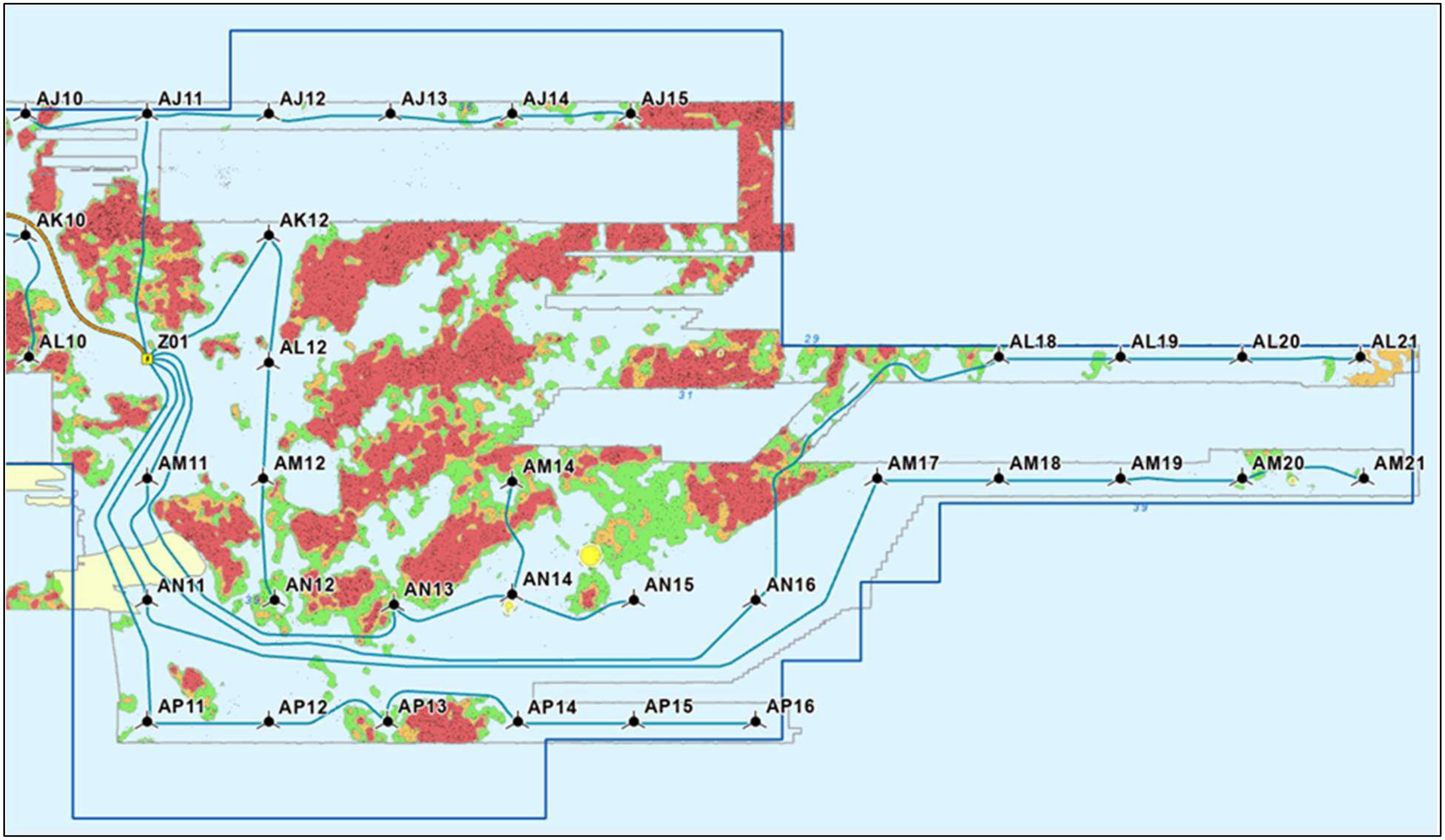


**Figure K-18. Example microsited wind turbine generators and inter-array cable routes to avoid boulders, complex benthic habitat, unexploded ordnance, marine archaeological resources, and other engineering constraints.**

In summary, Alternative G as defined by BOEM would include the construction, operations and maintenance, and eventual decommissioning of 65 WTGs within 79 possible WTGs positions (as illustrated in Alternatives G1, G2, and G3) at a capacity of 11 MW and up to two offshore substations within Lease Area OCS-A 0468. The Alternative G export cables would extend from Lease Area OCS-A 0468 to the mainland, making landfall in North Kingstown, Rhode Island see (Figure K-14). Like the other action alternatives analyzed in the EIS, Alternative G would occur within the range of design parameters outlined in the COP and is subject to applicant-committed environmental protection measures as well as possible additional agency-proposed mitigation measures to avoid or reduce impacts.

# Alternatives C, D, E, and F: Feasibility Analysis Updates

## Feasibility Analysis Update for Alternatives C1, C2, D1+D2, D1+D2+D3, E1, E2, and F

BOEM received additional information from Revolution Wind regarding 1) geotechnical feasibility for Alternatives C1, C2, D1+D2, D1+D2+D3, E1, and E2, and 2) WTG model availability for Alternative F. In response, BOEM conducted an independent review of the information, including engagements with National Renewable Energy Laboratory, the Engineering and Technical Review Branch, and BOEM's Economics Division. A summary of BOEM's findings is below.

### Geotechnical Feasibility for Alternatives C1, C2, D1+D2, D1+D2+D3, E1, and E2

Revolution Wind provided geotechnical feasibility and electrical engineering information and analysis regarding 21 of the 100 WTG positions included in the Proposed Action. BOEM's independent review confirmed that the 21 WTG positions identified by Revolution Wind are technically and economically infeasible for use in the RWF, as follows:

- Alternatives C1 and C2 relied on the use of 11 WTG positions that are infeasible for use in the RWF. Without those 11 WTG positions, the RWF would not have enough WTGs to meet its PPAs. Alternative C1 would have only 54 WTGs and Alternative C2 would have only 53 WTGs when 65 are needed for the PPAs. Alternatives D1 through D3 are still feasible *if selected individually*. However, Alternatives D1+D2 together would be infeasible because the RWF would not have enough WTGs to meet its PPAs. Alternatives D1+D2 together would only have 64 WTGs when 65 are needed for the PPAs.
- Similarly, Alternatives D2+D3 together would be infeasible because the RWF would not have enough WTGs to meet its PPAs. Alternatives D2+D3 together would only have 64 WTGs when 65 are needed for the PPAs.
- Alternatives D1+D2+D3 together would be infeasible because the RWF would not have enough WTGs to meet its PPAs. Alternatives D1+D2+D3 together would only have 59 WTGs when 65 are needed for the PPAs.
- Alternative E1 relied on the use of 16 WTG positions that are infeasible for use in the RWF. Without those 16 WTG positions, the RWF would not have enough WTGs to meet its PPAs. Alternative E1 would only have 48 WTGs when 65 are needed for the PPAs.

- Alternative E2 relied on the use of 19 WTG positions that are infeasible for use in the RWF. Without those 19 WTG positions, the RWF would not have enough WTGs to meet its PPAs. Alternative E2 would only have 62 WTGs when 65 are needed for the PPAs.

### Wind Turbine Generator Model Availability for Alternative F

Alternative F (Selection of a Higher Capacity Wind Turbine Generator) contains the following qualifier:

- The higher capacity WTG would fall within the physical design parameters of the PDE and be commercially available to the Project proponent within the time frame for the construction and installation schedule proposed in the COP.

Revolution Wind selected Siemens Gamesa as their WTG manufacturer. Siemens Gamesa verified in a signed letter that no WTG models with a nameplate capacity larger than 11 MW were available for use in the RWF (Revolution Wind 2022a). Specifically,

> … however, after evaluating the anticipated installation schedules and required certification timelines; as well as a lack of production capacity available from Siemens Gamesa, the change in platform was, and is still not a possibility. (Revolution Wind 2022a)

While preparing the Final EIS, BOEM conducted its own market research regarding other potentially available WTG models for the RWF and found that there are no models available with a larger capacity than the 11-MW model selected by Revolution Wind. The U.S. Department of Energy's *Offshore Wind Market Report: 2022 Edition* identifies General Electric (GE), Siemens Gamesa, and Vestas as the three manufacturers of WTGs that could theoretically be available for the Project under Alternative F (U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy 2022). However, GE's Haliade-X WTG is currently unavailable because it is "subject to a permanent injunction, issued Sept. 7, 2022, which bars the U.S. firm from selling the 12-MW to 14-MW megaturbine in the American market, except for exemptions granted for the Vineyard Wind 1 project off Massachusetts and the Ocean Wind project off southern New Jersey" (Powers 2022). Given the uncertainty regarding the future availability of the GE model and the length of time needed to order WTGs and prepare WTG-specific engineering, BOEM determined the Haliade-X is not economically feasible for consideration under Alternative F. Finally, the Vestas WTG has a rotor diameter that is larger (236 m) than the PDE for the RWF (220 m), rendering it inconsistent with the parameters for the alternative established in the Draft EIS (Vestas 2023).

## U.S. Army Corps of Engineers Section 404: Export Cable Route Alternatives Analysis Information

The EPA's Section 404(b)(1) guidelines can be found at 40 Code of Federal Regulations [CFR] 230 and apply to the U.S. Army Corps of Engineers' (USACE's) review of proposed discharges of dredged or fill material into waters of the United States (WOTUS) regulated under Section 404 of the Clean Water Act. In tidal waters, the shoreward limit of Section 404 jurisdiction is the high tide line, whereas the seaward limit is 3 nautical miles (nm) from the baseline of the territorial seas. In non-tidal waters, the Section 404 jurisdictional limit is the ordinary high-water mark of a waterbody. The guidelines also address impacts to special aquatic sites (SAS) identified in 40 CFR 230 subpart E. SASs are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. SASs include wetlands, sanctuaries and refuges, vegetated shallows (such as eelgrass), mud flats, coral reefs, and riffle and pool complexes.

Except as provided under Section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge that would have fewer adverse impacts on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Where the activity associated with a discharge which is proposed for a special aquatic site (as defined in 40 CFR 230 subpart E) does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not ‘‘water dependent’’), practicable alternatives that do not involve SASs are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for an SAS, all practicable alternatives to the proposed discharge that do not involve a discharge into an SAS are presumed to have fewer adverse impacts on the aquatic ecosystem, unless clearly demonstrated otherwise.

For the proposed RWF, the USACE has determined that the basic Project purpose is offshore wind energy generation. The following information on alternatives was provided to the USACE by the applicant and will be analyzed by the USACE according to the appropriate criteria in the guidelines in order to determine whether the applicant’s proposed discharge complies with the guidelines.

## Summary of Alternatives Considered

Revolution Wind evaluated combinations of nine potential export cable routes connecting the RWF with the mainland at five different landing locations (Figure K-19 and Figure K-20). Table K-2 provides a summary of cable routes considered and their potential impacts of concern to the USACE. The sections following Figure K-19, Figure K-20, and Table K-2 provide summaries of the nine export cable route evaluations.

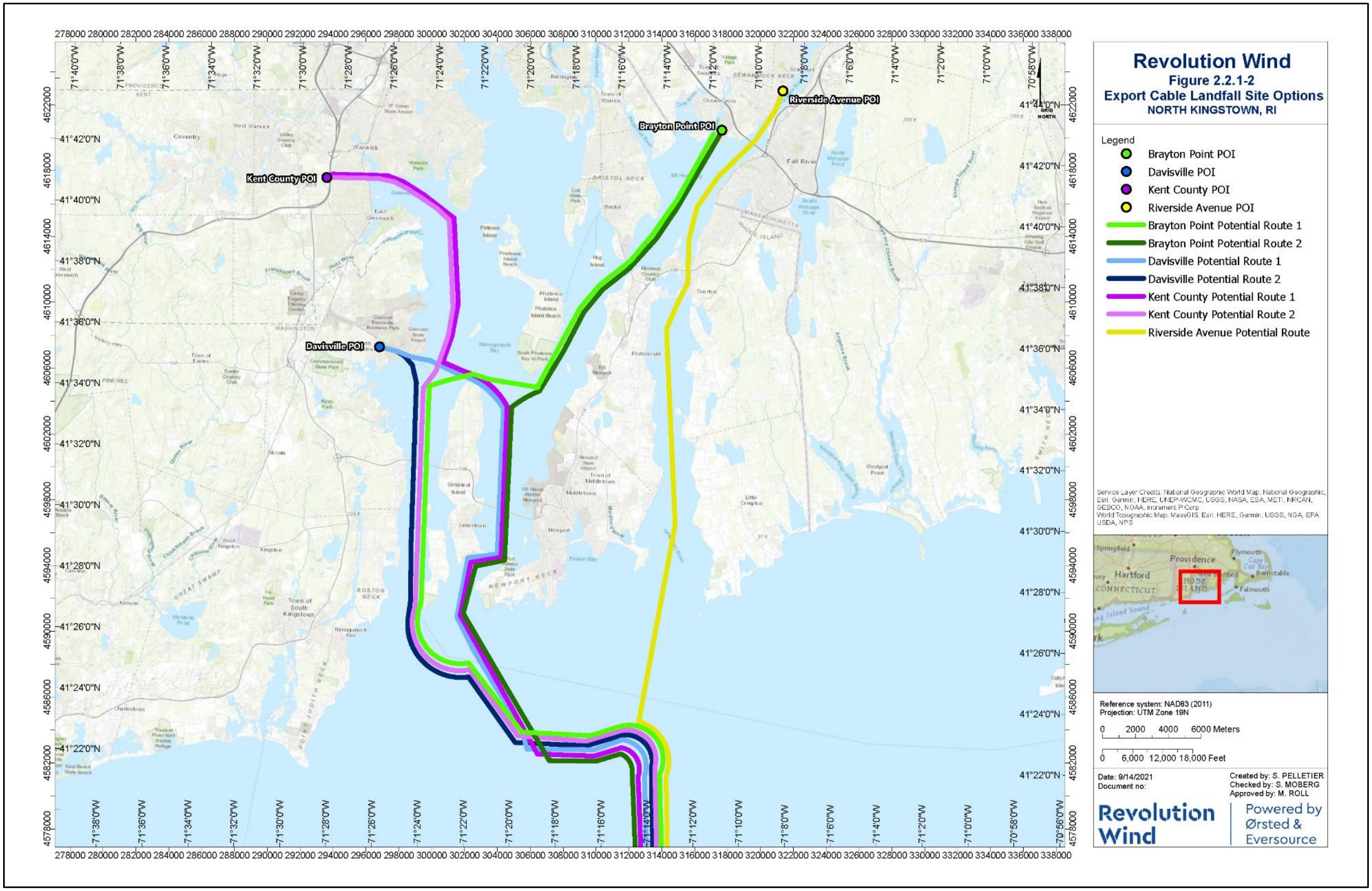


Figure K-19. Cable routes and landing sites considered (Brayton Point Routes 1 and 2, Riverside Avenue Route, Kent County Routes 1 and 2, Davisville Routes 1 and 2).

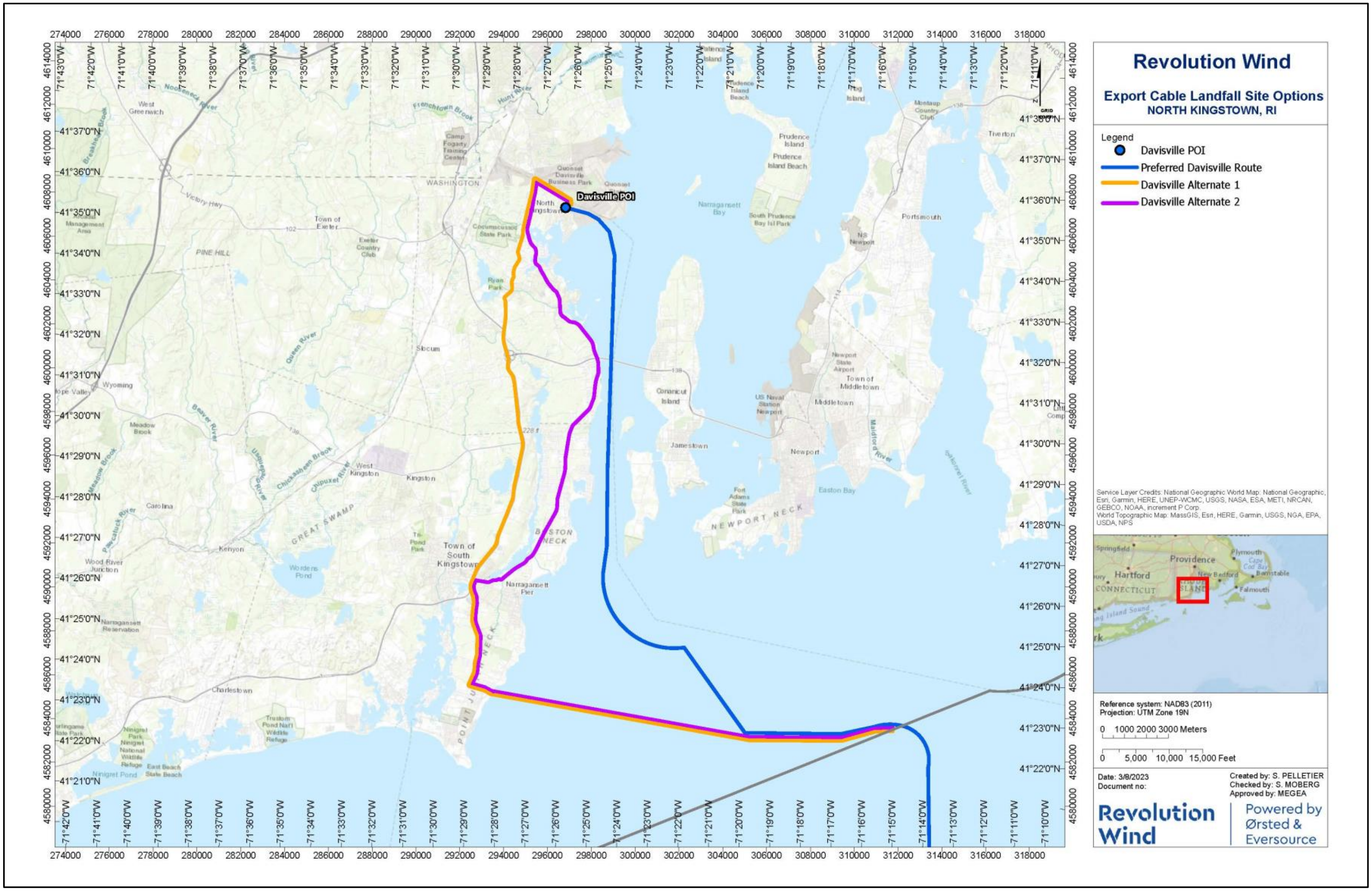


Figure K-20. Cable routes and landing sites considered (selected Davisville Route 2 and Davisville Over Land Alternates 1 and 2).

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**Table K-2. Summary of Cable Routes Considered**

| Factors | No Action Alternative | Brayton Point Route 1 | Brayton Point Route 2 | Riverside Avenue Route | Kent County Route 1 | Kent County Route 2 | Davisville Route 1 | Davisville Route 2 (Selected) | Davisville Over Land Alternate 1 | Davisville Over Land Alternate 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Linear feet of cable[*, †,‡] | 0 | 379,104 | 307,296 | 272,448 | 305,184 | 316,800 | 221,760 | 242,880 | 121,440 | 121,440 |
| Amount of redeposition of dredge material from horizontal directional drilling pits (square feet)[§] | 0 | 41,290 | 41,290 | 41,290 | 41,290 | 41,290 | 41,290 | 41,290 | 41,290 | 41,290 |
| Amount of fill material (acres)[¶] | 0 | 61.1 | 54.1 | 47.9 | 53.7 | 50.2 | 39.0 | 32.9 | 5.4 | 5.4 |
| Wetland impacts (square feet) | 0 | 0 | 0 | 0 | 30,000[††]<br>fresh water | 30,000[††]<br>fresh water | 0[**] | 0[**] | 13,476[##]<br>fresh water | 139,470[#]<br>(54,547 fresh water and 84,923 tidal) |
| Impacts to other SASs (square feet)[‡‡] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other concerns | N/A | Northern long-eared bat (NLEB)[§§] | U.S. Department of Defense (DOD) use conflicts<br>NLEB[§§] | N/A | DoD use conflicts<br>NLEB[§§]<br>Submerged cultural resources[¶¶] | NLEB[§§]<br>Submerged cultural resources[¶¶] | DOD use conflicts<br>NLEB[§§] | NLEB[§§] | USCG and DOD use conflicts<br>NLEB[§§]<br>High cost of overland construction<br>Need to obtain multiple real estate easements | USCG and DOD use conflicts<br>NLEB[§§]<br>High cost of overland construction<br>Need to obtain multiple real estate easements |
| Reasons for non-selection | Does not meet purpose and need | Longest cable length<br>Highest amount of fill in tidal waters | Cable length<br>Fill amount<br>DOD use conflicts | Cable length<br>Fill amount | Wetland fill<br>DoD use conflicts<br>Cable length<br>Fill amount<br>Submerged cultural resources | Wetland fill<br>Cable length<br>Fill amount<br>Submerged cultural resources | Fill Amount<br>DOD use conflicts | N/A | Wetland fill<br>USCG/DOD use conflicts<br>Cost<br>Project delays due to need for multiple real estate easements | Wetland fill<br>USCG/DOD use conflicts<br>Cost<br>Project delays due to need for multiple real estate easements |

Source: Revolution Wind (2023).

[*] Excludes onshore export cable segments.

[†] Distances reported from state waters boundary to landfall.

[‡] Distances reported in linear feet are inclusive of both export cable circuits.

[§] Assumes all export cable landfalls achieved by use of horizontal directional drilling methodology.

[¶] Approximate fill depths of 1 foot are anticipated from secondary cable protection. Fill is limited to secondary cable protection. Acreages shown include fill anticipated for cable crossings. Cable installation method is such that displaced material is incidental fallback; therefore, cable installation not subject to Section 404 review.

[#] Based on data obtained from MassGIS OLIVER online mapping tool, accessed September 2018.

[**] Up to 4,370 square feet of proposed tree clearing activities at Davisville Routes 1 and 2 are not considered to be wetland impacts as described in the “No Permit Required” letter issued by the USACE on February 11, 2022. No discharge of fill materials is proposed.

[††] Approximate area based on assumed Project substation footprint 150 × 200 feet. Existing site constraints would require the substation to be built in wetlands.

[‡‡] Data from Narragansett Bay National Estuarine Research Reserve (2009).

[§§] Within northern long-eared bat habitat range.

[¶¶] Data from Morissette (2014).

## Fill impacts associated with cable installation.

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### Brayton Point Route 1

The Brayton Point Route 1 (BPR1) export cable route would run from the Lease Area north into Narragansett Bay through the Lower West Passage between the towns of Jamestown, Narragansett, and North Kingstown, Rhode Island. The route would then pass through the Upper East Passage between Aquidneck Island and Prudence Island into Mount Hope Bay and terminate on the west side of Brayton Point in Somerset, Massachusetts. The BPR1 export cable route would be approximately 189,552 linear feet from the 3-nm limit of state waters to the landfall at Brayton Point.

- Revolution Wind assumed that a landfall at any potential location would be accomplished using horizontal directional drilling (HDD) techniques. This would require the excavation of two HDD exit pits in subtidal waters. The redeposition of the dredged material back into the pits at the conclusion of the HDD work would constitute a fill impact regulated under Section 404 of the Clean Water Act. The exit pits would total 41,290 square feet.
- Fill in subtidal WOTUS is limited to secondary cable protection where installation of the export cable may not reach target burial depth and cable protection is deemed warranted based on site specific conditions. Additionally, cable protection is anticipated for cable crossings of existing assets. Approximate fill depths of 1 foot are anticipated from secondary cable protection. Approximately 61.1 acres of secondary cable protection is anticipated for BPR1. The proposed impacts involve subtidal waters only. No fill impacts to tidal SASs, including salt marsh, mudflat, and eelgrass, are proposed.
- Revolution Wind performed a desktop review of available information regarding onshore freshwater wetlands subject to Section 404 jurisdiction. No Section 404 wetlands are present at the point of interconnection to the regional transmission grid, and consequently, no wetland impacts are associated with the BPR1 project substation.

BPR1 was excluded from further consideration based on having the greatest overall cable length and requiring the greatest amount of fill in tidal WOTUS.

### Brayton Point Route 2

The Brayton Point Route 2 (BPR2) export cable route would run from the Lease Area north into Narragansett Bay through the Lower East Passage between the towns of Jamestown and Newport and Middletown, Rhode Island, on Aquidneck Island. The route would then pass through the Upper East Passage between Aquidneck Island and Prudence Island into Mount Hope Bay and terminate on the west side of Brayton Point in Somerset, Massachusetts. The BPR2 export cable route would be approximately 153,648 linear feet from the 3-nm limit of state waters to the landfall at Brayton Point.

- 41,290 square feet of subtidal impacts is anticipated for the redeposition of dredged material back into the two HDD exit pits.
- Fill anticipated in subtidal WOTUS associated with secondary cable protection along BPR2 is 54.1 acres. No fill impacts to tidal SASs, including salt marsh, mudflat, and eelgrass, are proposed.

- Similar to BPR1, no Section 404 wetlands are present at the point of interconnection to the regional transmission grid, and consequently, no wetland impacts are associated with the BPR2 Project substation.
- Beginning in 2018, Revolution Wind consulted with the United States Navy (Department of Defense [DOD]) regarding the potential for siting an export cable in the Lower East Passage. Although the DOD did not issue correspondence to Revolution Wind denying the use of the East Passage as a potential export cable route, their preference for avoiding siting a cable in the East Passage was expressed consistently during a series of meetings occurring in 2018 and 2019. Consequently, Revolution Wind focused its attention on identifying and engineering a preferred export cable route in the West Passage of Narragansett Bay (Revolution Wind 2022b). This constraint applies to any export cable route option occupying the Lower East Passage.

BPR2 was excluded from further consideration based on DOD use conflicts and based on having a longer cable route and requiring a higher amount of fill in tidal WOTUS than several other routes, including the Project proponent’s selected route.

### Riverside Avenue Route

The Riverside Avenue Route (RAR) export cable would run from the Lease Area north into Narragansett Bay through the Sakonnet River between Aquidneck Island and the Towns of Little Compton and Tiverton, Rhode Island, into Mount Hope Bay. The RAR export cable would continue north through Mount Hope Bay into the Taunton River between the town of Somerset and the city of Fall River, Massachusetts, and terminate near the former Montaup Power Plant on the east side of Somerset. The RAR export cable route would be approximately 136,224 linear feet from the 3-nm limit of state waters to the landfall at Montaup.

- 41,290 square feet of subtidal impacts is anticipated for the redeposition of dredged material back into the two HDD exit pits.
- Fill anticipated in subtidal WOTUS associated with secondary cable protection along RAR is 47.9 acres. No fill impacts to tidal SASs, including salt marsh, mudflat, and eelgrass, are proposed.
- Similar to BPR1, no Section 404 wetlands are present at the point of interconnection to the regional transmission grid, and consequently, no wetland impacts are associated with the RAR Project substation.

RAR was excluded from further consideration based on having a longer cable length and requiring a higher amount of fill in tidal WOTUS than several other routes, including the Project proponent’s selected route.

### Kent County Route 1

The Kent County Route 1 (KCR1) export cable route would run from the Lease Area north into Narragansett Bay through the Lower East Passage between the towns of Jamestown and Newport and Middletown, Rhode Island, on Aquidneck Island. The route would then pass through the Upper West Passage between Prudence Island and the town of North Kingstown, town of East Greenwich, and the city of Warwick, Rhode Island, and terminate near Chipewanoxet Point in Warwick, Rhode Island. The KCR1 export cable route would be approximately 152,592 linear feet from the 3-nm limit of state waters to the landfall at Chipewanoxet Point.

- 41,290 square feet of subtidal impacts are anticipated for the redeposition of dredged material back into the two HDD exit pits.
- Fill anticipated in subtidal WOTUS associated with secondary cable protection along KCR1 is 53.7 acres. No fill impacts to tidal SASs, including salt marsh, mudflat, and eelgrass, are proposed.
- For the Kent County routes, the point of interconnection to the regional transmission grid is The Narragansett Electric Company (TNEC) Kent County Substation. The substation site is bordered by wetland resource areas on the north, west, and south, and by Interstate 95 on the east. Revolution Wind concluded based on these constraints that the Project substation would need to be built in Section 404 jurisdictional wetlands. Based on an assumed Project substation footprint of 150 × 200 feet, the KCR1 export cable route would result in 30,000 square feet of impacts to Section 404 wetlands.
- The DOD expressed a preference to avoid the Lower East Passage due to potential use conflicts.
- During its preliminary cable routing analysis, Revolution Wind identified the potential for significant pre-Contact submerged cultural resource constraints within Greenwich Bay (Morissette 2014), making either Kent County export cable route less desirable.

KCR1 was excluded from further consideration based on wetland impacts, the potential for greater impacts to submerged cultural resources, DOD use conflicts, and having a longer cable length and requiring more fill in tidal WOTUS than some other routes, including the proponent’s selected route.

### Kent County Route 2

The Kent County Route 2 (KCR2) export cable route would run from the Lease Area north into Narragansett Bay through the Lower West Passage between the towns of Jamestown, Narragansett, and North Kingstown, Rhode Island. The route would then pass through the Upper West Passage between Prudence Island and the town of North Kingstown, town of East Greenwich, and the city of Warwick, Rhode Island, and terminate near Chipewanoxet Point in Warwick, Rhode Island. The KCR2 export cable route would be approximately 158,400 linear feet from the 3-nm limit of state waters to the landfall at Chipewanoxet Point.

- 41,290 square feet of subtidal impacts is anticipated for the redeposition of dredged material back into the two HDD exit pits.
- Fill anticipated in subtidal WOTUS associated with secondary cable protection along KCR2 is 50.2 acres. No fill impacts to tidal SASs, including salt marsh, mudflat, and eelgrass, are proposed.
- Similar to KCR1, because of existing wetland constraints at the Kent County Substation, the KCR2 export cable route would result in 30,000 square feet of impacts to Section 404 wetlands.
- There are potential submerged cultural resources within Greenwich Bay.

KCR2 was excluded from further consideration based on wetland impacts, the potential for greater impacts to submerged cultural resources, and having a longer cable length and requiring a higher amount of fill in tidal WOTUS than some other routes including the proponent's selected route.

### Davisville Route 1

The Davisville Route 1 (DR1) export cable route would run from the Lease Area north into Narragansett Bay through the Lower East Passage between the towns of Jamestown, Newport, and Middletown, Rhode Island, on Aquidneck Island and terminate at the south side of Quonset Point in North Kingstown, Rhode Island. The DR1 export cable route would be approximately 110,880 linear feet from the 3-nm limit of state waters to the landfall at Quonset Point.

- 41,290 square feet of subtidal impacts is anticipated for the redeposition of dredged material back into the two HDD exit pits.
- Fill anticipated in subtidal WOTUS associated with secondary cable protection along DR1 is 39.0 acres. No fill impacts to tidal SASs, including salt marsh, mudflat, and eelgrass, are proposed.
- DR1 avoids impacts to onshore freshwater wetlands.
- The DOD expressed a preference to avoid the Lower East Passage due to use conflicts.

DR1 was excluded from further consideration based on DOD use conflicts and because it would require a higher amount of fill in tidal waters than the proponent's selected route.

### Davisville Route 2 (Selected)

The Davisville Route 2 (DR2) export cable route would run from the Lease Area north into Narragansett Bay through the Lower West Passage between the towns of Jamestown, Narragansett, and North Kingstown, Rhode Island, and terminate at the south side of Quonset Point in North Kingstown, Rhode Island. The DR2 export cable route would be approximately 121,440 linear feet from the 3-nm limit of state waters to the landfall at Quonset Point.

- 41,290 square feet of subtidal impacts is anticipated for the redeposition of dredged material back into the two HDD exit pits.
- Fill anticipated in subtidal WOTUS associated with secondary cable protection along DR2 is 32.9 acres. No fill impacts to tidal SASs, including salt marsh, mudflat, and eelgrass, are proposed.
- DR2 avoids impacts to onshore freshwater wetlands .
- DR2 avoids potential DOD/USCG use conflicts.

DR2 was selected by the Project applicant based on the avoidance of wetland impacts and DOD/USCG use conflicts. Moreover, the potential for major Project delays associated with Davisville Over Land Alternates 1 and 2 would likely render those alternatives inconsistent with the purpose and need for the Project because they would negate the applicant's ability to meet their offtake agreement terms. The DR2 route is used in all action alternatives analyzed in this EIS.

### Davisville Over Land Alternate 1

The Davisville Over Land Alternate 1 (DA1) export cable route would run from the Lease Area north into Narragansett Bay and terminate at Scarborough State Beach in Narragansett, Rhode Island. The DA1 export cable route would be approximately 60,720 linear feet from the 3-nm limit of state waters to the landfall at Narragansett. Onshore, the underground ductbank would follow existing paved roadways (Burnside Road, State Route 108, and U.S. Route 1) in the towns of Narragansett, South Kingstown, and North Kingstown before joining the TNEC 115-kilovolt (kV) Davisville Transmission Tap right-of-way (ROW) and would follow the TNEC ROW to the Davisville Substation for an overall onshore distance of approximately 17 miles (89,760 linear feet). Between the Davisville Substation and the Project's onshore substation, the underground ductbank would be co-located in the overhead ROW.

Construction of DA1 would impact 13,476 square feet of palustrine scrub-shrub and palustrine forested wetland primarily along the Davisville Transmission Tap ROW. The DA1 export cable route would cross the USCG traffic separation scheme entering the bay and a DOD torpedo testing range.

- 41,290 square feet of subtidal impacts is anticipated for the redeposition of dredged material back into the two HDD exit pits.
- Fill anticipated in subtidal WOTUS associated with secondary cable protection along the selected route is 5.4 acres. No fill impacts to tidal SASs, including salt marsh, mudflat, and eelgrass, are proposed.
- DA1 would result in 13,476 square feet (0.3 acre) of impacts to onshore freshwater wetlands. No fill impacts to tidal SAS- including salt marsh, mudflat, and eelgrass- are proposed.
- DA1 would cross the USCG traffic separation scheme entering the bay and would cross a DOD torpedo testing range, thereby creating potential DoD/USCG use conflicts.
- DA1 would have the second highest construction cost due to the length of the onshore route and would be estimated to cost 60% more than Davisville Route 2.
- DA1 would have difficult constructability issues due to its location along high traffic, limited access roadways.
- The cable installation work for DA1 would take much longer than for the cable routes that are primarily located in the water, which would cause a major delay in the completion of the Project.
- DA1 would require that the Project proponent obtain real estate easements from state and local entities, which would cause a major delay in the implementation of this alternative.

DA1 was excluded from further consideration based on wetland impacts, potential DOD/USCG use conflicts, major delays in Project implementation based on the need to obtain real estate easements from state and local entities, and higher construction costs and a much longer construction timeframe than the proponent's selected alternative.

### Davisville Over Land Alternate 2

The Davisville Over Land Alternate 2 (DA2) export cable route would run from the Lease Area north into Narragansett Bay and terminate at Scarborough State Beach in Narragansett, Rhode Island. The DA1 export cable route would be approximately 60,720 linear feet from the 3-nm limit of state waters to the landfall at Narragansett. Onshore, the underground ductbank would follow existing paved roadways (Burnside Road, State Route 108, and U.S. Route 1) in the towns of Narragansett, South Kingstown, and North Kingstown before joining a TNEC 34.5-kV distribution ROW. At that point, it would follow the TNEC distribution ROW cross country to the Davisville Transmission Tap ROW, then follow the Davisville Transmission Tap ROW to the Davisville Substation for an overall onshore distance of approximately 18.8 miles (99,264 linear feet). Between the Davisville Substation and the Project's onshore substation, the underground ductbank would be co-located in the overhead ROW.

Construction of DA2 would impact 144,262 square feet of palustrine scrub-shrub and forested and estuarine emergent wetland. The DA2 export cable route would cross the USCG traffic separation scheme entering the bay and a DOD torpedo testing range.

- 41,290 square feet of subtidal impacts is anticipated for the redeposition of dredged material back into the two HDD exit pits.
- Fill anticipated in subtidal WOTUS associated with secondary cable protection along the selected route is 5.4 acres.
- DA2 would result in 139,470 square feet (3.2 acres) of fill impacts to wetlands (1.25 acres of freshwater wetlands and 1.95 acres of tidal wetlands) related to the cable installation along the overland route. There would also be 1,269 square feet (0.03 acre) of fill impacts to a freshwater pond and 3,523 square feet (0.08 acre) of fill impacts to tidal waters.
- DA2 would cross the USCG traffic separation scheme in the bay and would cross a DOD torpedo range, thereby creating potential USCG/DOD use conflicts.
- DA2 would have the highest construction cost of any of the alternatives due to having the greatest length of onshore route and would cost approximately 75% more than Davisville Route 2.
- DA2 would have difficult constructability issues due to its location along a cross-country utility ROW with multiple wetland and waterway crossings.
- The cable installation work for DA1 would take much longer than for the cable routes that are primarily located in the water, which would cause a major delay in the completion of the project.
- DA2 would require that the Project proponent obtain real estate easements from state and local entities, TNEC, and potentially private property owners, which would cause a major delay in implementation of this alternative.

DA2 was excluded from further consideration based on wetland impacts; potential DOD/USCG use conflicts; major delays in Project implementation based on the need to obtain real estate easements from state, local, and possibly private entities; and higher construction costs and a much longer construction timeframe than the proponent's selected alternative.

### Summary

Of the potential export cable routes evaluated, the Brayton Point routes, the Kent County routes, the Riverside Avenue route, Davisville Route 1, and the two Davisville Over Land Alternate routes were ultimately excluded from further consideration by the Project applicant. Subsequently, as part of its implementation of the NEPA regulations governing the development of a "reasonable range of alternatives" and its alternatives screening criteria, BOEM also excluded these routes from further consideration based on a variety of factors, including wetland impacts, fill impacts, USCG and/or DOD use conflicts, construction costs, and Project implementation and completion delays. Consequently, Revolution Wind identified Davisville Route 2 as their selected route for the export cable. This alternative accommodates the full generation capacity of the Project while avoiding wetland impacts, DoD/USCG use conflicts, and the major Project delays and higher construction costs associated with the two over land alternatives. This  route also involves the least fill in tidal waters of the primarily in-water routes and is used in all action alternatives analyzed in this EIS.

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# APPENDIX L

## Comments Received on Draft Environmental Impact Statement and BOEM's Responses to Public Comments on the Draft Environmental Impact Statement

# Contents

# Tables

# Introduction

On September 2, 2022, the Bureau of Ocean Energy Management (BOEM) published a notice of availability for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project draft environmental impact statement (EIS), consistent with the regulations implementing the National Environmental Policy Act (NEPA) (42 United States Code 4321 et seq.) to assess the potential impacts of the Proposed Action and alternatives. The Draft EIS was made available in electronic form for public viewing at https://www.boem.gov/renewable-energy/state-activities/revolution-wind, and hard copies or electronic copies were delivered to other entities as specified in EIS Appendix H. The NEPA review process requires agencies to allow the public the opportunity to comment on a draft EIS. The notice of availability initiated a 45-day public comment period for the Draft EIS. The comment period closed on October 17, 2022. This appendix presents the public comment processing methodology and definitions, includes responses to comments received on the Draft EIS, and describes whether updates to the Final EIS have been made in response to a comment.

# Objective

BOEM reviewed and considered all written and oral public submissions received during the 45-day public comment period. BOEM's goal was to identify comments to be addressed in the Final EIS and to categorize those comments based on the applicable resource areas or NEPA topics. This categorization scheme allowed subject matter experts to review comments directly related to their areas of expertise and allowed BOEM to generate statistics based on the resource areas or NEPA topics addressed in each of the comments. All public comment submissions received can be viewed online at http://www.regulations.gov by typing "BOEM-2022-0045" in the search field.

# Methodology

## Terminology

The following terminology is used throughout this appendix:

- *Submission*: The entire content submitted by a single person or group at a single time. For example, a 10-page letter from a citizen, an email with a portable document format (PDF) attachment, and a transcript of an oral comment given at a public hearing meeting were each considered to be a submission.
- *Comment*: A specific statement within a submission that expresses a sender's specific point of view, concern, question, or suggestion. A comment can consist of more than one sentence, as long as those grouped sentences express a single idea. One submission may contain many comments.
- *Substantive comment*: To be substantive, a comment must relate to the reasonably foreseeable impacts of the Proposed Action, alternatives, or cumulative actions and do one or more of the following:
    - Question (with supporting rationale) the accuracy of information in the Draft EIS
    - Question (with supporting rationale) the adequacy of, methodology for, or assumptions used for the environmental analysis

  - Present new information relevant to the analysis
  - Present reasonable alternatives or mitigation measures other than those analyzed in the Draft EIS
  - Present or cause modifications to alternatives or mitigation measures analyzed in the Draft EIS
  - Correct factual errors in the content of the Draft EIS
- *General comment*: General comments are comments other than substantive comments. General comments may 1) express interest or concern regarding an impact topic without providing specific comments on the information, methods, or findings presented in the Draft EIS; 2) express general support for or opposition to the Project; or 3) comment on a topic unrelated to the Project.

## Comment Submittals

Federal agencies; state, local, and tribal governments; and the general public had the opportunity to provide comments on the Draft EIS via the following mechanisms:

- Electronic submissions via www.regulations.gov under docket number BOEM-2022-0045
- Hard copy comment letters submitted to BOEM via traditional mail
- Comments submitted verbally at each of the public hearings.

BOEM held two online public hearings via Zoom Webinar platform and three in-person public hearings to solicit verbal and written comments to inform preparation of the Final EIS. The hearings were free and open to the public with no reservations required. Locations and dates of these hearings are outlined in Table L-1, and transcripts are available here: https://www.boem.gov/renewable-energy/state-activities/revolution-wind.

**Table L-1. Public Hearings**

| Date | Time | Location |
|---|---|---|
| September 29, 2022 | 1:00 p.m. eastern time | Zoom Webinar |
| October 4, 2022 | 5:00 p.m. eastern time | In person (Martha's Vineyard)<br>Aquinnah Old Town Hall<br>955 State Road<br>Aquinnah, Massachusetts 02535 |
| October 5, 2022 | 5:00 p.m. eastern time | In person (East Greenwich)Swift Community Center 121 Peirce Street East Greenwich, Rhode Island 02818 |
| October 6, 2022 | 5:00 p.m. eastern time | In person (New Bedford)Keith Middle School<br>225 Hathaway Boulevard<br>New Bedford, Massachusetts 02740 |
| October 11, 2022 | 5:00 p.m. eastern time | Zoom Webinar |

All submissions initially provided by methods other than submitting them to www.regulations.gov, including the transcripts of testimony by individual speakers at the public hearings listed in Table L-2, were uploaded to the docket at www.regulations.gov and assigned a unique submission identification number. That unique submission identification number was retained throughout the comment management process for both submissions and for the individual comments within those submissions.

## Comment Processing

BOEM downloaded and reviewed all submissions from www.regulations.gov. These submissions were provided in Hypertext Markup Language (html) format, whereas attachments provided by stakeholders as part of their www.regulations.gov submission were typically provided in PDF or Microsoft Word format. Text from all formats was parsed, coded, and exported into a single Microsoft Excel file that served as the primary submission database. The submission database also included information about each submission, including the submitter's contact information, submission date, and whether the submitter was a government entity or agency or citizen. All coded comments are presented herein verbatim as received. No edits or grammatical corrections were made. All submissions are available for review at www.regulations.gov under docket number BOEM-2022-0045.

BOEM received a total of 123 individual comment submissions as shown in Table L-2. As noted in the notice of availability, BOEM did not include anonymous comments.

**Table L-2. Regulations.gov Submission Identification Number and Submitter**

| Federal Document Management System (FDMS) Submission Number | Submitter |
|---|---|
| BOEM-2022-0045-0001 | This submission number was not assigned |
| BOEM-2022-0045-0002 | Benjamin Riggs |
| BOEM-2022-0045-0003 | Associated Industries of Massachusetts (AIM) |
| BOEM-2022-0045-0004 | City of New London |
| BOEM-2022-0045-0005 | johnprue62@gmail.com* |
| BOEM-2022-0045-0006 | Edward R. Johnson |
| BOEM-2022-0045-0007 | Chamber Of Commerce Of Eastern Connecticut |
| BOEM-2022-0045-0008 | Iron Workers Local 37 |
| BOEM-2022-0045-0009 | Katherine Kohrman |
| BOEM-2022-0045-0010 | Jennifer Valentine |
| BOEM-2022-0045-0011 | Nancy Cadet |
| BOEM-2022-0045-0012 | Eastern Connecticut Workforce Investment Board, Inc. |
| BOEM-2022-0045-0013 | Greater New Bedford Workforce |
| BOEM-2022-0045-0014 | Rhode Island Building and Construction Trades Council |
| BOEM-2022-0045-0015 | BuildRI |
| BOEM-2022-0045-0016 | Blount Boats |
| BOEM-2022-0045-0017 | One SouthCoast Chamber |

| Federal Document Management System (FDMS) Submission Number | Submitter |
|---|---|
| BOEM-2022-0045-0018 | The Connecticut Business & Industry Association (CBIA) |
| BOEM-2022-0045-0019 | Building Futures |
| BOEM-2022-0045-0020 | Massachusetts Business Roundtable |
| BOEM-2022-0045-0021 | Greater Mystic Chamber of Commerce |
| BOEM-2022-0045-0022 | Chamber of Commerce Eastern Connecticut |
| BOEM-2022-0045-0023 | North Kingstown Chamber of Commerce |
| BOEM-2022-0045-0024 | ECOncrete |
| BOEM-2022-0045-0025 | Harriet Bernstein |
| BOEM-2022-0045-0026 | MetroHartford Alliance |
| BOEM-2022-0045-0027 | Waterson Terminal Services, LLC |
| BOEM-2022-0045-0028 | AdvanceCT |
| BOEM-2022-0045-0029 | TY Howe |
| BOEM-2022-0045-0030 | Southeastern Wind Coalition |
| BOEM-2022-0045-0031 | Maritime Association of the Port of NY & NJ |
| BOEM-2022-0045-0032 | North Kingstown Chamber of Commerce |
| BOEM-2022-0045-0033 | Northeast Clean Energy Council |
| BOEM-2022-0045-0034 | Miles Grant |
| BOEM-2022-0045-0035 | The Greater Boston Chamber of Commerce |
| BOEM-2022-0045-0036 | BlastOne International |
| BOEM-2022-0045-0037 | John Haran |
| BOEM-2022-0045-0038 | Edison Chouest Offshore |
| BOEM-2022-0045-0039 | Climate Jobs Rhode Island |
| BOEM-2022-0045-0040 | Benjamin Candea |
| BOEM-2022-0045-0041 | Menunkatuck Audubon Society |
| BOEM-2022-0045-0042 | Connecticut Port Authority |
| BOEM-2022-0045-0043 | Construction Industries of Rhode Island |
| BOEM-2022-0045-0044 | Paige Therien |
| BOEM-2022-0045-0045 | IUPAT DC 11 |
| BOEM-2022-0045-0046 | Meghan Gombos |
| BOEM-2022-0045-0047 | Riggs Distler and Company, Inc. |
| BOEM-2022-0045-0048 | Albert Wynn |

| Federal Document Management System (FDMS) Submission Number | Submitter |
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| BOEM-2022-0045-0049 | James A. "Spider" Marks |
| BOEM-2022-0045-0050 | Guy Caruso |
| BOEM-2022-0045-0051 | Christopher Thawley |
| BOEM-2022-0045-0052 | University of Connecticut |
| BOEM-2022-0045-0053 | Constance Gee |
| BOEM-2022-0045-0054 | Alpine Ocean Seismic Survey, Inc. |
| BOEM-2022-0045-0055 | ECOncrete |
| BOEM-2022-0045-0056 | TY Howe |
| BOEM-2022-0045-0057 | Nouveau Consulting |
| BOEM-2022-0045-0058 | U.S. Coast Guard |
| BOEM-2022-0045-0059 | Seafreeze Shoreside, Seafreeze Ltd. |
| BOEM-2022-0045-0060 | Connecticut Roundtable on Climate and Jobs |
| BOEM-2022-0045-0061 | Stephen Kent |
| BOEM-2022-0045-0062 | Save The Bay |
| BOEM-2022-0045-0063 | Martha Small |
| BOEM-2022-0045-0064 | Norman Bird Sanctuary |
| BOEM-2022-0045-0065 | RODA |
| BOEM-2022-0045-0066 | Patrice Douglas |
| BOEM-2022-0045-0067 | Thomas Magness |
| BOEM-2022-0045-0068 | Craig Stevens |
| BOEM-2022-0045-0069 | Rhode Island Department of Environmental Management |
| BOEM-2022-0045-0070 | New Bedford Port Authority |
| BOEM-2022-0045-0071 | New England Fishery Management Council and Mid-Atlantic Fishery Management Council |
| BOEM-2022-0045-0072 | The Massachusetts Office of Coastal Zone Management |
| BOEM-2022-0045-0073 | Emily Pfeifer |
| BOEM-2022-0045-0074 | Anne Simon |
| BOEM-2022-0045-0075 | New England for Offshore Wind |
| BOEM-2022-0045-0076 | The Nature Conservancy |
| BOEM-2022-0045-0077 | New England for Offshore Wind & Green Energy Consumers Alliance |
| BOEM-2022-0045-0078 | The Nature Conservancy |
| BOEM-2022-0045-0079 | U.S. Environmental Protection Agency (EPA) |

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| BOEM-2022-0045-0080 | Town of New Shoreham, City of Newport et al. |
| BOEM-2022-0045-0081 | Town of New Shoreham, City of Newport et al. |
| BOEM-2022-0045-0082 | Town of New Shoreham, City of Newport et al. |
| BOEM-2022-0045-0083 | New York State Department of State |
| BOEM-2022-0045-0084 | Jane Philppi |
| BOEM-2022-0045-0085 | Matthew Dawson |
| BOEM-2022-0045-0086 | Orsted |
| BOEM-2022-0045-0087 | Vaisala |
| BOEM-2022-0045-0088 | Robert Dalglish |
| BOEM-2022-0045-0089 | Rhode Island Saltwater Anglers Association |
| BOEM-2022-0045-0090 | RI Associated General Contractors |
| BOEM-2022-0045-0091 | Save The Sound |
| BOEM-2022-0045-0092 | Business Network for Offshore Wind |
| BOEM-2022-0045-0093 | Elizabeth Knight |
| BOEM-2022-0045-0094 | RENEW Northeast |
| BOEM-2022-0045-0095 | ConservAmerica |
| BOEM-2022-0045-0096 | Rhode Island Coastal Resources Management Council |
| BOEM-2022-0045-0097 | Carl van Warmerdam |
| BOEM-2022-0045-0098 | Long Island Commercial Fishing Association |
| BOEM-2022-0045-0099 | Gay Head Lighthouse Advisory Board and Town of Aquinnah |
| BOEM-2022-0045-0100 | National Marine Fisheries Service, Greater Atlantic Regional Fisheries Office |
| BOEM-2022-0045-0101 | Mashantucket (Western) Pequot Tribal Nation |
| BOEM-2022-0045-0102 | Mashpee Wampanoag Tribe |
| BOEM-2022-0045-0103 | EPA |
| BOEM-2022-0045-0104 | Cultural Heritage Partners |
| BOEM-2022-0045-0105 | U.S. Army Corps of Engineers |
| BOEM-2022-0045-0106 | maggielsmith@gmail.com* |
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| BOEM-2022-0045-0108 | flycasting@comcast.net* |
| BOEM-2022-0045-0109 | eqknight@verizon.net* |
| BOEM-2022-0045-0110 | National Wildlife Federation, Natural Resources Defense Council, Conservation Law Foundation, National Audubon Society, |

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| BOEM-2022-0045-0111 | State of New York Department of State |
| BOEM-2022-0045-0112 | Mystic Aquarium |
| BOEM-2022-0045-0113 | BlueGreen Alliance |
| BOEM-2022-0045-0114 | Theodore Barten |
| BOEM-2022-0045-0115 | Public Hearing #1 9/29/2022 transcript |
| BOEM-2022-0045-0116 | Public Hearing #2 10/4/2022 transcript |
| BOEM-2022-0045-0117 | Public Hearing #3 10/5/2022 transcript |
| BOEM-2022-0045-0118 | Public Hearing #4 10/6/2022 transcript |
| BOEM-2022-0045-0119 | Public Hearing #5 10/11/2022 transcript |
| BOEM-2022-0045-0120 | BlueGreen Alliance |
| BOEM-2022-0045-0121 | William Barry |
| BOEM-2022-0045-0122 | William Barry |
| BOEM-2022-0045-0123 | National Park Service |
| BOEM-2022-0045-0124 | Rhode Island Historic Preservation and Heritage Commission |

* First and last name not provided in the www.regulations.gov online form for comment submission.

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# NEPA Process and EIS Components

## Alternatives

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| BOEM-2022-0045-0096 | 1 | Reduce the number of WTG positions to the amount necessary to meet existing Purchase Power Agreements (PPAs)<br><br>The final approval of the Project should limit the number of WTG positions to the number needed to meet current PPA obligations so to reduce the overall footprint and impacts from the construction, operation and maintenance, and decommissioning of the Project. The Proposed Action would include 100 WTG positions with the capacity to deliver 880MW of offshore wind renewable energy. However, the Project currently has three PPAs totaling 704MWs: 200MW with the State of Connecticut, 400MW with the State of Rhode Island, and an additional 104MW with the State of Connecticut. See DEIS at ES-2. Thus, if the project were to utilize 11MW WTGs, only 64 WTG positions would be necessary to fulfill the 704MW PPA and 36 WTG positions could be eliminated. Eliminating 36 positions would allow for greater flexibility in siting WTGs to avoid fragile habitat and resources and reduce user conflicts that would result from the Proposed Action. | Thank you for the comment. After carefully considering the EIS alternatives, including comments from the public on the Draft EIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0092 | 1 | While the Network begins by commending BOEM for recognizing the importance of public policy by maintaining a commitment to achieving at least 704-MW nameplate capacity for the Proposed Action and each of the Action Alternatives, we encourage BOEM closely examine whether the environmental, safety, and/or societal benefits of each alternative outweighs the loss of clean energy output. Offshore wind project developers are currently dependent on state procurement processes to receive an offtake agreement and due to state timelines or market competition, may not have secured an offtake agreement that is reflective of their entire project portfolio or that maximizes the public good. We commend BOEM for weighing state policy choices in the EIS process, but encourage BOEM to recognize that future state energy needs may not have been defined yet, and alternative offtake pathways including corporate or governmental procurement agreements may be utilized in the future. Every reduction in a turbine is a reduction in clean, renewable energy production that can be used in the future. As noted above, the cumulative environmental impact of the Revolution Wind project is substantial, especially in comparison to the absence of any action and the continued reliance on current energy generation.<br>Additionally, while BOEM considers the minimum turbines needed to achieve public policy objections, the Network encourages analysis to factor in unexpected disruptions to service. Routine maintenance may require turbines to be shutdown occasionally, and developers may have factored in extra turbine placements to mitigate time lost to service. | BOEM’s regulations require BOEM to analyze Revolution Wind’s proposal to build a commercial-scale wind energy facility on the Renewable Energy Lease Number OCS-A 0486. The purpose and need in the EIS reflect the requirement per those regulations, whereas BOEM’s purpose as stated in Section 1.2 is to determine whether to approve, approve with modifications or disapprove Revolution Wind’s COP to fulfill BOEM’s duties under the lease. BOEM considered reasonable alternatives during the EIS development process that would avoid or minimize adverse impacts in accordance with NEPA implementing regulations. |
| BOEM-2022-0045-0058 | 1 | Overall, the DEIS sufficiently evaluates the impacts to navigation safety of waterway users and our missions, resulting in minor to moderate adverse impacts. The Coast Guard supports the Proposed Action Alternative, which maintains an east-west and north-south 1NM by 1NM spacing and layout, in alignment with other proposed adjacent wind farms. As we concluded in the Massachusetts/Rhode Island (MA/RI) Port Access Route Study (MARIPARS) report (referenced in the DEIS as USCG 2020), a key means to mitigate effects on safe navigation and Coast Guard missions is the adoption of a uniform grid pattern across the entire MA/RI wind energy area. The standard and uniform grid pattern may also mitigate cumulative impacts to commercial and recreational fishing. | Thank you for your comment. |
| BOEM-2022-0045-0103 | 2 | We support the inclusion of Alterative F in the mix of DEIS alternatives under consideration by BOEM and see it as an effective tool in combination with other build alternatives to reduce project impacts while still meeting energy generation objectives. BOEM’s consideration of 14 MW WTGs in Alternative F is consistent with other projects proceeding through the BOEM environmental review process that contemplate similar or greater minimum nameplate capacities. The DEIS generally describes impact reductions provided by Alternative F through reductions in the number of WTGs and inter-array cables needed for the project.<br>Recommendations: Our recommendations below are intended to help BOEM improve the analysis of Alternative F to support BOEM decision-making regarding alternatives.<br>Based on our review we encourage BOEM to present a more refined analysis of the amount of impact reduction that could be associated with Alternative F through the reduction in the number of WTGs and inter-array cables. One area where the analysis could be improved is in the presentation of the alternative. Whereas the DEIS provides both narrative and visual representations of the Alternatives B/C-E as part of the effort to describe impacts, the presentation of Alternative F is less specific due it appears to the noted uncertainty about which WTG locations would be eliminated under the alternative. For example, the DEIS notes that “…using a higher capacity WTG would potentially reduce the number of foundations constructed | Thank you for your comment. Appendix E-4 of the EIS provides calculations of WTG numbers, footprint, and scour protection associated with Alternative F. The EIS was updated to provide this quantification, as feasible by resource. Project design has not occurred for Alternative F; therefore, GIS calculations for the IAC, OSS-link cable, and RWEC are not available. In these cases, the EIS uses the Proposed Action as the most conservative proxy estimate and indicates that best professional judgment suggests that the footprint of the IAC, OSS-link cable, and RWEC would change and be slightly reduced to match the reduced number of WTGs under Alternative F. |

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| | | to meet the purpose and need and thereby potentially reduce impacts to marine habitats and culturally significant resources and potentially reduce navigation risks." We agree with this generalized statement and encourage BOEM to take steps to provide more quantitative information to describe the likely reduction in impacts both in the description of the alternative and in the impact assessments that follow in the body of the EIS. | |
| BOEM-2022-0045-0092 | 2 | III. Comments on the Proposed Alternatives<br>The Network acknowledges BOEM's thorough Scoping and Alternatives analysis process and is pleased to note that the proposed Action Alternatives have no significantly different resource impact ratings than the Proposed Action. We emphasize the importance of maximizing the capacity to deliver energy from the project in order to achieve commitments while reducing costs, amplifying community benefits and safeguarding the environment. In that, we believe that Alternatives C-E address particular concerns, however, each of these alternatives are presented without consideration of the other alternatives. The Network believes the most successful alternative may be an amalgamation of parts of each. In order to recognize and support the required clean energy transition, these alternatives must be looked at in conjunction with each other. One solution may negate and/or exacerbate the impacts of another when the examination is not wholistic.<br>Furthermore, the Network encourages BOEM to think about holistic economic and environmental impacts when considering alternatives. BOEM estimates that construction will would generate up to an average 4,976 full time jobs and up to $535.91 million in value-added production to the combined GDP of Rhode Island and Connecticut (DEIS Table 3.11-9), and operations and maintenance phase is estimated to generate up to $86.52 million in total value added per year over the 35-year life span of the Project (DEIS Table 3.11-10). In comparison, commercial fishing revenue is estimated at $1.42 million annually – multiple mitigation measures are proposed to offset these impacts from commercial fisheries such as compensation for loss of fishing gear and lost fishing income. | BOEM considered reasonable alternatives during the EIS development process that would avoid or minimize adverse impacts in accordance with NEPA implementing regulations. After carefully considering the EIS alternatives, including comments from the public on the DEIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0078 | 2 | Typically, a draft Environmental Impact Statement is an analysis of the particular environmental concerns identified during the earlier phases of project development or a scoping process. The objective of the analysis is to estimate the nature, severity, and duration of impacts that might occur and to compare the impacts of the proposed project to the identified relative alternatives. The challenges for stakeholders and the developer in the offshore wind context of this process are that 1) the proposed action listed in the DEIS is the Construction and Operation Plan envelope (i.e., the full breadth of all 100-wind turbine generator and substation positions), and 2) it is unclear whether the alternatives identified and analyzed by BOEM are electrically, technically, and economically feasible or even available to the project developer.<br>It is also not easy to understand how a preference for one alternative may hinder or undermine the goals of the other alternatives identified. Because the primary concern in developing a final EIS is to address public comments on the draft EIS, the constraints on the public's ability to see and comment on habitat or viewshed mitigation alternatives that are actually available to the developer, reduces the effectiveness of stakeholder engagement and the ability of BOEM to identify, receive comments on, and analyze alternatives that would reduce impacts to habitat, users, transit and viewshed. BOEM should make it clear to the public that the ultimate project likely will need to be a combination of these alternatives. It may also be helpful for BOEM to be clear that the alternatives identified in the DEIS have not been proposed by or reviewed with the project developer but are instead proposed by BOEM before feasibility has been assessed.<br>Each of the alternatives listed in the DEIS addresses only one category of the project's potential impacts in isolation to other impacts. For example, the Habitat Alternatives C1 and C2 contemplate changes to the overall project that would result in fewer impacts to complex habitat. And TNC might prefer Habitat Alternative C1 because, as the DEIS states, this alternative would allow for the fulfillment of the existing three PPAs, while maintaining a uniform east–west/north–south grid of 1nm x 1nm spacing between wind turbine generators, and "noticeably" reducing impacts to complex fisheries habitats most vulnerable to permanent and long-term impacts. See DEIS p. 3.6-61. But the DEIS does not help us to understand whether 1) this alternative would create an electrical imbalance between substations that would significantly delay the project or, 2) how removal of wind turbines from the complex and sensitive habitat areas might affect the Visual Impact Alternative or the benefits to be gained from other presented alternatives, or 3) whether fewer turbines in a specific area is the only path to avoiding and minimizing impacts.<br>For example, prior to disqualifying an area for foundation installation based on the pre-construction presence of complex fish habitat, it may be possible to mitigate the potential impacts by recreating habitat of equal, or perhaps even greater value to the species/communities of concern in terms of size, configuration, and complexity of habitat structures within and adjacent to the specific foundation(s) through the use of Nature-Inclusive Designs of scour protection and/or other structures | Thank you for the comment. These concerns were considered during BOEM's development of the preferred alternative in Section 2.1.7 and will be considered in BOEM's Record of Decision. |

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| | | established around the specific foundation location(s) of concern. Mitigation of potential impacts to complex fish habitat through Nature-Inclusive Design provides an opportunity to deploy mitigation at the exact site of impact, with the potential to not only restore, but even enhance the habitat value of the area impacted. In the ocean environment there are few examples of this, but there is new research looking at how to maximize ecological value of offshore wind scour protection in the North Sea. The focus is on species "that need hiding places, shelter, feeding area or use the area as a nursery area and species that will profit from creating additional smaller and larger crevices," such as Atlantic cod, loligo squid, crab, lobster, and tautog, scup, seabass, and summer flounder, all of which are of interest here in the Northeastern United States.<br>The general approach is to integrate objects like pipes, reef balls, cages and other space producing items into the standard scour protection to improve fish and other marine life habitat. If TNC encourages an alternative that would remove turbines from one area within the lease area those turbines likely will have to go somewhere else in the lease area, but the DEIS does not equip the reader to understand the implications associated with project tweaking. For this reason, it is challenging to provide comments on the suggested alternatives. Importantly, the outcome of the DEIS should not be a scorecard that tracks votes for addressing habitat impacts against votes for addressing visual impacts, rather it should be a process that results in the identification of available alternatives each that maximize the project benefits while reducing impacts. The best outcome in a final EIS is a project design that is electrically and economically available and that maximizes the avoidance, minimization and mitigation principles for habitat and species protection while also addressing the visual and cultural impacts and ocean user challenges. It is impossible to know whether such an alternative exists from reviewing the DEIS or what the next steps are with respect to integrating all or parts of the presented alternatives into a final project design.<br>For these reasons, TNC strongly encourages the continued evolution of the environmental review and permitting process, in general, for future offshore wind projects, and for Revolution Wind, to the extent possible. Specifically, for future projects, the DEIS should identify alternatives that have been developed in consultation with the developer (or at least vetted with them) to assure that each of the considered alternatives are feasible in whole or in part. Pre-vetting is particularly important to the goal of streamlining the permitting process without sacrificing the concerns of stakeholders. Pre-vetting alternatives would also allow for greater transparency and inclusion of stakeholder and developer concerns in a more meaningful way. | |
| BOEM-2022-0045-0075 | 2 | Environmental Protection<br>The DEIS evaluates several alternatives to the Proposed Action that result in lesser or greater environmental impacts. BOEM has recognized that discrete aspects of the various identifed alternatives could be combined in order to enhance the beneficial impacts of the project. The Preferred Alternative identifed in the FEIS should identify and evaluate those opportunities in order to achieve the project objectives while minimizing adverse impacts to wildlife and environmental and cultural resources. For example, taking advantage of ongoing technological improvements, the FEIS should evalute the opportunity created by the deployment of larger turbine blades ("Alternative F") to reduce the number of required turbine foundation sites and identify whether this reduction in the project footprint could accommodate turbine siting supportive of Habitat Impact Minimization ("Alternative C") and address the tribal concerns considered in Reduction of Surface Occupancy to Reduce Impact to Culturally-Significant Resources ("Alternative E") while maintaining the Proposed Action's energy output to meet states' climate goals. | Thank you for the comment. After carefully considering the EIS alternatives, including comments from the public on the Draft EIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0058 | 2 | The Coast Guard also supports Alternative D3: Removal of the northwest row of WTGs adjacent to the inbound Buzzards Bay traffic lane. The Buzzards Bay approach is part of an International Maritime Organization adopted routing measure, and the northwest row of WTGs in the RWF is less than 2 NM to its parallel boundary. Consistent with the Coast Guard Marine Planning Guidelines, enclosure (3) to Navigation and Vessel Inspection Circular 01-19, the Coast Guard recommends a minimum spacing of 2 NM from the parallel out boundary of a Traffic Separation Scheme traffic lane to minimize the navigational risk and ensure vessels have sufficient room to adhere to the International Regulations for Preventing Collisions at Sea (COLREGS). Additionally, the RWF is the closest MA/RI project located to the ports projected to be used for both construction and operations of all the wind farms in the MA/RI area. | Thank you for the comment. After carefully considering the EIS alternatives, including comments from the public on the Draft EIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0071 | 2 | It is noteworthy that the DEIS includes Alternative F which requires use of 14 MW turbines. This is outside the project design envelope (PDE) proposed in Ørsted's COP. As described below, we support consideration of higher MW turbines as this can reduce the footprint of the project while still generating the same amount of power as a project with lower MW turbines and a larger footprint. However, this alternative creates a disconnect between the DEIS and the COP and could lead to confusion. The COP should be updated to include this turbine size. | This alternative was carried forward in response to cooperating agency and stakeholder requests for evaluation of WTGs capable of greater than 12 MW capacity. This alternative, however, has been bounded as not to exceed the physical parameters or footprint of the structures as described in the PDE and thus, does not propose larger structures. Therefore, in terms of assessing impacts, this alternative does not consider WTGs that fall outside the |

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| | | | bounds of the maximum impacts that could occur from the range of parameters in the COP. |
| BOEM-2022-0045-0110 | 3 | BOEM must make every attempt to obtain and disclose data necessary to its analysis in order to provide a "full and fair discussion of significant environmental impacts."16 The simple assertion that no information or inadequate information exists will not suffice. Unless the costs of obtaining the information are exorbitant, NEPA requires that it be obtained.17 Agencies are further required to identify their methodologies, indicate when necessary information is incomplete or unavailable, acknowledge scientific disagreement and data gaps, and evaluate indeterminate adverse impacts based upon approaches or methods "generally accepted in the scientific community."18 Such requirements become acutely important in cases where, as here, so much about an activity's impacts depend on newly emerging science. As we expand upon later in this section, this duty also applies to the evaluation of reasonable alternatives. In particular, BOEM should provide an evaluation of the feasibility of various turbine technologies and foundations in the Final EIS. Finally, NEPA does not permit agencies to "ignore available information that undermines their environmental impact conclusions." | Appendix C of the EIS analyzed and disclosed where there is incomplete and unavailable information, whether that information is essential to a reasoned choice among the alternatives, and what acceptable scientific methodologies were applied to inform the analysis in light of this incomplete or unavailable information. Based on the purpose and need, BOEM considered a range of design elements that fell within the project design envelope of the COP. As described more fully in Section 2.1.8 Alternatives Considered but Dismissed from Detailed Analysis, consistent with BOEM's screening criteria and the underlying purpose and need, BOEM determined an analysis of turbine and foundation technologies beyond those included in the COP was not necessary, as an analysis of such parameters would require submission of an updated COP and would be functionally equivalent to selection of the no action alternative. |
| BOEM-2022-0045-0103 | 3 | The DEIS at page 2-54 notes, "Under this alternative, BOEM could select the implementation of a higher capacity turbine in combination with any one alternative or a combination of the alternatives retained for detailed analysis in this EIS. Refer to Section 2.1.2, Section 2.1.3, Section 2.1.4, and Section 2.1.5 for figures." The references provided here and throughout the DEIS are to figures that do not include the additional reductions in WTGs that alternative F would provide. We recommend that additional graphics be provided to represent results of the hybridization of any of the other build alternatives with Alternative F. The figures could contain a general note indicating that the eliminated WTGs shown are representative but the characterization of the impact reduction from infrastructure would be representative of the hybridized (mix and match) approach. We encourage BOEM to present Alternative F with the same level of supporting figures/tables and analysis that accompanies the other build alternatives in the analysis. | Thank you for your recommendation. No decision regarding the placement of WTG locations has been made. Providing additional representative graphics would provide false precision that could lead to erroneous findings related to benthic or other resource impacts. Appendix E-4 of the EIS does provide calculations of WTG numbers, footprint, and scour protection associated with Alternatives C and F. The EIS was updated to disclose the additional reduction of acreage through application of Alternative F, as feasible by resource. Project design has not occurred for Alternative C or F; therefore, GIS calculations for the IAC, OSS-link cable, and RWEC are not available. In these cases, the EIS uses the Proposed Action as the most conservative proxy estimate and indicates that best professional judgment suggests that the footprint of the IAC, OSS-link cable, and RWEC would change and be slightly reduced to match the reduced number of WTGs under these two alternatives. |
| BOEM-2022-0045-0092 | 3 | Alternative B<br>The Network recommends that BOEM implement the goals of Alternative B, while recognizing, based on the valuable input that BOEM has received during the process, there are ways to improve upon the project while ensuring the timeline move forward without delay. | Thank you for your comment. After consideration of the public comments on the DEIS and analysis of those comments and other information (including the adverse and beneficial impacts of each alternative), BOEM has identified a preferred alternative in the Final EIS. BOEM's selected alternative, along with any additional mitigation measures required by BOEM, will be disclosed in the Record of Decision. |
| BOEM-2022-0045-0099 | 3 | It was mentioned in the recent presentation that not all 100 of the wind generators would be built at this time. We ask that Revolution Wind consider removing or relocating the northern and eastern most WTGs from the proposed grid within the leased area. | Thank you for the comment. As shown in Figures 2.1-11, 2.1-13, and 2.1-15 to 2.1-18 in the Draft EIS, BOEM is evaluating Alternative E to reduce the visual impacts on culturally important resources as well as Alternative D to reduce navigation risks and conflicts with other competing space uses. Various permutations of these two alternatives would remove the northern and/or eastern most WTGs in the Lease Area. |
| BOEM-2022-0045-0071 | 3 | Also, we are assuming that the Alternative F concept of using larger turbines sufficient to meet existing power purchase agreements can be combined with Alternatives C, D, or E that are focused on which locations to remove to reduce conflicts. If this is not the current intent, we recommend that BOEM consider allowing Alternative F to be combined with other alternatives. | Thank you for the comment. This is correct; Alternative F can be combined with other alternatives. |
| BOEM-2022-0045-0103 | 4 | In general, we note that the quantification of the additional reductions afforded through the adoption of Alternative F in combination with C1 and C2 could be shown more clearly in the revised analysis presented in the FEIS. | Thank you for your comment. Appendix E-4 of the EIS provides calculations of WTG numbers, footprint, and scour protection associated with Alternatives C and F. The EIS was updated to disclose the additional reduction of acreage through application of Alternative F, as feasible by resource. Project design has not occurred for Alternative C or F; therefore, GIS calculations for the IAC, OSS-link cable, and RWEC are not available. In these cases, the EIS uses the Proposed Action as the most conservative proxy estimate and indicates that best professional judgment suggests that the footprint of the IAC, OSS-link cable, and |

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| | | | RWEC would change and be slightly reduced to match the reduced number of WTGs under these two alternatives. |
| BOEM-2022-0045-0092 | 4 | Alternative C<br>The Network encourages BOEM to take a reasonable approach to the siting of the WTGs based on the Habitat Impact Minimization Alternative. Alternatives C1 and C2 leave a central gap in the wind energy facility, which will have a major impact on the electrical structure of the project. The alternative siting scheme increases the potential for major cost impacts and potential delay in the project. Although Alternative C potentially reduces the impacts to environmentally sensitive resources, the number of WTGs is reduced by 35, with no reduction in impacts significant enough to lower the impact rating of any resource analyzed within the EIS. For instance, the DEIS compares the annual commercial fishing revenue exposed in the lease area along the evolution Wind export cable by fishery management plan fishery under Alternatives B and C. The differences in average annual revenue at risk between Alternatives B and C are negligible. Alternative C would have a lower average annual revenue at risk by 0.02% to 0.23%, depending on FMP fishery, when compared to the Proposed Action (DEIS Tables 3.9-25 and G-3). | Thank you for the comment. Impacts to the project siting and constructability have been considered in the alternatives analysis, including development of the preferred alternative as described in Section 2.1.7. |
| BOEM-2022-0045-0114 | 5 | The three primary Alternatives (habitat, transit, visual) involve the elimination of up to 36, 22 and 36 WTG positions, respectively. Elimination of more than 1/3 of the possible WTG positions means that 400 MW of potential wind generation is being taken off the table. Given the expected demand for OSW capaciy in New England, NY and NJ, and the limited size of fixed bottom lease areas, this a very significant change and one that deserves to be explicitly weighed and balanced against the typically minimal impact reductions. For example, the Project layout already reflects the RI/MA area wide use of uniform 1 nm by 1 nm NS-EW grid, thus negating the need for further transit lanes. Well screened, deconflicted lease areas are a very valuable regional resource and should, in my opinion, be treated accordingly. | BOEM's regulations require BOEM to analyze Revolution Wind's proposal to build a commercial-scale wind energy facility on the Renewable Energy Lease Number OCS-A 0486. The purpose and need in the EIS reflect the requirement per those regulations. BOEM's purpose as stated in Section 1.2 is to determine whether to approve, approve with modifications or disapprove Revolution Wind's COP to fulfill BOEM's duties under the lease. BOEM considered reasonable alternatives during the EIS development process that would avoid or minimize adverse impacts in accordance with NEPA implementing regulations. After carefully considering the EIS alternatives, including comments from the public on the DEIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0092 | 5 | Alternative D<br>The Network strongly recommends that BOEM not implement Alternatives D1, D2, and D3 fully to eliminate the Buzzard's Bay Traffic Separation Scheme Inbound Lane. In November 2019, BOEM achieved Northeast leaseholder agreement aligning project layouts and avoiding irregular transit corridors, in accordance with the Massachusetts and Rhode Island Port Access study, making further transit lanes unnecessary; additional transit requirements may decrease the likelihood of future similar agreements among leaseholders. | Thank you for the comment. These concerns were considered during BOEM's development of the preferred alternative in Section 2.1.7 and will be considered in BOEM's Record of Decision. |
| BOEM-2022-0045-0059 | 5 | The Revolution Wind COP contends that it evaluated wind turbines from 8-12 MW in size,28 and the DEIS states that the Proposed Action is to include wind turbines ranging in size from 8-12 MW.29 The Project Design Envelope and Maximum Case Scenario found in Appendix D of the DEIS lists 12 MW as the maximum design size for both proposal and analysis.30 This is what has been analyzed.<br>However, Alternative F of the DEIS envisions "Selection of a Higher Capacity Wind Turbine Generator", and specifies that such an alternative would implement "a higher nameplate capacity WTG (up to 14 MW) than what is proposed in the COP".30 We are unaware of any provisions that allow BOEM to propose alternatives that have not been analyzed and have not been proposed in the COP, particularly when the alternative introduces a larger structure. To introduce an alternative that is outside the scope of the application of a developer, outside the scope of analysis, and outside the scope of the maximum case scenario of the PDE contained in the DEIS is both arbitrary and capricious, and unreasonable, action by the agency. It appears to be a thinly veiled attempt to give the developer even more deference for profit than it has by only considering alternatives that fulfill the developer's PPAs or future development goals.<br>We request that this alternative either be removed in its entirety, or that the developer amend their COP to include 14 MW turbines, with maximum design size and impacts analysis for a 14 MW turbine and resubmit the COP with this information contained. We request that BOEM then conduct additional NEPA analysis in a supplemental DEIS specific to a 14MW turbine. | This alternative was carried forward in response to cooperating agency and stakeholder requests for evaluation of WTGs capable of greater than 12 MW capacity. This alternative, however, has been bounded as not to exceed the physical parameters or footprint of the structures as described in the PDE and thus, does not propose larger structures. Therefore, in terms of assessing impacts, this alternative does not consider WTGs that fall outside the bounds of the maximum impacts that could occur from the range of parameters in the COP. |
| BOEM-2022-0045-0071 | 5 | We appreciate that the DEIS indicates the minimum number of turbines which may be used and provides maps of turbine locations under each alternative. Assuming turbine capacities of 8-14 MW, this allows for calculations of how each alternative may compare to the existing power purchase agreements totaling 704 MW, which we assume is the baseline for evaluating against the purpose and need. It is worth noting that some alternatives can only meet the 704 MW target at larger turbine | Based on the information received during the scoping effort and other information, such as the location of sensitive natural resources, BOEM identified alternatives to the proposed action that might reduce possible impacts. The DEIS evaluated a reasonable number of alternatives covering the full spectrum of alternatives, each of which was rigorously |

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| | | capacities (i.e., Alternatives C1, C2, and E1). We appreciate the level of detail provided in Alternative D where it is clearly stated that if all sub-options are selected, the purpose and need will still be met. It is unclear, however, what specific combination of Alternatives C-F can be selected to still generate a minimum of 704 MW.<br>Combining location removals, potentially from more than one alternative, with the range of possible turbine sizes in the PDE quickly becomes confusing. Multiple alternatives include overlapping locations where turbines may be excluded, but the maps for each alternative are presented separately, posing challenges for determining how many wind turbine locations would remain under various combinations of some alternatives. The FEIS should specify the number of turbines and their locations for each alternative and turbine capacity combination. If smaller turbines (e.g., 8 MW) are not realistic for the project, these could be eliminated from the COP and FEIS to simplify the analysis. A map with numbered turbine or substation locations would be useful for considering combinations of multiple alternatives. | explored and objectively evaluated, as well as those other alternatives that were eliminated from detailed study with a brief discussion of the reasons for eliminating them (40 CFR 1502.14). The decision-maker may select elements from several alternatives discussed (40 CFR 1505.1 (e)). Various parts of separate alternatives that are analyzed in the DEIS can also be combined to develop a new, complete alternative in the FEIS as long as the reasons for doing so are explained and it is supported by the analysis. Ch 1 & 2 give a description and show a map layout for each alternative. After carefully considering the EIS alternatives, including comments from the public on the DEIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0070 | 5 | Fishing operations in and around this area will be altered throughout the different phases of the project and likely throughout the entire life of the project. The Port of New Bedford generates $11.1 billion in economic activity and represents 2% of the entire Commonwealth of Massachusetts GDP (2019 Martin Assoc. Economic Impact Study of the New Bedford/Fairhaven Harbor). https://porto{11ewbedford.org!H·p-conte11t/1112.load.\/2019/04/Fi1/I 2019 Martin Report. pdf The major portion of this economic output is from the fishing industry, making the Port of New Bedford the nation's #1 fishing port in catch value. Mitigation, safety navigation, habitat impacts, cable burial depth, environmental monitoring and data collection, supply chain impacts and decommissioning are at the forefront of the fishing industry's concerns. Based on the multiple stated alternative analyses of this project, we recommend a combination of Alternatives C (Habitat Impact Minimization Alternative), & D (Transit Alternative) should be considered to minimize, to the greatest extent possible, any potential temporary or permanent negative effects to the fishing industry. Furthermore, in a general sense, we would be interested in promoting Alternative F (Selection of a Higher Capacity Wind Turbine Generator) to reduce the number of foundations constructed while still fulfilling the minimum amount of (MW) desired. | Thank you for the comment. After carefully considering the EIS alternatives, including comments from the public on the EIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0092 | 6 | Alternative E<br>Ensuring that impacts to culturally-significant resources are limited is a critical part of the entire permitting process and the Network applauds BOEM's years-long stakeholder process, before and after wind energy area identification, to properly identify these situations. The Network encourages BOEM consider the economic and environmental impacts of any Reduction of Surface Occupancy options due to the decrease in potential energy generation. Removing or relocating turbines without sufficient justification would set a powerful precedent that will impact other projects in the future, limiting the overall capacity of the U.S. market in the near-term and economically weakening the supply chain. | Thank you for the comment. These concerns were considered during BOEM's development of the preferred alternative in Section 2.1.7 and will be considered in BOEM's Record of Decision. |
| BOEM-2022-0045-0071 | 6 | We are confused about how the substation locations intersect with modifications that might be made if some combination of Alternatives C-F are selected. The DEIS notes that "Based on the COP and additional feedback from the applicant, BOEM continues to assume no change to the offshore substation locations due to feasibility constraints that would delay the Project to the extent that it would no longer meet the PPA obligations or BOEM's purpose and need as described in Chapter 1.2 of the EIS." It seems illogical to remove turbines from a portion of the lease area, for example to mitigate impacts to Atlantic cod, but then locate the substation in that vicinity regardless. In addition to any impacts of construction at the substation position on cod and structured habitats, additional miles of cabling will be required if the substation is separated from the turbines.<br>The configuration of the interarray cables and substations is based on using all 100 locations, but other routing approaches might be possible (and more efficient, requiring less cabling) depending on which turbine positions are removed. However, in some cases adjacent turbines cannot be connected without going outside the maximum work area identified in the COP. Could BOEM require additional surveys and a modification of the work area footprint, if it would facilitate relocation of the substation outside the Alternative C1/C2 exclusion zone? | Based on independent review of design constraint information from the applicant, and meetings with ISO-New England, BOEM determined that certain reconfigurations like relocation of the OSSs to reduce inter-array cable lengths and associated system impedances, are not feasible within the time-frame for which the project is feasible. Relocation of the OSSs would also have knock-on effects requiring size increase of high voltage components on the OSS (e.g., shunt reactors) and the export cable. A larger export cable size would then also require a larger size of the HDD and components on the OnSS. These larger components, and associated footprints, would fall outside the PDE proposed in the COP. Because of these reasons, BOEM concluded that analysis of such an alternative would be functionally equivalent to selecting the No Action alternative. |
| BOEM-2022-0045-0092 | 7 | Alternative F<br>The Network does not support the mandate of higher nameplate capacity even if the WTGs are commercially available. The Network is supportive of the growth of the supply chain, and recognizes there are business cases for the selection of particular WTGs, and higher capacity is not the only consideration | Thank you for your comment. After consideration of the public comments on the DEIS and analysis of those comments and other information (including the adverse and beneficial impacts of each alternative), BOEM has identified a preferred alternative in the Final EIS. BOEM's selected alternative, along with any additional mitigation measures required by BOEM, will be disclosed in the Record of Decision. |
| BOEM-2022-0045-0078 | 7 | TNC's specific recommendations to improve the outcomes for the environmental review process include:<br>BOEM should work with the developer, state resource managers and stakeholders to develop available alternatives that | As indicated in the comment, BOEM has an extensive and staged process for regulating offshore wind development, with numerous opportunities for developer and stakeholder |

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| | | address the challenges in a specified lease area in a balanced way before the DEIS is published.<br>To this end, BOEM should:<br>• Articulate and adhere to a more iterative process that allows concerns regarding specific impacts to inform the project design and alternatives at the earliest possible point in the review timeline. Much like BOEM's process for winnowing down a Call Area to a lease area has been improved, so should the process for identifying the alternatives that can address impacts associated with various project layouts and material and technology selection. TNC encourages BOEM to establish a process that would allow BOEM to incentivize bidders at the leasing stage to design projects (including material and methods selections) that thoughtfully address visual impact concerns, decrease impacts to vulnerable habitats and species, incorporate plans for achieving net positive biodiversity impacts, and incorporate nature inclusive design elements, etc.… Project developers should have the chance to incorporate these solutions into their project designs at the earliest stage possible. There are several examples of more iterative processes that allow for earlier examination of feasibility and alternatives. For example, a number of states are incorporating non-price related scoring criteria into their respective procurement procedures for offshore wind. These non-price criteria are beginning to establish a set of minimum standards that must be addressed by a successful bid. BOEM should consider requiring companies that win leases to present project designs that address shared transmission, avoidance of complex and sensitive habitat, avoidance and minimization of impacts to cultural and commercial resources in the lease area after site assessment and before the Construction and Operation Plans are submitted for review. Another example comes from the fisheries management process where various technically evaluated management scenarios are co-developed and vetted among stakeholders, resource managers, and law enforcement prior to adoption. BOEM should invite key stakeholders, state resource managers, and developers to inform the identification of feasible alternatives in the DEIS well before they are presented for comment.<br>• Produce a draft map (in consultation with the project developer) of the optimal project layout and present mapped versions of the alternatives to that optimal project layout at the DEIS stage. To the extent a project developer has flexibility to micro-site while also adhering to a 1nm x 1nm grid pattern, BOEM should show draft maps to stakeholders concerned with project layout these options in advance of the DEIS.<br>• When identifying alternatives, consider that removing turbines is not the only way to avoid impacts. Micro-siting can be effective, especially when options identified by feasible alternatives are combined with a micro-siting approach. Also, BOEM should consider identifying alternatives that require nature inclusive designs to enhance scour protection in hard bottom habitat areas that are not able to be avoided. Developers' goals to achieve net positive impacts on key biodiversity factors should be reflected in the project envelope and be evident in the alternatives so that a cost versus benefits analysis is possible and may be commented on by BOEM and stakeholders at the DEIS stage.<br>• Ensure that alternatives presented in the DEIS are feasible and that they address interconnection and integration with shared transmission. In this case, Revolution Wind is limited to delivering 704MW of energy because of on-shore interconnection constraints, but the lease area would have allowed for a project that could generate 880MW of offshore wind energy. Therefore, and as a result of transmission constraints, nearly 200MW of offshore wind is not being captured. For this reason, TNC recommends that where the existing on-shore interconnection points constrain the project's energy delivery potential, BOEM also should consider alternatives that would allow lease holders to capture the full potential of the lease area at a future date if and when integration with a shared grid becomes an option. See section below on Transmission re "shared grid" or "shared transmission."<br>• Clearly identify the minimum mitigation requirements and monitoring measures that will become required permitting conditions that the developer must adhere to as part of the final permit or Record of Decision regardless of the ultimate alternative selected.<br>• Include as much detail in the final EIS as possible about what measures will be used, the performance standards they must meet, and how the developer will be evaluated on meeting those standards. We also recommend incorporating replicated BAG (before-aftergradient) designs into ecological monitoring plans and protocols to facilitate converting observations from early projects into informed predictions for future projects.<br>In finalizing the layout and design elements of the Revolution Wind project in particular and before issuing a final EIS, TNC urges BOEM to engage the developer and stakeholders in an iterative process to identify alternatives that seek to serve the various objectives (delivering offshore wind, meaningfully addressing environmental, commercial and cultural concerns, etc.) that are also infact feasible. It is only by identifying feasible alternatives that sufficiently address stakeholder concerns that the resulting alternatives can be used for the development of the final EIS without adding further delay to the permitting process. | engagement. BOEM's planning and leasing activities offshore Rhode Island leading up to submission of the Revolution Wind COP are outlined in Table 1.1-1 of the EIS. Also, as summarized in Section 2.1.2 of the COP, Revolution Wind conducted comprehensive desktop studies of oceanographic, geologic, shallow hazards, archaeological, and environmental resources in the Lease Area beginning in 2017 (vhb 2022) prior to submitting a COP to BOEM for consideration. These desktop studies informed the preliminary siting of the Project and supported the development of COP survey plans, which were conducted in 2017, 2018, and 2019. The purpose of the COP surveys was to conduct site characterization, marine archeological, and benthic studies necessary to further evaluate the seafloor in the Lease Area and along potential RWEC routes. The COP survey plans were submitted in accordance with the stipulations of the Lease as well as the following BOEM regulations and BOEM's guidelines:<br><br>- Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR 585, dated May 27, 2020 (BOEM 2020a)<br><br>- Guidelines for Submission of Spatial Data for Atlantic Offshore Renewable Energy Development Site Characterization Surveys, dated February 1, 2013 (BOEM 2013)<br><br>- Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR 585, dated May 27, 2020 (BOEM 2020b)<br><br>- Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585, dated June 2019 (BOEM 2019)<br><br>- Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP), dated May 27, 2020 (Version 4.0) (BOEM 2020c)<br><br>After carefully considering the EIS alternatives, including comments from the public on the Draft EIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS.<br><br>Appendix F of the EIS has also been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. These measure are being considered across all action alternatives. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. BOEM fully supports regional monitoring and sharing data with the public as offshore wind development progresses and will incorporate results in future decisions<br><br>BOEM is also continually exploring ways to improve NEPA analyses and stakeholder engagement. As one example of these efforts, BOEM recently announced its intent to prepare a Programmatic EIS to analyze the potential impacts of wind energy development activities in the New York (NY) Bight. The Programmatic EIS will help BOEM make timely decisions on COPs submitted for the NY Bight and provide earlier opportunities for engagement with potentially affected stakeholders to better inform project siting and COP development prior to submission to BOEM. |

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| BOEM-2022-0045-0071 | 7 | We support the habitat impact minimization alternative (Alternative C) given the potential for micrositing or removal of turbine locations to meet the 704 MW power purchase agreements. This would mean only 64-65 turbines would be used, not the full 100 turbines proposed. It is unclear, however, which turbine size this alternative is based on. Alternatives C1 and C2 combined will meet the PPAs if a 14 MW turbine is used (Alternative F). The most robust evidence for cod spawning activity is within the westernmost portion of the C1 and C2 exclusion zones, west of one of the offshore substations. If either Alternative C1 or Alternative C2 cannot be adopted in full, we suggest prioritizing removal of these locations. Figure K-1 in Appendix K shows sub-areas considered during development of Alternative C, overlaid on substrate data; this is a useful figure that should be referred to throughout the FEIS and in future presentations. Area 1 is the region where cod spawning activity is well documented. Additional surveys throughout these four areas, especially in sub-areas 3a and 3b, would help elucidate presence and absence of contiguous complex habitat. | Thank you for the recommendation. A detailed description of the development of Alternative C is provided in Appendix K, which is available to the public with the FEIS. As noted in the appendix, the number of WTGs that could be removed in Alternative C is based on the minimum power output for Revolution Wind (704 megawatts [MW]) using the largest capacity WTG in the PDE (12 MW). After carefully considering the EIS alternatives, including comments from the public on the DEIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0065 | 7 | A range of alternatives for the following topics should be included for analysis and full consideration in the EIS: a. Transit lanes for fishing vessels; b. Cable burial depths; and c. Compensatory mitigation and impact fees for fisheries loss and risk.7 7 Discussions regarding impact fees for this project are occurring in certain states in parallel to this NEPA review. For example, the State of Massachusetts' Fisheries Working Group for Offshore Wind viewed an economic analysis prepared by Ørsted for this project that is not readily discoverable in the DEIS or the docket. The DEIS thus is not based on all available information, and impact fees are not being based on a holistic environmental review. These processes must be improved and aligned. | Thank you for the comment. The EIS analysis was based on the latest publicly available information. After carefully considering the EIS alternatives, including comments from the public on the EIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. Updated mitigation and monitoring requirements, including compensatory mitigation, are outlined in Appendix F of the EIS. |
| BOEM-2022-0045-0110 | 8 | For this Project, the purpose and need is defined as "to contribute to Connecticut's mandate of 2,000 megawatts (MW) of offshore wind energy by 2030, as outlined in Connecticut Public Act 19-71, and Rhode Island's 100% renewable energy goal by 2030, as outlined in Rhode Island Governor's EO 20-01 of January 2020."33 We are concerned that the DEIS did not consider alternate turbine foundation technologies, such as gravity based and suction bucket foundations which significantly reduce noise-related impacts to marine mammals and the broader marine ecosystem. Instead, the various alternatives evaluated in the DEIS mostly focus on layout changes as well as some variation in turbine capacity to accommodate those layout alterations. The COP eliminates these technologies from consideration based on a series of factors including logistics,34 but their analysis is not provided to the public for review, nor does it appear that BOEM has confirmed that the applicant's conclusion is correct. BOEM should evaluate and provide for public review a more robust array of foundations, like quiet foundations, which would significantly reduce impacts to the marine environment. | Thank you for your comment. As discussed in Section 2.1.8 Alternatives Considered but Dismissed from Detailed Analysis, BOEM considered a range of alternatives during the EIS development process that emerged from scoping, interagency coordination, government-to-government consultation, and internal BOEM deliberations. The use of alternative foundation types, including suction bucket foundations and floating wind turbine foundation types to reduce impacts on marine mammals, sea turtles, and fish from pile driving associated with monopile and jacket foundations, are not feasible within the Lease Area because of the following:<br>1. The dense soils beneath an upper loose surficial layer of sand may prevent the full penetration required for stability of suction bucket foundations.<br>2. The loose upper layer of sandy sediment also presents a settlement risk for gravity-based foundations.<br>3. The water depths are too shallow in portions of the Lease Area for floating foundations. Although these foundation types would not require pile driving, the larger footprint of suction bucket foundations would increase seabed disturbance; additionally, all alternate foundation types would create less room for fishing activities between turbines when compared to monopile foundations. The cables associated with floating wind turbines would also increase the risk of entanglement for marine mammals. Overall, these alternative foundation types are not feasible in the Lease Area and may increase long-term environmental impacts to some resources over those from monopile foundations within the Lease Area. This rationale was added to Table 2.1-19 of the Final EIS. |
| BOEM-2022-0045-0114 | 8 | As noted above, I do not believe the Transit alternative (D) is necessary given Revolution Wind's use of the agreed upon 1 nm by 1 nm NS-EW grid across the 9 lease areas comprising the entirety of the RI/MA WEAs. That said, the graphics used to illustrate the transit variations (Figures 2.1-10 through 16) should include the immediately adjoining Southfork lease area for context. | Thank you for the comment. Figures 2.1-10 through 2.1-16 display differences in layout between possible combinations under Alternative D. Geographic analysis area maps provided in the resource areas of Chapter 3 of the EIS display surrounding lease areas for each resource. |
| BOEM-2022-0045-0086 | 8 | Revolution Wind appreciates the NEPA alternative screening criteria that BOEM highlighted in the DEIS and that BOEM subsequently further elaborated upon in published guidance.8 In particular, the guidance emphasizes that in developing the Purpose and Need for the Environmental Impact Statement (EIS), the lead agency should consider "the goals of affected states, including state laws that establish renewable energy goals and mandates, where applicable."9 The guidance also highlighted the appropriateness of considering the project developer's goals, including "awarded contracts for offtake and/or the MW nameplate capacity for the proposed project; the proposed area within the lease."10 In addition, the screening criteria recognize that alternatives that "result in implementation delays that would invalidate the [offtake] agreement or | The proposed Project, as described in the COP, includes WTG dimensions that would allow for a 220-meter rotor diameter WTG. As such, BOEM analyzed larger turbines consistent with Revolution Wind's PDE parameters. BOEM's purpose as stated in Section 1.2 is to determine whether to approve, approve with modifications, or disapprove Revolution Wind's COP in fulfillment of BOEM's duties under the lease. In making this determination, the Secretary retains wide discretion to weigh those goals as an application of their technical expertise and policy judgment. |

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| | | trigger significant penalties (the would lead to economic infeasibility) for delays in commercial operations according to the terms of the power purchase agreement (PPA) or offshore wind renewable energy certificate (OREC) agreement" are likely unreasonable.11 As a result, in weighing whether a proposed alternative is reasonable, and warrants further consideration, the agency must consider whether the alternative would result in the development of a project that would not allow the developer to satisfy contractual offtake obligations. As such, Alternatives that may result in significant Project delays or a reduction in generated capacity due to removal of turbine positions beyond the 704 megawatts (MW) design of the Project do not meet the Project purpose and need as identified in the BOEM guidance for identifying alternatives for offshore wind.12 When considering which technologies within the Project envelope could support alternatives, BOEM is required to provide a "reasonable alternatives that are technically and economically feasible and meet the purpose and need of a proposed action"13, which the Department of the Interior expanded to note "technically and economically practical or feasible".14 Therefore, BOEM should only consider those technologies that are commercially available and within timing constraints of the Project to procure delivery of WTGs to meet the schedule outlined in the Section 1.2 of the DEIS. For example, Alternative F includes larger turbines which are not commercially available in line with the Revolution Wind project timeline, as clarified and confirmed in the January 2022 letter from Siemens Gamesa (Attachment A), which details an evaluation of the 14 MW WTG and the technical infeasibility for these turbines to be utilized for the Revolution Wind Project due to anticipated installation schedule, certification timelines, and limited production capacity. As such, Alternative F would not satisfy the PPAs to deliver offshore wind energy to the transmission grid beginning in 2024 and does not satisfy the BOEM definition of a "reasonable alternative". When discussed throughout the Alternatives feedback, technical feasibility also considers foundation design and fabrication limitations, cable sizing and ordering, and lengthy certification processes that can limit the ability of Revolution Wind to make significant changes to design at late stages of development without impacting the Project's ability to meet milestone requirements of the PPAs. As discussed below, Revolution Wind provides additional detail for how many of the proposed Alternatives, including C, D, and E are not technically or economically feasible as they are currently configured, and thus are not reasonable alternatives. | BOEM, with the assistance of NREL and other technical experts, has independently reviewed the information provided by the Lessee and concluded that the potential project delays and cost expected to result from adoption of the alternatives would not render the Project technically or economically infeasible. While BOEM acknowledges that a decision to select alternatives C, E, and F, or any combination thereof, is not without consequence, for purposes of NEPA they remain viable alternatives for the decision maker to consider. BOEM will continue dialogue with Revolution Wind in order to receive additional information that should be considered at the ROD stage. |
| BOEM-2022-0045-0071 | 8 | We also support no surface occupancy in 1+ outermost portion of project area (Alternative D) to allow transit lane of ~4 nm. This alternative proposes fewer turbine locations (78-93) based on the maximum capacity identified in the PDE of 880 MW. Across all alternatives, the FEIS should assume the same turbine capacity and project power capacity to be able to evaluate and compare the likely impacts. | Thank you for the comment. After carefully considering the EIS alternatives, including comments from the public on the EIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0086 | 9 | Alternatives C-1 and C-2 pose three key significant challenges for Revolution Wind. Although C1 retains the minimum number of positions that Revolution Wind intends to construct to meet PPA obligations, this Alternative includes no contingency locations for unforeseen circumstances. C2 does not provide the minimum number of positions that Revolution Wind intends to construct and would not allow Revolution Wind to meet PPA obligations. Alternatives C1 and C2 would create an electrical system imbalance between the two offshore substation (OSSs) that would result in an almost complete redesign of the system, and very likely force a schedule delay beyond the milestone requirements of Revolution Wind's PPAs. Alternatives C1 and C2 would force Revolution Wind to use most or all the WTG locations in the area west of South Fork (WSFW; the southwest portion of the lease area), which pose a substantial installation challenge due to high bolder densities and increases impacts to significant geologic and benthic habitats. Electrical System Compared to a more balanced layout configuration between the two OSSs (i.e., similar number of WTGs at similar distances) alternatives C1 and C2 would result in a significant increase in required inter-array cable lengths, particularly pertaining to those connected to the southern OSS. In addition, a redesign of the collection system would be required with longer, and likely larger cross section inter-array cables. There would also be knock-on effects that would cause changes to the high voltage components on the OSS (specifically the shunt reactors) and the export cable size. Both would require a size increase to balance the increased system impedance associated with alternatives C1 and C2. A change of the export cable size would require a redesign of the Horizontal Directional Drill (HDD) at the landfall and components on the onshore substation (OnSS). Longer inter-array cables will reduce the system availability and efficiency, which will result in a less reliable supply of electricity to consumers. Given the soil conditions in the lease area, a stable and efficient electrical system is designed using six WTGs per string. Isolated islands of WTGs, such as the three north of the southern OSS in Alternative C1, will negatively impact system efficiency significantly. Longer inter-array cables, potentially larger export cable cross sections and shunt reactors will also result in significant cost increases for the Project. Significant schedule delays would be expected as components that are designed and in fabrication workstreams would have to be redesigned and new fabrication slots secured. Schedule delays of at least 6 months, but potentially much higher are to be | The proposed Project, as described in the COP, includes WTG dimensions that would allow for a 220-meter rotor diameter WTG. As such, BOEM analyzed larger turbines consistent with Revolution Wind's PDE parameters. BOEM's purpose as stated in Section 1.2 is to determine whether to approve, approve with modifications or disapprove Revolution Wind's COP in fulfillment of BOEM's duties under the lease. BOEM, with the assistance of NREL and other technical experts, has independently reviewed the information provided by the Lessee and concluded that the potential project delays and cost expected to result from adoption of the alternatives would not prevent the Project from meeting BOEM's purpose and need. While BOEM acknowledges that a decision to select alternatives C, E, and F, or any combination thereof, is not without consequence, for purposes of NEPA they remain viable alternatives for the decision maker to consider and would not ultimately result in an inability to move forward with the project. |

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| | | expected. Furthermore, system reliability changes caused by Alternatives C1 and C2 would have to be assessed by ISO New England (ISO-NE), which would have additional schedule implications due to the timing of the Material Modification Determination (MMD) (see "ISO New England Material Modification Determination Process" section below for additional details). Installation The majority of the WTG positions in the area WSFW fall within boulder fields that have significant geologic and benthic habitat complexity. Around half of the potential WTG positions in the WSFW area have more than 1,500 boulders larger than 1 meter within the foundation installation footprint. This amount of boulders is unprecedented and introduces both technical feasibility as well as a substantially increased duration of the associated boulder relocation campaign, which would increase the overall risk for delays during installation. In addition, relocation of these boulders during seabed preparation would significantly increase the impacts to areas of complex geologic and benthic habitat. In particular, it would disproportionately affect glacial moraine areas that are dominant in the installation footprint when connecting the WTG locations in the area WSFW to the southern OSS. In conclusion, most, if not all, of the WTG locations in the area WSFW have significant installation challenges that would unduly increase the risk profile for the Revolution Wind project (both from an installation feasibility standpoint as well as health and safety) and would result in significant impacts to particularly complex geologic and benthic habitats. | |
| BOEM-2022-0045-0069 | 9 | Project design<br>o If turbines larger than 12 MW are available by the time of construction, the developer should aim to use larger turbines to reduce the number of foundations within the wind farm. This will reduce the area of benthic disturbance and the amount of pile driving. | Thank you for your comment. The development of the EIS has been based on the Applicant's Project Design Envelope (PDE) which includes a range of 8 to 12 MW capacity turbines. As part of the Record of Decision, BOEM could choose to incorporate other potential monitoring and mitigation measures to reduce benthic disturbance. |
| BOEM-2022-0045-0086 | 10 | As one of the very first developers in the region, Revolution Wind has advocated for adopting an offshore wind farm layout that follows a 1 x 1 nautical mile (nm) grid WTG layout. Revolution Wind has further committed to ensuring at least 0.6 nm corridors in any direction to ensure compliance with the USCG navigational safety risk assessment. Additional information on this 1 x 1 nm layout can be found in The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study (MARIPARS) completed by the United States Coast Guard (USCG).15 In doing so, Revolution Wind reduced the number of overall WTGs that would be installed in the lease area compared to standard layouts seen globally; giving up a significant number of positions that would have been able to support the clean energy goals of the Northeast states. Revolution Wind also notes that the South Fork Wind approval does not include transit lanes along the southern edge of its lease area, so Alternative D1 (removal of the southernmost WTGs) would not result in a contiguous transit lane in the south end of the Revolution Wind lease area. Moreover, BOEM also chose not to include a transit lane in the nearby Vineyard Wind approval, Electrical System From an electrical perspective the removal of positions in the north-west as suggested in D3 is undesirable as these positions are close to the northern OSS and the point of interconnection. Due to this proximity, they contribute comparatively low impedance to the collection system and are therefore increasing the reliability of the system. However, it is noted there is a potentially feasible path forward that is in line with the intention of Alternative D3. Removal of the southern row as suggested in D1 is undesirable due to the proximity of six WTGs to the southern OSS. Installation Removal of the north-western diagonal (D3) and eastern rows (D2) is undesirable as it removes locations that are in areas of particularly low geologic complexity. In these, only very little seabed preparation (i.e. boulder relocation) is required and therefore they represent positions with a comparatively much lower risk profile for the Revolution Wind Project and minimal environmental impacts. As outlined in the comments to Alternative C, connecting a limited number of WTGs in the area WSFW to the southern OSS unduly increases the risk profile for the Project and the impact to particularly sensitive benthic habitats. | The proposed Project, as described in the COP, includes WTG dimensions that would allow for a 220-meter rotor diameter WTG. As such, BOEM analyzed larger turbines consistent with Revolution Wind's PDE parameters. BOEM's purpose as stated in Section 1.2 is to determine whether to approve, approve with modifications or disapprove Revolution Wind's COP in fulfillment of BOEM's duties under the lease. BOEM, with the assistance of NREL and other technical experts, has independently reviewed the information provided by the Lessee and concluded that the potential project delays and cost expected to result from adoption of the alternatives would not prevent the Project from meeting BOEM's purpose and need. While BOEM acknowledges that a decision to select alternatives C, E, and F, or any combination thereof, is not without consequence, for purposes of NEPA they remain viable alternatives for the decision maker to consider and would not ultimately result in an inability to move forward with the project. |
| BOEM-2022-0045-0069 | 10 | The DEM is supportive of a 1 x 1 NM turbine grid layout to improve safety and fishing ability of the windfarm as best as possible. | Thank you for your comment. |
| BOEM-2022-0045-0086 | 11 | Wind would be remiss to not clearly outline the Project's commitment to implement an Aircraft Detection Lighting System (ADLS), as mentioned throughout the DEIS. The DEIS notes that should ADLS be implemented, the relative impact ratings to several resources for nighttime conditions would be substantially diminished, including but not limited to, visual resources. Revolution Wind respectfully informs the BOEM team that ADLS will be implemented as a mitigation measure throughout operation and will reiterate that commitment in its forthcoming comments on the draft Memorandum of Agreement and the Finding of Effects under Section 106. Alternative E1 Alternative E1 would result in an almost complete redesign of the electrical system and very likely a schedule delay beyond the milestone requirements of Revolution Wind's PPAs. Similarly, to Alternatives C1 and C2, Alternative E1 does not provide the minimum number of positions Revolution Wind intends to | The proposed Project, as described in the COP, includes WTG dimensions that would allow for a 220-meter rotor diameter WTG. As such, BOEM analyzed larger turbines consistent with Revolution Wind's PDE parameters. BOEM's purpose as stated in Section 1.2 is to determine whether to approve, approve with modifications or disapprove Revolution Wind's COP in fulfillment of BOEM's duties under the lease. BOEM, with the assistance of NREL and other technical experts, has independently reviewed the information provided by the Lessee and concluded that the potential project delays and cost expected to result from adoption of the alternatives would not prevent the Project from meeting BOEM's |

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| | | construct. Electrical System This alternative represents a significant increase in the required inter-array cable length connecting turbines to the northern OSS as well as the southern OSS. As previously outlined to BOEM staff, relocation of the OSS to reduce inter-array lengths and associated system impedances is not feasible at this stage. Redesign of the collection system with longer, and larger cross section inter-array cables will have knockon effects requiring size increase of high voltage components on the OSS (specifically the shunt reactors) and the export cable. A larger export cable size would then also require a larger size of the HDD and components on the OnSS. To maximize electrical efficiency, the inter-array cable system is designed for six WTGs per string, which is, among other things, driven by the soil conditions at the site. Isolated islands of WTGs, such as the area WSFW are undesirable. Longer inter-array cables, potentially larger export cable cross sections and shunt reactors will have significant cost implications. There would be a high risk for schedule delays as components that are designed and in fabrication workstreams would have to be redesigned and fabrication slots secured. A schedule delay of at least 6 months, but potentially much longer, would be expected. System reliability concerns would have to be assessed by ISO-NE, which has schedule implications due to the MMD process. Installation Removal of positions in the north is undesirable as it removes locations that are in areas of particularly low geologic complexity. In these areas only very little seabed preparation (i.e. boulder relocation) is required and therefore they represent positions with a comparatively much lower risk for schedule delays during installation. As outlined in the comment to Alternative C, connecting a limited number of WTGs in the area WSFW to the southern OSS unduly increases the risk profile for the project and the impact to particularly sensitive benthic habitats. Alternative E2 Due to the reasons outlined below, Alternative E2 would require a complete redesign of the electrical system, new geophysical and geotechnical surveys, and very likely a schedule delay beyond the milestone requirements of Revolution Wind's PPAs. However, it is noted that as opposed to Alternative E1, there is a potentially feasible path forward that is in line with the intention of Alternative E2.<br>Electrical System Alternative E2 represents an increase in the required inter-array cable length connecting turbines to the northern as well as the southern OSS. As previously outlined to BOEM staff, relocation of the OSS to reduce inter-array cable lengths and associated system impedances is not feasible at this stage. Redesign of the collection system with longer, and larger cross section inter-array cables will have knock-on effects requiring size increase of high voltage components on the OSS (specifically the shunt reactors) and the export cable. A larger export cable size would then also require a larger size of the HDD and components on the OnSS. To maximize electrical efficiency, the inter-array cable system is designed for six WTGs per string, which is, among other things, driven by the soil conditions at the site. Isolated islands of WTGs such as the area WSFW are undesirable. Longer inter-array cables, potentially larger export cable cross sections and shunt reactors will have significant cost implications. High risk for schedule delays as components that are designed and in fabrication workstreams would have to be redesigned and fabrication slots secured. A schedule delay of at least 6 months, but potentially much longer, would be expected. System reliability concerns would have to be assessed by ISO-NE, which has schedule implications due to the MMD process. Installation Removal of positions in the north is undesirable as it removes locations that are in areas of particularly low geologic complexity. In these only very little seabed preparation (i.e. boulder relocation) is required and therefore they represent positions with a comparatively much lower risk for schedule delays during installation. As outlined in the comment to Alternative C, connecting a limited number of WTGs in the area WSFW to the southern OSS unduly increases the risk profile for the project and the impact to particularly sensitive benthic habitats. | purpose and need. While BOEM acknowledges that a decision to select alternatives C, E, and F, or any combination thereof, is not without consequence, for purposes of NEPA they remain viable alternatives for the decision maker to consider and would not ultimately result in an inability to move forward with the project. |
| BOEM-2022-0045-0110 | 13 | Alternatives C and E take measures to avoid or minimize impacts to habitat areas and culturally significant resources, making them more responsible alternatives. We support Alternative C based on the benefits to benthic habitat and essential fish habitat but emphasize that the concerns raised by the Tribes must be addressed. The Mashpee Wampanoag Tribe of Gay Head (Aquinnah) have identified certain views from the Gay Head Cliffs (Aquinnah Cliffs) on Martha's Vineyard as important to their oral history, traditions, cultural practices, and as a traditional cultural property (TCP) associated with the Wampanoag cultural hero Moshup. The tribe is especially concerned about the siting of WTGs affecting sunset views from Gay Head and that the introduction of offshore wind infrastructure will adversely affect the recently identified Vineyard Sound and Moshup's Bridge TCP and the Gay Head Cliffs National Natural Landmark (which is also part of the traditional cultural property).41 Alternative E was specifically designed to address these concerns. Inasmuch as Alternative E adequately addresses tribal concerns, we support the measures therein; addressing these concerns, in combination with Alternative C, may require larger turbines, as contemplated in Alternative F, to generate enough capacity to meet the 704 MW total of the three Power Purchase Agreements this project is meant to fulfill. | Thank you for the comment. BOEM has consulted with and will continue to consult with potentially impacted tribes to address their concerns. |

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| BOEM-2022-0045-0100 | 22 | The description of this alternative should be revised to include cod spawning activity. While the description of C2 includes cod spawning activity, as discussed with BOEM and illustrated in the prioritization of areas for turbine removal, the primary focus of the alternative development was to minimize impacts to cod spawning activity in addition to complex habitat. Cod spawning activity should be accurately described as a primary focus for this alternative. | BOEM has added additional language to Section 2.1.3 and Appendix K of the EIS. |
| BOEM-2022-0045-0100 | 23 | The description of the alternatives should be revised to exclude the statement "where micrositing is not possible." Micrositing was not considered in the development of this alternative and is not factored into the selection of turbines for removal. If necessary, the potential for micrositing turbines that would not be removed under this alternative into soft bottom habitats can be mentioned as an additional mitigation measure. | Alternative descriptions have been revised to remove "where micrositing is not possible." |
| BOEM-2022-0045-0100 | 24 | The reference to coordination with NMFS should be clarified. Specifically, we did not recommend narrowing the alternative to two options, rather we reviewed and agreed that the configurations, as presented in the DEIS, were reasonable layout options for turbine removal considering the priorities of avoiding impacts to cod spawning activity and habitat complexity; based upon the data available at the time of our review. We cautioned against making a predetermination of which turbines should be removed and recommended the layouts be presented as options for illustrative purposes and examples in the DEIS for how this alternative could avoid and minimize impacts to cod spawning and complex habitats. The reference to coordination with NMFS should be clarified to indicate that the presented alternatives were selected by BOEM. | Clarifying text has been added to Section 2.1.3 |
| BOEM-2022-0045-0101 | 24 | WTG Minimization and Cumulative Visual Impacts<br>MP-THPO Comments and Concerns<br>Each additional WTG impacts our traditional lands by adding another foundation and inter-array cables that may disturb the paleolandscape. Reducing the number of WTGs to the bare minimum required by the PPAs for the Project would minimize these impacts.<br>Additionally, these projects currently have a 25 – 30-year cycle before evaluation of continuance or decommissioning. The renewable future (today) is not clear. New renewable power generation plants may be developed in terrestrial (dry) areas within that 30-year time frame. This would lessen the dependence for power to come from our ancestral TCP’s, thereby lessening impacts to the OCS.<br>Research and Document Review Summary<br>DEIS<br>Alternatives C through F (DEIS Sections 2.1.3 through 2.1.6, respectively)—which are alternatives designed to minimize impacts to local habitats, transit activities, and viewsheds as well as allow for higher-capacity WTGs—provide possibilities for anywhere from 56 to 93 WTGs instead of the 100 proposed by Alternative B (execute the Project IAW the COP issued by Ørsted).<br>Only Alternative A, which would entail BOEM refusing to allow the project to proceed, would add no WTGs from the Project. (Alternative A, however, does not preclude the construction of future projects.) | Thank you for the comment. |
| BOEM-2022-0045-0100 | 25 | The provided figures for Alternative C do not illustrate the data that BOEM relied upon in the identification of turbines considered for removal. While some of the data used is illustrated in Appendix K, the provided figures (Figure 2.1-8 and Figure 2.1-9) in the presentation of the alternative should clearly depict the data used to determine the considered turbine removal locations to provide the reader with the appropriate context and clearly illustrate what resource impacts will - and will not - be avoided or minimized under the alternative. | Thank you for your recommendation. A detailed description of the development of Alternative C is provided in Appendix K of the EIS, including Figure K-1, Figure K-2, and Figure K-3. Appendix K includes a description of the data used for WTG placement, consisting of:<br>• GARFO’s identified priority areas<br>• Maintaining continuity of complex habitat<br>• Boulder density (higher density areas were avoided over lower density areas)<br>• Multibeam backscatter data (high backscatter areas were avoided over lower backscatter areas) and,<br>• Engineering considerations such as maintaining linearity of inter-array cable layouts and maintaining offshore substation locations<br>Additionally, new Figure 3.6-3 and Figure 3.6-5 have been added in Section 3.6 Benthic Habitat and Invertebrates that include overlays of boulder field classifications. |

## Alternatives Not Analyzed In Detail

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| BOEM-2022-0045-0101 | 23 | Cable Emplacement—Common Corridors and Submerged Landscapes<br>MP-THPO Comments and Concerns. The following also apply to future projects in the MA/RI WEAs:<br>• Common cable paths are needed instead of a conglomeration of cables that look like a plate of spaghetti; disruption cannot be mitigated by digging up the entire ocean floor.<br>• Export cable-related mitigation measures are needed for the submerged land that our people once walked.<br>• Common cable corridors that are negotiated with the tribes and other stakeholders, along with full proper marine archaeological and geotechnical surveys as outlined in this document, must be conducted to establish the best routes to shore shared by all proposed wind energy projects. The MPTN feels this is the only way to minimize ocean floor impacts.<br>The MPTN understands that a common cable path would create greater impact in a confined area; however, it is far better than scattered impacts of multiple offshore export cable corridors all throughout the eastern seaboard, which is the current approach. Deep geophysical surveys would need to be conducted to “clear” the corridor route.<br>Tribal input must be considered in route selection and archaeological analysis interpretation, resulting in additional core sampling being conducted. The MPTN feels that other routes were not fairly considered; explanations for why other routes cannot be used have ranged from ocean floor surface terrain conditions to infrastructure constraints at researched landing sites. Yet we have participated in many consultation meetings with various stakeholders, including companies responsible for laying cables that claim the methods used today are modern and innovative.<br>The bottom line for the MPTN is that there appears to be no will to honestly identify other routes and methods. The established WEA leases are conjoined off the New England coastline; therefore, all projects should agree to traverse cables through one corridor route. Once a common location is established, electric transmission providers such as Eversource are responsible for determining how to route power to the various states to comply with their individual power purchase agreements (PPAs).<br>Research and Document Review Summary<br>Section 2.1.7 of the DEIS, Alternatives Considered But Dismissed from Detailed Analysis, provides an alternative that “uses common cable routing corridors with adjacent projects to facilitate avoidance and minimization of impacts to resources by reducing the number of corridors and allowing for programmatic-level review and comment.” Per Table 2.1-17, BOEM dismissed that alternative because “(t)he Project intends to deliver power to the existing Davisville Substation in North Kingstown, Rhode Island, and none of the projects for which COPs are under consideration intend to deliver power to areas that will have cables located in that general location”<br>Recommended Action Item<br>Consider common cable routes to reduce seabed disturbance, the concerns identified in Section 2.1.7 notwithstanding. | The lease action was analyzed in BOEM’s Programmatic EIS for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf was the establishment of the Marine Minerals Management Service Alternative Energy and Alternate Use Program on the Federal Outer Continental Shelf which complied with the procedural requirements of NEPA including coordination with agencies, tribes and public review. BOEM’s regulations require BOEM to analyze Revolution Wind’s proposal to build a commercial-scale wind energy facility on the Renewable Energy Lease Number OCS-A 0486. The purpose and need in the EIS reflect the requirement per those regulations, whereas BOEM’s purpose as stated in Section 1.2 is to determine whether to approve, approve with modifications or disapprove Revolution Wind’s COP, is needed to fulfill BOEM’s duties under the lease. BOEM considered reasonable alternatives during the EIS development process that would avoid or minimize adverse impacts in accordance with NEPA implementing regulations. BOEM’s screening criteria is presented in Appendix K, Additional Analysis for Alternatives Dismissed, of the Final EIS. |
| BOEM-2022-0045-0102 | 18 | Government accounted for the environmental footprint of only the lease area itself when first beginning wind farm projects in the area—not concerns related to cables and the path to the grid. (Cable corridors containing five cables can be as wide as 800 meters.)<br>Research and Document Review Summary<br>Section 2.1.7 of the DEIS, Alternatives Considered But Dismissed from Detailed Analysis, provides an alternative that “uses common cable routing corridors with adjacent projects to facilitate avoidance and minimization of impacts to resources by reducing the number of corridors and allowing for programmatic-level review and comment.”<br>BOEM dismissed that alternative because “(t)he Project intends to deliver power to the existing Davisville Substation in North Kingstown, Rhode Island, and none of the projects for which COPs are under consideration intend to deliver power to areas that will have cables located in that general location” (DEIS Table 2.1-17).<br>Recommended Action Items<br>Consider common cable routes to reduce seabed disturbance, the reasoning for not doing so identified in Section 2.1.7 notwithstanding. | Comment noted. BOEM will consider common cable routes in future NEPA assessments as appropriate. For purposes of this EIS, the rationale for not considering shared cable routes presented in Section 2.1.8 remains valid. |

## Cumulative Analysis

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| BOEM-2022-0045-0119 | 3 | As far as the deis goes in the DEIS BOEM conflates the no action alternative with the cumulative impacts alternative, which is completely unacceptable. They should be two different sections two completely different sections. They are two completely different NEPA requirements, um, and putting them together as if it is one issue is unreasonable, and it's arbitrary and capricious on the agency's part earlier on the presenter said that the navigation impacts were the same whether it was the proposed action or the no action alternative, and that is only because BOEM has conflated no action with cumulative impacts alternative. and the No action alternative in the document includes build out of all the current leases, even those currently unapproved which is truly a cumulative impact analysis. Not a no, not a no action analysis. Um. So by doing that the impacts of this project are downgraded in the BOEM analysis, and that's unacceptable, and I would request that BOEM reissue the DEIS with a true no action alternative, and a true cumulative impacts alternative in the documents and corresponding analyses. | Clarification regarding BOEM's methodology for assessing impacts has been provided in Section 1.6 of the Final EIS. The Final EIS presents a complete description and analysis of impacts from ongoing activities and trends (i.e., No Action Alternative) and impacts from the proposed action and action alternative. The No Action Alternative provides a current baseline for analysis of impacts from the action alternatives. A separate analysis of the No Action Alternative when combined with future planned activities (i.e., cumulative actions) provides the future baseline as a basis for comparison of the cumulative impacts of the action alternatives .The analysis of the No Action Alternative has been updated to better describe impacts of the No Action in relation to the existing baseline and in relation to cumulative activities. Impact-level conclusions for the No Action have been reviewed and revised in the Final EIS as appropriate. |
| BOEM-2022-0045-0059 | 4 | The DEIS states that BOEM's 2019 study National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Continental Shelf 13, completed in May 2019 is the study which identifies past, present and reasonable foreseeable actions in the North Atlantic that BOEM incorporated into the EIS analysis for Revolution Wind.14 However, the reasonably foreseeable future actions have increased since 2019, and BOEM should adjust its cumulative impact analysis accordingly as the 2019 study is now outdated.<br>The 2019 BOEM cumulative impacts study set the threshold for "reasonably foreseeable" as the "State Capacity Planned Commitment for Existing Atlantic Leases", which was 21.8 GW in 2019.15 However, the state planned capacity has risen sharply since 2019. It is now well over 40 GW. For example:<br>- Maine has a target of 5 GW by 2030. 16<br>- Massachusetts as of March 2022 has a target of 5.7 GW by 2027. 17<br>- Rhode Island in 2022 signed legislation procuring up to 1,000 MW. 18<br>- Connecticut has a legislative target of 2,000 MW by 2030, with recommendations for 4,000 MW. 19<br>- New York in 2022 issued its third power solicitation to add another 2 GW to its procurement goals, for a total of 9 GW by 2030. 20<br>- New Jersey in 2022 increased its offshore wind target to 11 GW by 2040. 21<br>- Maryland in 2021 increased its offshore wind market to 2,022.5 MW, an increase from 2019. 22<br>- Virginia in 2020 passed legislation increasing its offshore wind power requirements to at least 5.2 GW by 2034. 23<br>- North Carolina in 2021 passed an Executive Order establishing a goal of 2.8 GW of offshore wind by 2030 and 8 GW by 2040. 24<br>Although some of these commitments may exceed the planned commitment for existing Atlantic leases category and fall into the pledged commitment category, it is inarguable that states have increased procurement and planned procurement since 2019. This is combined with additional leases since 2019.<br>BOEM auctioned off six additional leases in the NY Bight in 2022, totaling nearly half a million acres of ocean floor.25 These cannot be ignored but must be included. BOEM's Central Atlantic Call Area, totaling over 3.8 million acres, also cannot be ignored.26 Although BOEM's 2019 document does not consider Call Areas to be reasonably foreseeable but only preliminary,27 BOEM has indicated on Central Atlantic public meetings that it expects to identify and lease areas in the Central Atlantic in late 2022. In this case, the leases identified as part of that process would also need to be included in the cumulative impacts analysis of the Revolution Wind DEIS/FEIS, as that leasing would be complete prior to the approval of any Revolution Wind DEIS alternatives.<br>Therefore, with the additional state planned procurement and additional leases since 2019, the 2019 BOEM cumulative impacts analysis study is no longer accurate. BOEM must update its cumulative impacts analysis with the increased state planned capacity commitment as well as recent New York Bight leases and any Central Atlantic leases in the Revolution Wind DEIS cumulative impacts scenario. We request that BOEM initiate a new cumulative impacts study incorporating these increased impacts for the Revolution DEIS and make that updated cumulative impacts analysis available for public comment as | Detailed information regarding reasonably foreseeable offshore wind projects is provided in Appendix E of the EIS. BOEM analyzes the impacts of all reasonably foreseeable future planned activities, which include future offshore wind activities, in each resource-specific environmental consequences section in Chapter 3 of the EIS. Cumulative impacts of each alternative are also analyzed separately in relation to the future baseline. Reasonably foreseeable future actions include the build-out of executed renewable energy lease areas. While the BOEM (2019) study was incorporated by reference, it was not the sole basis for determining cumulative activities. BOEM developed the cumulative offshore wind estimates based on offshore wind demand, and by summing acreage or number calculations across all lease areas noted as occurring within, or overlapping, a given geographic analysis area. This likely overestimates some impacts in cases where lease areas only partially overlap analysis areas. However, this approach was used to provide the most conservative estimate of future offshore wind development within the analysis period. |

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| | | part of the DEIS process before completion of the FEIS. Accurate cumulative impacts analysis is necessary in particular for analyzing impacts to federally permitted fisheries which operate from Maine to North Carolina in the Greater Atlantic Regional Office jurisdiction.<br>Footnote 13: See (OCS Study 2019- 036) (BOEM 2019).<br>Footnote 14: DEIS, p. 1-9.<br>Footnote 15: See National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Continental Shelf , OCS Study 2019- 036) (BOEM 2019) https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Impact-Producing-Factors-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-South-Atlantic.pdf, p. 29.<br>Footnote 16: See : Offshore Wind \| Governor's Energy Office (maine.gov)<br>Footnote 17: See Massachusetts (United States) targets 5.6 GW of offshore wind capacity by 2027 \| Enerdata.<br>Footnote 18: See Governor McKee Signs Legislation Requiring Offshore Wind Procurement for 600 to 1,000 Megawatts \| Rhode Island Office of Energy Resources.<br>Footnote 19: See Connecticut Looks Before It Leaps on Offshore Wind \| Clean Energy Finance Forum.<br>Footnote 20: See NY issues third offshore wind solicitation, seeking at least 2 GW \| Energy News Network and Governor Hochul Announces New York's Third Offshore Wind Solicitation to Accelerate Clean Energy Development \| Governor Kathy Hochul (ny.gov).<br>Footnote 21: See New Jersey snatches US offshore wind crown with new nation-leading 11GW state target \| Recharge (rechargenews.com)<br>Footnote 22: See Offshore Wind (maryland.gov)<br>Footnote 23: See Virginia governor signs off on 5.2 GW by 2034 offshore wind target - Offshore Energy (offshore-energy.biz).<br>Footnote 24: See North Carolina sets an 8GW offshore wind target for 2040 - REGlobal - Big Moves and PowerPoint Presentation (nc.gov).<br>Footnote 25: See https://www.boem.gov/renewable-energy/state-activities/new-york-bight.<br>Footnote 26: See https://www.boem.gov/renewable-energy/state-activities/central-atlantic-activities.<br>Footnote 27: See National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Continental Shelf , OCS Study 2019- 036) (BOEM 2019) https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Impact-Producing-Factors-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-South-Atlantic.pdf, p. 29. | |
| BOEM-2022-0045-0119 | 5 | the cumulative impact section must include locations and breadth of all the subsea cables. From this project and all other projects in the reason in the region BOEM continues to ignore the hazards and the significant individual and cumulative impacts of export tables on fisheries, um commercial fisheries with mobile bottom tending gear will not be able to safely operate over export tables or inter-array cables BOEM has said in previous the EISs well the cable route is narrow. It's only going to be a minor impact. It's it's nothing really worth analyzing. That is not accurate. When you consider the spiderweb of cables the export tables included that are going to arise from all of the proposed projects, and I would request that in this DEIS BOEM go back to the drawing board. Put a chart of all of the proposed export cable routes, and the multiple cables that will be in them, and the wet, the the breadth of those cables, and the length of those cables, and conduct a cumulative impact analysis on fisheries with those cables, because much more area will be lost to fisheries than is just consumed by the one hundred turbines themselves. Areas outside of the lease will also be lost to fisheries because of the export tables. | Export cables were estimated for all foreseeable projects within the GAAs as presented in Appendix E3. Most export cable routes are proposed at this stage and subject to change, however, the impacts from installation, O&M, and removal of these cables were considered in the cumulative analysis. |
| BOEM-2022-0045-0071 | 15 | In terms of cumulative effects, the DEIS considers future offshore wind energy activities in other lease areas as part of future baseline conditions against which the impacts of this project are compared (Appendix 3, Table E3-1). As we understand it, the DEIS has two baseline conditions, one with other wind projects and one without. The alternatives should be compared against both sets of conditions in a consistent way. | Clarification regarding BOEM's methodology for assessing impacts has been provided in Section 1.6 of the Final EIS. The Final EIS presents a complete description and analysis of impacts from ongoing activities and trends (i.e., No Action Alternative) and impacts from the proposed action and action alternative. The No Action Alternative provides a current baseline for analysis of impacts from the action alternatives. A separate analysis of the No Action Alternative when combined with future planned activities (i.e., cumulative actions) |

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| | | | provides the future baseline as a basis for comparison of the cumulative impacts of the action alternatives. |
| BOEM-2022-0045-0100 | 20 | We request that reasonably foreseeable impacts be defined based on the 2020/22 CEQ regulations (40 CFR 1508.1) under which this document is written, ""Reasonably foreseeable means sufficiently likely to occur such that a person of ordinary prudence would take it into account in reaching a decision."" The text here, ""Reasonably foreseeable can occur from individually minor but collectively significant actions that take place over time"" is the definition of ""cumulative impacts"" as defined in both the 1978 (40 CFR 1508.7)) and 2022 (40 CFR 1508.1) regulations. " Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time."" Additionally, cumulative impacts should be incorporated in a separate analysis from the No Action Alternative. | Clarification regarding BOEM’s methodology for assessing impacts has been provided in Section 1.6 of the Final EIS. The Final EIS presents a complete description and analysis of impacts from ongoing activities and trends (i.e., No Action Alternative) and impacts from the proposed action and action alternatives. The No Action Alternative provides a current baseline for analysis of impacts from the action alternatives. A separate analysis of the No Action Alternative when combined with future planned activities (i.e., cumulative actions) provides the future baseline as a basis for comparison of the cumulative impacts of the action alternatives. The Final EIS has been updated to better delineate the impacts of the alternatives, including the No Action, against ongoing activities and against future baseline conditions (i.e., cumulative impacts). |
| BOEM-2022-0045-0101 | 33 | Recommended Action Items<br>• Consider each individual project as one overarching project to better account for cumulative effects and lessen the administrative burden on the THPO. | The lease auction was analyzed in BOEM’s Programmatic EIS for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf was the establishment of the Marine Minerals Management Service Alternative Energy and Alternate Use Program on the Federal Outer Continental Shelf which complied with the procedural requirements of NEPA including coordination with agencies, tribes and public review. Appendix E provides an analysis of the impacts of the types of actions (including the future action of approving wind farm development activities other than the Project) that BOEM has identified as potentially contributing to the impacts from the planned actions when combined with impacts from the Proposed Action and other alternatives over the geographic and time scale identified. BOEM analyzes the impacts of all reasonably foreseeable future planned activities, which include future offshore wind activities, in each resource-specific environmental consequences section in Chapter 3 of the EIS. Cumulative impacts of each alternative are also analyzed separately in relation to the future baseline. Reasonably foreseeable future actions include the build-out of executed renewable energy lease areas. |

## Decision Process

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| BOEM-2022-0045-0065 | 5 | Existing activities supporting the Revolution Wind project, such as geological and geophysical surveys, do not comply with NEPA and other applicable laws. | Thank you for your comment. The 2013 lease sale EA referenced in Table 1.4-1 of the EIS considered impacts resulting from site characterization and site assessment activities. The analysis found in the EA provided NEPA coverage for said activities. This EIS considers impacts from past, ongoing, and future activities, including the site characterization and site assessment activities that will be needed for finalizing the design and installation reports for the construction of this project. |
| BOEM-2022-0045-0086 | 7 | It is important to note that, in addition to the BOEM-led National Environmental Policy Act (NEPA) process, the Project is also being reviewed through a robust state permitting process, including the Rhode Island Department of Environmental Management (RIDEM), the Rhode Island Coastal Resources Management Council (CRMC), the Massachusetts Office of Coastal Zone Management (MA CZM), as well as various State Historic Preservation Offices (SHPOs) including the Rhode Island Historic Preservation & Heritage Commission (RIHPHC), the Massachusetts Historical Commission (MHC), the Connecticut State Historic Preservation Office, New York State Division of Historic Preservation, and the Massachusetts Board of Underwater Archaeological Resources through Section 106 of the National Historic Preservation Act. The Project is also coordinating with federally and non-federally recognized Tribal Nations, local governments, and non-governmental organizations. | Thank you for the comment. Appendix A discusses federal and state required permits and consultations for the project and lists them in Table A-1. Text has been added to the introduction of Table A-1. |
| BOEM-2022-0045-0065 | 11 | BOEM and the U.S. Department of the Interior appear to be applying conflicting environmental regulations and policies to their OSW project reviews, including NEPA and interagency agreements. Some of these contradictions are summarized in RODA’s Ocean Wind scoping comments (Appendix III) and others including those submitted on another recent Atlantic Ørsted project (e.g. South Fork). The public cannot be prepared to offer comment—and BOEM cannot release a DEIS for such comment—when there is no certainty as to what laws and policies will apply to the agency’s review. The fishing industry, and other sectors, are persistently confused by BOEM’s process, how to engage, and the potential benefits of engagement. Again, we call on BOEM to provide this transparency and a balanced and coherent planning process. | Comment noted. This comment lacks the necessary specificity to provide a detailed response. However, we have reviewed the documents the commenter referenced, which relate to different projects. BOEM prepared the DEIS and has incorporated all comments received and prepared responses in this appendix as part of the NEPA process. BOEM will follow its regulations regarding COP approval. |
| BOEM-2022-0045-0069 | 13 | Seafloor disturbance, sediment suspension, boulder relocation, and deposition in Rhode Island state waters will all be reviewed in greater detail through the RIDEM permitting process for a Water Quality Certification (RIGL § 46-12-3 and 250-RICR-150-05-1.1 et seq. – federal authority delegated to the State pursuant the Clean Water Act [CWA], 33 U.S.C. §§ 1341-1342) and a Dredge Permit (pursuant to the Rules and Regulations for Dredging and the Management of Dredged Materials - 250-RICR-150-05-2.1 et seq.). | Thank you for the comment. Appendix A discusses federal and state required permits and consultations for the project and lists them in Table A-1. Text has been added to the introduction of Table A-1. |
| BOEM-2022-0045-0100 | 16 | Please add the following footnote after the reference to the regulations, "(40 Code of Federal Regulations [CFR] 1500–1508": "This EIS is being prepared using the 2020 CEQ NEPA Regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020, and reviews begun after this date are required to apply the 2020 regulations unless there is a clear and fundamental conflict with an applicable statute. 85 Fed. Reg. at 43372-73 (§§ 1506.13, 1507.3(a)). This EIS began on April 30, 2021 and accordingly proceeds under the 2020 regulations.” | Thank you for you comment. BOEM has updated this section to clarify that this EIS was prepared in accordance with the 2020 CEQ NEPA regulations. |
| BOEM-2022-0045-0100 | 18 | Please replace this sentence with the following for accuracy, "The National Oceanic and Atmospheric Administration’s (NOAA’s) National Marine Fisheries Service (NMFS) received a request for authorization to take marine mammals incidental to construction activities related to the Project, which NMFS may authorize under the Marine Mammal Protection Act (MMPA)." | Thank you for the comment. Edits have been made. |

## Effects Analysis (General)

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| BOEM-2022-0045-0100 | 1 | In our dual roles as both a cooperating and adopting agency, we provided comments on May 23, 2022, during an interagency review of the PDEIS. While some of our comments were addressed, a significant portion of the comments we provided during the cooperating agency review are not reflected or resolved in the current version of the DEIS. Thus, we remain concerned with the analysis of impacts from the project on NOAA trust resources. | Thank you for your comment. The FEIS has been updated in response to comments on the DEIS as outlined in the responses to comments provided in Appendix L. |
| BOEM-2022-0045-0086 | 1 | Revolution Wind strongly agrees that offshore wind will provide the long-term benefits identified throughout the DEIS and believes the benefits of the Project should be evaluated and considered as prominently as the evaluation of impacts. Revolution Wind suggests that BOEM expand the discussion of these positive findings in the FEIS to emphasize and balance those benefits in comparison to the impacts. | Thank you for the comment. Beneficial project impacts have been highlighted in the Chapter 3 resource area analyses, Chapter 2 Table 2.3-1 Summary and Comparison of Impacts by Alternative, and in Executive Summary Table ES-2. |
| BOEM-2022-0045-0071 | 1 | Given the current pace of offshore wind energy development in this region and workload constraints, we are unable to provide a detailed review of this project. The analysis in the DEIS has important ramifications for terms and conditions which may be implemented through final project approval, including fisheries mitigation and compensation measures. With this in mind, we strongly encourage BOEM to consider the recommendations listed in the wind energy policies adopted by both Councils, which apply across all projects.2 Our two Councils worked together on these policies and adopted the same policy language. We also urge BOEM to adopt the recommendations provided by NOAA Fisheries for this project, including recommendations regarding data considerations, impacts analysis, and ways to minimize the negative impacts of this project on marine habitats, commercial and recreational fisheries, and fishery species. | There are a number of monitoring reports that will be required such as weekly reporting of pile driving activity, sound source measurements, PSO data, and reporting all sightings of North Atlantic right whales. Appendix F of the EIS has also been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. BOEM fully supports regional monitoring and sharing data with the public as offshore wind development progresses and will incorporate results in future decisions. |
| BOEM-2022-0045-0069 | 1 | The geographic area analysis for the analysis does not include adjacent leases. Therefore, prospective effects the area of interest has on adjacent areas and vice versa are not considered. This notion follows a similar concern of not evaluating the cumulative effects of development on these areas. | Where appropriate, The DEIS analysis did include adjacent leases. Section 3.1 explains how GAAs were applied and resource-specific GAAs were defined at the beginning of each resource section in Chapter 3 of the EIS. |
| BOEM-2022-0045-0065 | 1 | RODA and its members have submitted hundreds of comment letters to BOEM and its cooperating federal and state agencies outlining significant concerns associated with offshore wind energy (OSW) development in the Southern New England region, where this project is proposed, and other areas that are essential to U.S. seafood production. These projects have become indistinguishable in most fundamental ways,2 yet BOEM continues to conduct environmental review using a piecemeal, rather than regional, approach. 2 If there are design or operational measures proposed for the Revolution Wind project (or future projects) that differ significantly from others in the region, BOEM should clearly present these to the public to inform responsive comments. It is neither reasonable nor achievable for seafood industry members to read thousands of pages of documents in dozens of projects over the span of mere months in order to participate in the environmental review process for the new OSW industry in Southern New England. | BOEM's regulations require BOEM to analyze Revolution Wind's proposal to build a commercial-scale wind energy facility on the Renewable Energy Lease Number OCS-A 0486. The purpose and need in the EIS reflect the requirement per those regulations, whereas BOEM's purpose as stated in Section 1.2 is to determine whether to approve, approve with modifications or disapprove Revolution Wind's COP, to fulfill BOEM's duties under the lease.<br><br>As outlined in Section 1.4, this EIS tiers to and incorporates by reference a number of programmatic assessments on wind energy development in the New England region. In support of the NEPA process, BOEM also develops white papers to provide detailed discussions of topics raised. These papers are summarized and iteratively incorporated into BOEM's offshore renewable energy NEPA documents as available. Completed BOEM white papers are available here: https://www.boem.gov/renewable-energy/national-environmental-policy-act-and-offshore-renewable-energy. |
| BOEM-2022-0045-0065 | 2 | RODA provided comments and recommendations specific to the scoping process for the Revolution Wind project3 and on the project's Incidental Harassment Authorization4 under the Marine Mammal Protection Act. These comments covered a broad range of topics from the fisheries communication plan to the structure of NEPA analysis. The DEIS is nonresponsive to these constructive comments. As most of the issues outlined in RODA's previous letters on this project and others have not been addressed to date, we incorporate all past correspondence by reference and do not repeat the entirety of the consistent, clear, and reasonable requests our members have previously raised.5 5 In particular, RODA submitted comprehensive comments to BOEM pertaining to the South Fork and Ocean Wind project Draft EISs owned by the same company (Ørsted). As none of those comments or suggestions have yet been addressed, these letters remain directly applicable to the preparation of a DEIS for the Revolution Wind project and are therefore wholly incorporated bv reference herein. | Comment noted. This comment lacks the necessary specificity to provide a detailed response. However, we have reviewed the documents the commenter referenced, which relate to different projects. BOEM is in Section 7 ESA and MMPA consultation with NMFS and will comply with applicable terms and conditions. |

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| BOEM-2022-0045-0100 | 3 | The DEIS does not fully evaluate each alternative and, in many cases, the analysis does not provide any meaningful distinctions between the impacts of the action alternatives. While the document considers alternatives that would reduce the project size by one-third to one-half, BOEM concludes that there are no differences between the effects of the proposed action and any other action alternatives. We disagree with the conclusion that impacts to NOAA trust resources would be the same among all alternatives considered - impact minimization alternatives are included and evaluated based on the expectation that they will result in a measurable and meaningful reduction in substantial impacts to resources. For example, Alternative C (habitat impact minimization alternative), in combination with Alternative F (larger turbine size) could avoid most impacts to complex habitats and avoid areas of known Atlantic cod spawning activity; yet those reductions in impacts are not meaningfully discussed, analyzed, or explained. Alternatives C through F would result in a lower magnitude of noise exposure for marine mammals (due to the installation of fewer turbines), which could easily be quantified to demonstrate the reduced impacts associated with scaling down project size; however, that analysis is not included in the document. Moreover, the DEIS appears to lack any analysis of Alternative F, and while BOEM has not identified a specific layout for this alternative, the reduction in area and increased size of the turbines should be incorporated into the impacts analysis and should, at a minimum, be qualitatively discussed. | The impacts of each alternative align with the appropriate impact level as defined in Section 3.4 and are supported by the analysis. BOEM acknowledges the importance of describing nuanced differences among alternatives, particularly when those differences are not determined to change the overall impact determinations. The analysis has been updated throughout Chapter 3 where possible to further highlight the differences in impacts between alternatives, including when combined with Alternative F. The minimization of impacts is identified and quantified where possible in the Final EIS. |
| BOEM-2022-0045-0113 | 3 | As BOEM works to develop a Final Environmental Impact Statement (FEIS), we urge the agency to ensure the maximum beneficial impacts are fulfilled by employing the following standards to create a high-road, responsibly developed offshore wind industry:<br>Protect fisheries, wildlife, and marine ecosystems by avoiding, minimizing, mitigating, and monitoring environmental impacts; and, utilizing data sharing, the best available science and data, and adaptive management strategies; | Thank you for the comment. |
| BOEM-2022-0045-0100 | 4 | In addition to the structure of the No Action alternative, we have identified two other elements that contribute to the lack of distinction among alternatives: (1) The scale of the geographic area analyzed for each resource; and (2) the significance criteria definitions and their application to the various resources. For example, the approach to the area of analysis for each resource is unclear. The DEIS explains that the geographic analysis area - a broader scale - is used for cumulative impacts, but for direct and indirect effects of the proposed action, impacts are predicted presumably on a finer scale defined by the Impact Producing Factor (IPF). It is unclear in Chapter 3 how this geographic analysis approach is applied on an IPF or resource basis as the parameters in many cases are not well-defined. Moreover, the importance of the temporal duration of impacts to resources is not clearly explained through the significance criteria or applied to the analysis in the document. | The geographic analysis area varies according to the anticipated geographic extent of impacts for each resource. The purpose is to capture the cumulative impacts on each of those resources that would be affected by the Proposed Action as well as the impacts that would still occur under the No Action Alternative. Impacts from both the proposed action IPFs and from cumulative activities are evaluated using the significance criteria defined in Section 3.3, which consider the potential for population-level impacts. Where applicable, the EIS discloses localized impacts (e.g., to Cox's Ledge) from IPFs, however, those impacts are also evaluated in the context of the broader resource extent within the GAA. |
| BOEM-2022-0045-0091 | 4 | The DEIS identifies and evaluates six alternatives (including the Proposed Action and No Action alternatives) While we appreciate the work done by BOEM to analyze a number of alternatives, many of which on their face indicate an interest in exploring enhanced environmental outcomes, we are disappointed with the the manner in which the information related to the alternatives analysis is presented in the DEIS. As an initial matter, a summary table of the conclusions of the analysis for each alternative as it relates to a number of factors is provided on pages ES-7 to ES-10 of the Executive Summary. To quote the DEIS as to how that information is presented: The EIS uses four levels of classification to characterize the potential adverse or beneficial impacts as negligible, minor, moderate, or major. Chapter 2, Section 2.3 provides a summary and comparison of incremental and overall cumulative impacts by alternative, which is provided below as Table ES-2. Impacts include both Project-specific impacts and incremental impacts of the Project when combined with other current and reasonably foreseeable projects (i.e., cumulative impacts). Where directionality (e.g., adverse or beneficial) is not specifically noted, the reader should assume the impact is adverse. Green cell color represents negligible to minor adverse overall impact. Yellow cell color represents moderate adverse overall impact. Orange cell color represents major adverse overall impact. Resources with beneficial impacts are denoted by an asterisk, and alternatives within those resource rows with beneficial impacts are denoted by hatched cells and an asterisk. As presented in the Executive Summary, where many readers may begin and end their inquiry, the DEIS tends to obscure the beneficial impacts of proposed alternatives (simply denoting them with an Asterix or crosshatching within the color-coded system for identifying adverse impacts) while visually highlighting the overall adverse impacts of proposed alternatives through the color-coding system.<br>Within the body of the DEIS itself, the potential benefits of particular alternatives relative to the proposed action are also difficult to parse as presented in the tables. This is compounded by combining the analysis for several different alternatives into one common analysis. For example, the alternatives analysis regarding impacts to marine mammals treats alternatives “C” through “F” as functional equivalents, presumably because each reflects a reduction in the number of wind turbines, despite the fact that the number of turbines estimated under each scenario varies wildly.12 Alternative “D” (Transit Alternatives) | Thank you for the comment. Beneficial project impacts have been highlighted throughout the Chapter 3 resource analyses, in Chapter 2 Table 2.3-1 Summary and Comparison of Impacts by Alternative, and in Executive Summary Table ES-2. |

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| | | contemplates as many as 93 turbines (only 7 fewer than the Proposed Action), while alternative 'F' (Higher Capacity Turbines) considers a buildout of 56 turbines (almost 50% fewer than the Proposed Action). Clearly the differential impact of removing a handful of turbines versus reducing the overall project size by almost half is significant. Yet, such differential impacts are absent from the analysis. We would encourage BOEM in the Final Environmental Impact Statement (FEIS) to highlight the details of those specific alternatives which yield benefits and/or reduced environmental impacts relative the Proposed Action, while fulfilling the purpose and need of the project. We encourage BOEM to careful analyze how the elements of those alternatives which yield such benefits might be combined to yield multiple benefits across several different environmental impact categories. | |
| BOEM-2022-0045-0114 | 4 | The organization and format of the DEIS, appears to closely follow the earlier DEIS's as well as the extensive cumulative impact analysis developed by BOEM as a supplemental EIS in the lengthy Vineyard Wind 1 review process. This includes nearly 20 individual environmental and socioeconomic factors, each examined for "Alternative Impacts" and "Alternatives Combined with Other Foreseeable Impacts" for the No Action Alternative, the Project as Proposed as well as three specific options (reductions in the number of WTG locations in the interest of reducing potential marine habitat impacts, potentially improving marine transit and potentially reducing visual impacts), as well as a possible 14MW WTG option. This organization, while arguably thorough, results in a repetitive and rather tedious text. While there are locational and project specific factors which may need to be addressed, it would seem that the level of detail could be reduced in many instances via reliance on findings of negligible to minor impacts in prior analysis (VW cumulative, VW DEIS, Southfork DEIS, Ocean Wind DEIS, etc). | BOEM developed the tables in Appendix E for each resource category based on the 2019 study titled *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019). Tables E1-1 to E2-21 provide an analysis of the relevant ongoing and future non–offshore wind activities by IPF for each resource, as well as a reference to where each of those IPFs is analyzed in relation to future offshore wind activities and the Proposed Action and alternatives, if applicable. As suggested in this comment, and consistent with Section 1502.15 of the CEQ NEPA implementing regulations, IPFs either not applicable to the resource area or were determined by BOEM to have a negligible effect were excluded from analysis in the body of the EIS and retained in Appendix E1. IPFs that result in a minor (or less) impact were retained in Appendix E2. |
| BOEM-2022-0045-0065 | 4 | BOEM's NEPA process is insufficient for project review and development of effective mitigation measures, especially with regard to cumulative impacts of regional development. | Thank you for the comment. BOEM has worked with and will continue to work with cooperating agencies to develop mitigation measures appropriate for this project and all ongoing and future OSW projects. |
| BOEM-2022-0045-0103 | 5 | EPA is concerned that the DEIS generalizes project impacts through the use of broad, general metrics to compare impacts across alternatives (negligible, minor, moderate or major impacts). The broad metrics often result in differing alternatives being characterized as having similar (e.g., "moderate") impacts. Table 2.3-1 (Comparison of Impacts by Alternative) demonstrates this outcome as throughout the entire table, all impacts for all build alternatives are presented as being identical, despite there being demonstrable differences in the scale of the alternatives and the related impacts across the alternatives. Differences in impacts exist, however, as reflected by the fact that the habitat alternatives are specifically designed to result in less damage to identified critical resources.<br>Recommendation: The NEPA analysis would benefit from less focus on the presentation of generalized impacts and more on the clear tradeoffs between alternatives as measured by impacts. Such an approach would provide greater emphasis on the design, for example, of Habitat Alternatives (C1 and C2) to result in lowered impacts to benthic, finfish and EFH habitats. The Habitat Alternatives are specifically designed to reduce impacts by reducing the number of WTGs and locating the reduced number of WTGs and their associated inter-array cables, scour protection and other project infrastructure away from areas containing important complex bottom habitat. According to the DEIS, reducing the number of WTGs and associated cable and other infrastructure reduces associated areas of seafloor disturbance for Alternative F in conjunction with Alternatives C, D, and E by up to 43%, 29.5%, and 51%, respectively. These impacts are not similar and highlight the benefits of a more refined presentation of impacts in the analysis. Other examples provided throughout the DEIS show meaningful differences between proposed action alternative B and habitat alternatives C1 and C2 for overall construction disturbance footprint, seafloor preparation footprint, monopile and scour protection areal impacts, maximum seafloor foundation footprint and maximum cable protection footprint. We recommend that BOEM work to expand upon the discussion of the differences in impact across alternatives rather than focus on categorizing the impacts with broad metrics. These changes will benefit both the NEPA process and BOEM decision-making regarding alternatives. | Sections 1.6 and 3.0 of the EIS explain the impact analysis approach, and additional clarification was added to Table 2.3-1 and Table ES-2 to more clearly distinguish between impacts of each action alternative. The impacts of each alternative align with the appropriate impact level as defined in Section 3.3 and are supported by the analysis. BOEM acknowledges the importance of describing nuanced differences among alternatives, particularly when those differences are not determined to change the overall impact determinations. The analysis has been updated throughout Chapter 3 in an effort to better highlight the differences in impacts between alternatives, including when combined with Alternative F. The minimization of impacts is identified and quantified where possible in the Final EIS. |
| BOEM-2022-0045-0078 | 5 | Net Positive Impact on Biodiversity<br>A number of offshore wind companies have self-imposed organizational ambitions with respect to protecting biodiversity and related conservation efforts. In particular, several companies have established Net Positive Impact on Biodiversity goals to be achieved by specific dates within all respective project footprints. These ambitions should be recognized and, if not rewarded, then at the very least not penalized by the various permitting and approval processes. For this reason, TNC believes that it | The EIS evaluates and considers both the potential adverse and beneficial impacts from the proposed project. Any measures or proposed project design elements included as part of the COP are included in BOEM's evaluation of the proposed action and other action alternatives. Consideration of broader organizational efforts by the project proponent are |

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| | | would be extremely beneficial to have a point in the environmental review process at which the developer could present and BOEM and stakeholders could evaluate and comment on the methodologies being used to assess the need for offsets after application of the mitigation hierarchy and ultimately success (i.e., net positive impact on biodiversity). One possible point in the timeline to begin evaluating these goals and the effect of the project's approach on the overall project impact is within the alternatives analyses at the DEIS stage. | considered in the context of cumulative activities, however, are not considered part of the proposed action. |
| BOEM-2022-0045-0103 | 6 | In another representative instance the DEIS (Section 3.6.2.4) notes the discrepancy between the comparison and assessment of impacts based on broad general criteria (negligible, minor, moderate, major) and more appropriately scaled metrics: "While Alternatives C through F would noticeably reduce the extent of adverse impacts to benthic habitat relative to the Proposed Action, the general scale, nature, and duration of impacts are broadly comparable to those described for the Proposed Action and would therefore be minor adverse, applying the impact criteria defined in Section 3.3, Table 3.3-2. However, these criteria do not fully capture the benefits of avoiding long-term impacts to specific habitat types. For example, Alternative C emphasizes avoiding and minimizing impacts to complex benthic habitat and reducing the overall impact footprint. This alternative would reduce benthic habitat impacts from 6,615 acres to 4,374 to 4,440 acres, depending on the configuration selected. Impacts to large-grained complex and complex benthic habitat would decrease from an estimated 2,057 acres to 1,443 to 1,469 acres, depending on configuration. Impacts to these habitat types would be long term to permanent in duration."<br>Recommendation: The degree to which BOEM will rely on the assessments of impacts based on more specific information, as opposed to assessments based on general impact criteria, remains unclear and should be clarified in the FEIS. As Alternatives C1 and C2 appear to meaningfully reduce project impacts (with larger reductions when paired with Alternative F), it will be important for the FEIS to fully explain the decision-making rationale should a more damaging alternative be selected. | The impacts of each alternative align with the appropriate impact level as defined in Section 3.3 and are supported by the analysis. BOEM acknowledges the importance of describing nuanced differences among alternatives, particularly when those differences are not determined to change the overall impact determinations. The analysis has been updated throughout Ch 3 in an effort to better highlight the differences in impacts between alternatives, including when combined with Alternative F. The minimization of impacts is identified and quantified where possible in the Final EIS. The ROD will summarize the decision making rationale for the preferred alternative. |
| BOEM-2022-0045-0103 | 7 | The DEIS includes general conclusions that impacts are offset by benefits is repeated in several locations in the document (for example see 3.6.2.4.3 Conclusions, page 3.6-61). The DEIS states that "while the overall extent of offshore impacts to benthic habitat would be reduced under Alternatives C through F relative to the Proposed Action, the overall level of impact would be the same." As noted above, impacts of the various alternatives are not the same. For example, as noted above, both C Alternatives result in substantially less project level impacts than the proposed action. This characterization of the various types of impacts of alternatives as being reduced but similar to the impacts of the proposed action is repeated throughout the document.<br>Recommendation: We recommend that more detailed analysis be provided to support the statement that impacts are offset by benefits, to demonstrate more precisely how impacts are offset by benefits, and to specify the degree to which impacts are offset by benefits (e.g., partially offset, fully offset, etc.). | The impacts of each alternative align with the appropriate impact level as defined in Section 3.3 and are supported by the analysis. BOEM acknowledges the importance of describing nuanced differences among alternatives, particularly when those differences are not determined to change the overall impact determinations. The analysis has been updated throughout Ch 3 in an effort to better highlight the differences in impacts between alternatives, including when combined with Alternative F. The minimization of impacts is identified and quantified where possible in the Final EIS. The ROD will summarize the decision making rationale for the preferred alternative. |
| BOEM-2022-0045-0103 | 8 | Table E 4-1 provides helpful comparisons of impact estimates, but in several key areas the estimates provided are the same for the proposed action and all alternatives. This is based on a footnote which indicates that the project design has not occurred for Alternatives C through F and information is therefore not available. While all are maximum case scenarios, the maximum case scenario for the alternatives with reduced infrastructure and associated impacts should not be represented as having the exact same maximum case impact as the proposed action alternative. No complete comparison of impacts of various alternatives is possible unless the actual impacts from each alternative are factually and accurately presented.<br>Recommendation: We recommend that BOEM perform the work necessary to more fully populate this table with comparative estimates. Rather than include overestimates of the impacts of various alternatives often equivalent to the impacts of the proposed action, the table should instead include more realistic estimates of the reduced impacts that will result from alternatives, especially for those alternatives specifically designed to reduce impacts (Alternatives C-F). As noted above, these reductions are not "slight," but can be in the range of 25% - 35% or more depending on the impact type. Accurate representation of the impacts resulting from various alternatives is critical for meaningful assessment and comparison of alternatives and BOEM decision-making to follow. | Sections 1.6 and 3.1 of the EIS explain the impact analysis approach, and additional clarification was added to Table 2.3-1 and Table ES-2 to more clearly distinguish between impacts of each action alternative. The impacts of each alternative align with the appropriate impact level as defined in Section 3.3 and are supported by the analysis. The analysis has been updated throughout Ch 3 in an effort to better highlight the differences in impacts between alternatives. Table E 4-1 has been updated with the information available as of 12/20/22 and text has been highlighted to indicate changes from the DEIS to the FEIS. |
| BOEM-2022-0045-0065 | 8 | The following topics must be fully analyzed and clearly presented in the Revolution Wind EIS: a. Energy production, trade-offs, and alternative sources; b. Project cost and economic impacts, including to low income and environmental justice communities; c. Greenhouse gas/climate benefits and impacts; d. Supply chain impacts; e. Jobs, including demographics and gender; f. Extreme weather effects; g. Icing; h. Decommissioning; and i. Project schedule and details. | Thank you for your comment. These topics have been discussed and analyzed in the EIS. |

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| BOEM-2022-0045-0110 | 10 | Despite offshore wind's rapid growth in Europe, United States offshore wind remains a new industry, with the nation's first commercial project – the Block Island Wind Farm (30 MW) – only coming online in December 2016. BOEM has issued a Record of Decision approving a major project to the east of this project – Vineyard Wind 1 Offshore Wind Energy Project (Vineyard Wind 1) – and has also approved a project that would be surrounded on three sides by Revolution Wind – the South Fork Wind Farm and South Fork Export Cable Project (South Fork or SFWF). Commenters have provided ample comments on those projects which should provide guidance for this NEPA process as well. | Thank you for the comment. BOEM has incorporated information and analyses from the referenced NEPA documents, including consideration of the issues raised during those NEPA reviews, as appropriate. |
| BOEM-2022-0045-0071 | 10 | It is important to conduct NEPA impacts analysis based on specific turbine sizes considered under each alternative. There are tradeoffs inherent in the selection of larger or smaller turbines. For example, larger turbines will require larger impact hammers during installation, but the use of larger turbines will allow for fewer locations overall. | Thank you for the comment. As described in Chapter 2, the EIS analysis is based on a Project Design Envelope (PDE) approach. In Chapter 3, the resource areas address the maximum-case-scenario which includes the largest dimensions of each project component. Project components, design parameters, and their dimensions, are presented in Appendix D of the EIS. |
| BOEM-2022-0045-0110 | 12 | Various potential impacts associated with offshore wind construction and operations could directly, indirectly, and cumulatively impact marine species and habitats in the coastal zone and offshore environment along the coast. In addition to a thorough examination of direct and indirect impacts, as well as mitigation measures, assessing cumulative impacts is essential to understanding the impact of offshore wind on species and ecosystems along the coast. | Thank you for the comment. As explained in Sections 3.1-3.4, the EIS analyzes direct and indirect effects from the proposed action and alternatives in the context of the existing baseline as well as when combined with reasonably foreseeable activities (cumulative impacts). |
| BOEM-2022-0045-0100 | 13 | Missing Analyses: There continue to be important analyses and conclusions that are absent from the DEIS, many of which were identified in our PDEIS review. For example, while the document indicates there will be unexploded ordnance (UXO) removal and/or detonation (at least 13 in total), there is no information related to where these may occur or during what time of year; yet impact conclusions suggest effects will be minimal, with little supporting analysis. As noted in our PDEIS comments, there are missing IPFs considered for ESA-listed finfish and sea turtle species, including fisheries surveys and vessel traffic. These activities can result in injury and mortality of protected species and the absence of these analyses is a critical omission that should be resolved in the FEIS. The document is also missing an analysis of impacts from nighttime pile driving, despite it being a component of the proposed action. The DEIS also does not include social impact evaluations (non-market impacts) or estimate overall economic impacts to shoreside support services and fishing communities due to potential changes in fisheries operations, the latter of which is necessary to comprehensively evaluate potential compensation needs for this project. All anticipated changes to the marine environment and fishing communities from the Revolution Wind project and other projects should be explicitly discussed and the potential impacts examined in the FEIS. | EIS Section 3.13 and 3.19 describe impacts from IPFs likely to have biologically significant effects on ESA listed finfish and sea turtles. IPFs having insignificant or discountable effects are addressed in EIS Appendix E. |
| BOEM-2022-0045-0110 | 14 | The Revolution Wind Final EIS should not use value-laden terms (e.g., "beneficial") to describe changes in ecosystems or species. It should instead be objectively described as ecosystem change. While we agree that some offshore wind activities may result in a change in the ecosystem and, in some cases, an increase in the abundance of certain species or in overall diversity, we caution against representing these changes as "beneficial." This is especially the case because it is unclear what implications these changes may have on the wider ecosystem. We recommend that the Revolution Wind Final EIS remain objective in language used in its impact analysis (e.g., by using terminology such as "increase," "decrease," and "change"). | Sections 1.6 and 3.0 of the EIS explain the impact analysis approach, and Table 3.3-3 defines what constitutes beneficial impacts for each resource category. The impacts of each alternative align with the appropriate impact level as defined in Section 3.4 and are supported by the analysis and where appropriate, the analysis acknowledges that potential beneficial impacts would depend on how habitat and species changes influence the broader biological community. |
| BOEM-2022-0045-0100 | 14 | Geographic Analysis Area: As noted above, the analysis is complicated by the geographic analysis areas that vary by resource. While additional text and rationale were provided since we raised this concern in the PDEIS, it is still unclear how or why these geographic areas were selected. For example, the area of analysis for marine mammals covers the entire range, including into Canada; however, there is no indication that vessel traffic is originating in Canada. In addition, impacts to benthic resources appear to be limited within the lease area; yet extensive areas outside the lease area (in an attempt to connect survey locations) are included in the analysis area. This creates confusion and skews the analysis, as the geographic analysis areas do not appear connected to the IPFs. The geographic scope of potential project effects may vary depending on the IPFs and the presence of resources being impacted by those IPFs. This should be reflected in the analysis so impacts of the proposed action and each alternative can be accurately evaluated and clearly understood. | The geographic analysis area is defined by the anticipated geographic extent of impacts for each resource. For the mobile resources—bats, birds, finfish, and invertebrates; marine mammals; and sea turtles—the species potentially affected are those that occur within the area of impact of the Proposed Action. The geographic analysis area for these mobile resources is the general range of the species that could traverse the project footprint. The purpose is to capture the cumulative impacts on each of those resources, and the entire populations that could be affected by the Proposed Action as well as the impacts that would still occur under the No Action Alternative. Impacts from both the proposed action IPFs and from cumulative activities are evaluated using the significance criteria defined in Section 3.3, which consider the potential for population-level impacts. Where applicable, the EIS discloses localized impacts (e.g., to Cox's Ledge) from IPFs, however, those impacts are also evaluated in the context of the broader resource extent within the GAA. |
| BOEM-2022-0045-0113 | 14 | Environmental protection is a key requirement under the OCSLA and rigorous plans must be in place for offshore wind projects to comply with various state and federal statutes that projects are subject to. To achieve all necessary permits, offshore wind | Thank you for your comment. After consideration of the public comments on the DEIS and analysis of those comments and other information (including the adverse and beneficial |

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| | | energy must be developed in an environmentally responsible manner that avoids, minimizes and mitigates impacts to marine life and ocean users, meaningfully engages stakeholders from the start, and uses the best available science and data to ensure science-based and stakeholder-informed decision making. This includes analysis of cumulative impacts and adaptive management strategies, obtaining all necessary and relevant data, and requires BOEM to identify all methodologies, and indicate when information is incomplete or unavailable, acknowledge scientific disagreement and data gaps, and evaluate intermediate adverse impacts based on approaches or methods generally accepted in the scientific community. Avoiding sensitive habitat areas, requiring strong measures to protect wildlife throughout each state of the development process, and comprehensive monitoring of wildlife and habitat before, during, and after construction, are all essential for the responsible development of offshore wind energy. The project alternative should be chosen that ensures the environment and wildlife are protected while maximizing the creation of quality, high-paying jobs and economic benefits. | impacts of each alternative), BOEM has identified a preferred alternative in Section 2.1.7 of the Final EIS. BOEM's selected alternative, along with any additional mitigation measures required by BOEM, will be disclosed in the Record of Decision. |
| BOEM-2022-0045-0103 | 24 | EPA supports the various calls in the DEIS for additional study/research covering a number of issues (including but not limited to the determination of cumulative effects on invertebrates, the formation of large-scale reefs, the effects of operational noise on Atlantic Cod).<br>Recommendation: We recommend that the FEIS provide specific detail regarding the schedule for this research and the responsible parties for the work. We also recommend that the FEIS explain how issues warranting further study will be addressed for the Revolution Wind project. For example, the DEIS accurately notes that the significance of the effects of operational noise on Atlantic Cod is unknown. An explanation of how this issue will be considered in the decision-making process absent this information would be useful. | As outlined in the EIS, BOEM has ongoing research to better understand the potential effects of OSW infrastructure to fish patterns and movement in the New England area (see https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/Exploring%20the%20Connectivity%20Among%20Offshore%20Wind%20Turbines.pdf and https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/Movement-Patterns-of-Fish-in-Southern-New-England_0.pdf). These ongoing studies will further refine the rich research already completed to understand behavior and response of Atlantic cod and other species. Links to BOEM's completed renewable energy studies can be found here: https://www.boem.gov/environment/environmental-studies/renewable-energy-research. Ongoing and planned research can be found here: https://www.boem.gov/environment/environmental-studies/environmental-studies-planning. The Tethys Knowledge Database (https://tethys.pnnl.gov/) also provides an extensive list of research conducted to date. Relevant studies have been incorporated into the EIS analysis.<br><br>Appendix C of the EIS evaluates incomplete and unavailable information pertaining to benthic habitat, invertebrates, finfish, and EFH. As described in Section 3.6, Section 3.13, and Appendix C of the EIS, BOEM is able to draw on existing scientific findings and references for characterizing the likely effects of each IPF and analyzing potential impacts resulting from the proposed Project and past, present, and reasonably foreseeable actions.<br><br>For the reasons described in Section 3.6, Section 3.13, and Appendix C of the EIS, BOEM concludes that the available information about potential impacts to benthic habitat, invertebrates, finfish, and EFH adequately supports a reasoned choice among alternatives. Furthermore, Appendix F outlines the applicant proposed EPMs and additional mitigation measures being considered by BOEM, many of which include monitoring and reporting requirements. These, as well as additional measures from ongoing consultation and coordination, could be included as part of the Record of Decision or as terms and conditions of COP approval. |
| BOEM-2022-0045-0100 | 26 | Several of the general impact descriptions used are somewhat vague or unclear, e.g. "most adverse impacts..." Throughout the document, additional resource-specific impact descriptions are also not provided (for example, see previous NMFS comments on marine mammal criteria). Impact definitions also rely heavily on mitigation. All of these factors make it more difficult to assess impact conclusions for some resources. Please see additional comments on impact analysis in the attached letter. | Thank you for the comment. As a clarification of terms, Environmental Protection Measures (EPMs) are identified in the COP and listed in EIS Appendix F, Table F-1, and are a component of the Proposed Action, and shall be implemented by the applicant. Therefore, EPMs are included in the Chapter 3 analysis of direct and indirect impacts and cumulative impacts. Mitigation measures as identified in EIS Appendix F, Table F-2 and Table F-3, are proposed *additional* measures that may be applied by BOEM as a requirement for COP approval and are not considered components of the Proposed Action. The Mitigation section within each resource area of Chapter 3 addresses the potential reduction of the impact determination after the proposed *additional* mitigation measures are applied. |

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| BOEM-2022-0045-0086 | 28 | The DEIS should state that the Proposed Action does not increase the occurrence of climate change nor its degree of impact. Rather, in Section 3.11 and throughout the document, as was done in the Vineyard Wind 1 FEIS, climate change should be discussed as a "trend" in terms of how it will change the resource components of the proposed actions affected environment over the useful life of the project. See the Council on Environmental Quality (CEQ)'s Section 1502.15, Affected Environment, which states, "The environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration, including the reasonably foreseeable environmental trends and planned actions in the area(s)". | Thank you for the comment. Edits have been made to Section 3.11 to clarify that the "major" impacts from climate change are driven by cumulative activities and trends and not by emissions from the proposed project. EIS Section 3.4 outlines the Project’s anticipated GHG emissions and potential impact with respect to climate change. As discussed in EIS Section 3.4, the Project is expected to have an overall net beneficial contribution to slowing the impacts from climate change through reduced GHG emissions when compared to generation of the same amount of energy using fossil fuel or coal sources. |
| BOEM-2022-0045-0086 | 59 | The DEIS contains many general cross-references to the appendices, but without summarizing what specific content in the referenced appendix is relevant to the consequence being analyzed. Although the goal of incorporation by reference is to cut down on bulk, the CEQ regulations in Section 1501.12 require that when agencies reference the incorporated material, they need to “briefly describe its content” in order to accommodate public review. We recommend that in instances in the DEIS where it is unclear what and why an appendix is being referenced in the consequence section, a brief clarification be included in the FEIS. | Thank you for the comment. Incorporation by reference is applicable to unrelated documents, not to other components of the same document. Clarifications of section numbers, table numbers, and figure numbers have been made as appropriate. |
| BOEM-2022-0045-0086 | 62 | As required by CEQ’s NEPA implementation regulations in Section 1502.16(a)(2), an EIS should include a discussion entitled, “Any adverse environmental effects that cannot be avoided should the proposal be implemented.” We recommend that this summary discussion be included in the FEIS. | Thank you for the comment. Appendix I of the EIS addresses unavoidable adverse impacts of the proposed action and the irreversible and irretrievable commitment of resources related to the proposed action. |

## NEPA Process

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| BOEM-2022-0045-0122 | 1 | I also appreciate BOEM providing Aquinnah residents an extension of time beyond October 17, 2022, to the end of October to provide comments due to the short notice provided to Aquinnah and its residents about the October 4, 2022 1 Public Hearing and the October 17, 2022 comment deadline. Aquinnah, the jurisdiction most affected by the RWF, is already at a disadvantage because of the very small size of the town, and the limited number of residents compared to other competing, governmental, environmental, and business stakeholders. The lack of notice suppressed resident participation, further disadvantaging Aquinnah residents and therefore this extension was necessary.<br>Footnote 1: The BOEM personnel attending the October 4, 2022, Public Hearing were very knowledgeable and helpful. Unfortunately, the public did not have the full opportunity to benefit from the BOEM personnel because of the late notice and the fact that the residents were not told ahead of time to show up prior to the Public Hearing's scheduled time because the BOEM personnel would be available prior to the meeting to answer questions. | Thank you for the comment. BOEM published advance notice of five public hearing dates, times, and locations and the due date for receipt of comments in the Federal Register Notice of Availability and request for comments on the Draft Environmental Impact Statement for the Revolution Wind Farm on September 2, 2022 (87 FR 54248, pages 5428-54250, agency docket no. BOEM-2022-0045, document number 2022-18915). Two of the five public hearings were virtual meetings held to allow for participation by stakeholders that were unable to attend in-person and provided recordings on their BOEM project website. BOEM also published advance notice of five public hearing dates, times, and locations and the due date for receipt of comments in six newspapers located throughout the project area, including two in Connecticut, two in Massachusetts, and two in Rhode Island. Each newspaper ran the notification once a week for two weeks in advance of the first public hearing. BOEM also published press releases notifying 14 print news media outlets in Rhode Island and 8 in Massachusetts, as well as social media announcements. |
| BOEM-2022-0045-0101 | 3 | The DEIS contains no specific language regarding how whales respond to hammering on the ocean floor. Project proponents have responded to this concern by referencing whale studies conducted in Europe; however, ocean conditions and marine species are different there. The MPTN continues to suggest that a slower approval process would allow time for the development of a project or two while additional studies are conducted. We ask that this be seriously considered. | BOEM's EIS complies with the procedural requirements of NEPA. The Final EIS considers the best available data and information that reflect the state of the science at the time of publication of the EIS. Appendix C describes the incomplete or unavailable information for marine mammals and acoustic impacts associated with pile driving is included in the Final EIS. BOEM is in consultation with NMFS for Threatened and Endangered Species and the Marine Mammal Protection Act and compliance with the laws will be achieved before approval of the Revolution Wind project. |
| BOEM-2022-0045-0101 | 36 | • Revise the timeframes for the Project and all proposed offshore wind energy projects in the northeast. Allow more time for proper study of the marine environment and species. | BOEM's EIS complies with the procedural requirements of NEPA. The Final EIS considers the best available data and information that reflect the state of the science at the time of publication of the EIS. Appendix C describes the incomplete or unavailable information for marine mammals and acoustic impacts associated with pile driving is included in the Final EIS. BOEM is in consultation with NMFS for Threatened and Endangered Species and the Marine Mammal Protection Act and compliance with the laws will be achieved before approval of the Revolution Wind project. this |
| BOEM-2022-0045-0101 | 37 | • Enlist the participation of the Federal Permitting Improvement Steering Committee (FPISC), which the tribes believe (1) understand tribal concerns and (2) will improve the entire process. | BOEM's EIS complies with the procedural requirements of NEPA. Revolution Wind is a Fast-41 project in which coordination with FPISC is required and ongoing. |
| BOEM-2022-0045-0102 | 38 | MWT THPO Comments and Concerns<br>· The government keeps changing its feedback solicitation processes from project to project, which stresses the tribes unnecessarily in terms of workload and places what amounts to an unfunded mandate on the MWT THPO.<br>· Tribes do not receive sufficient funding from the federal government to articulate concerns in a timely fashion—input from multiple areas of expertise are necessary but not occurring because of a lack of funding and organization that the MWT perceives as intentional. Additionally, the MWT THPO has only one person to review and comment on multiple projects simultaneously.<br>· BOEM requesting that tribes submit comments through their website portal is redundant—especially considering that the NEPA/Section 106 process exists to capture concerns—and places an unnecessary administrative burden on the THPO. | An analysis of a proposed action's potential effect on Tribal lands, resources, or areas of historic significance, and meaningful coordination with Tribal entities, is an important part of BOEM's decision making process. Sections 1501.2 and 1501.7 of the CEQ's NEPA regulations call for the involvement of Tribes that may be affected by a Federal proposal. BOEM uses Regulations.gov as the preferred mechanism for receiving public comments on DEISs under NEPA, however, it was not the only method. BOEM has also received and accepted comments from MWT and other Tribal Nations through other mechanisms including email or hard copy through both the Section 106 and NEPA processes. BOEM also successfully funded and completed the Pilot Revolution Wind Tribal Support project to provide technical expertise and assistance to Tribal nations in the review of the Revolution Wind project documents, including the COP, supporting technical materials, and the DEIS. Through this contract and ongoing government-to-government and Section 106 consultation, BOEM has received productive feedback on the DEIS from MWT and other Tribal nations. BOEM will continue to coordinate and engage with the MWT. |

## No Action Alternative

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| BOEM-2022-0045-0103 | 1 | Based on our review we continue to encourage BOEM to refine the presentation and framing of the No Action alternative. Our previously expressed comments on this topic for Revolution Wind and other projects under development have focused in part on the nexus developed in the cooperating agency DEIS between the No Action and the analysis of cumulative impacts. We fully support the presentation of a cumulative impact analysis in the EIS that considers as one scenario the cumulative effects (positive and negative) on the environment of a full build (high benefit/impact) scenario for all lease areas.<br>Recommendation: We recommend that the consideration of project impacts as compared to the no action would be more valuable with a less broad framing of the No Action. Such a framing would avoid the tendency to dilute the significance of impacts attributed to the alternatives resulting from comparison of the action alternatives to a future full lease development (the cumulative impact scenario). This change will likely increase the value of the analysis as a tool to disclose impact differences among alternatives and support associated BOEM decision-making. | The impacts of each alternative are analyzed in relation to the current baseline, which only includes those offshore wind projects constructed or in which construction is actively underway. Cumulative impacts of each alternative are also analyzed separately in relation to the future baseline, which includes future offshore wind projects in which a commercial lease has been issued and a COP has been submitted to BOEM for review. Impact-levels are defined in each resource section, and conclusions drawn for each alternative align with the respective impact level. The analysis of the No Action Alternative has been reorganized to provide better clarity and impact-level conclusions for the No Action have been reviewed and revised in the Final EIS. |
| BOEM-2022-0045-0100 | 2 | Consistent with comments we provided on other recent offshore wind project EISs, we remain concerned with the approach to the alternatives analysis, including the No Action Alternative. Specifically, this approach leads to an incomplete description and analysis of impacts on NOAA trust resources from activities and trends in the baseline, as well as from the proposed action and alternatives. This approach skews the impacts analysis by minimizing and diluting the direct and indirect effects of the proposed action and action alternatives, by reducing the distinction in impacts among alternatives such that there is no material difference, and by conflating the cumulative impacts analysis with impacts considered in the No Action Alternative. As a result, the evaluation of cumulative impacts does not reflect the true scale of regional wind development; rather, it suggests that cumulative impacts will be similar to the direct and indirect impacts of the proposed action. We continue to recommend that BOEM evaluate a “No Action” scenario that does not include all future planned wind and non-wind activities. We understand and appreciate that you are in the process of updating the structure of your EIS documents and we recommend that you continue to work with us on this issue. We consider this to be a critical issue to resolve, as ultimately we will need to independently evaluate the structure and content of BOEM’s EIS to determine whether we will be able to adopt the BOEM NEPA document or develop our own to support our MMPA authorization decision. | BOEM analyzes the impacts of all reasonably foreseeable future planned activities, which include future offshore wind activities, in each resource-specific Environmental Consequences section in Chapter 3 of this Final EIS. The impacts of each alternative are analyzed in relation to the current baseline, which only includes those offshore wind projects constructed or in which construction is actively underway. Cumulative impacts of each alternative are also analyzed separately in relation to the future baseline, which includes future offshore wind projects in which a commercial lease has been issued and a COP has been submitted to BOEM for review. Impact levels are defined in each resource section, and conclusions drawn for each alternative align with the respective impact level. The analysis of the No Action Alternative has been updated to better describe impacts of the No Action in relation to the existing baseline and in relation to cumulative activities. Impact-level conclusions for the No Action Alternative have been reviewed and revised in the Final EIS as appropriate. |
| BOEM-2022-0045-0069 | 2 | As presented, it seems the ‘No Action’ Alternative assumes a scenario where this project does not move forward, but that all others would. This scenario seems unrealistic, and can distort one’s interpretation of potential impacts from this project. As a result, such a scenario may imply that the impacts could be negligible, which would not be accurate. | BOEM analyzes the impacts of all reasonably foreseeable future planned activities, which include future offshore wind activities, in each resource-specific Environmental Consequences section in Chapter 3 of this Final EIS. The impacts of each alternative are analyzed in relation to the current baseline, which only includes those offshore wind projects constructed or in which construction is actively underway. Cumulative impacts of each alternative are also analyzed separately in relation to the future baseline, which includes future offshore wind projects in which a commercial lease has been issued and a COP has been submitted to BOEM for review. Impact-levels are defined in each resource section, and conclusions drawn for each alternative align with the respective impact level. The analysis of the No Action Alternative has been updated to better describe impacts of the No Action in relation to the existing baseline and in relation to cumulative activities. Impact-level conclusions for the No Action have been reviewed and revised in the Final EIS as appropriate. |
| BOEM-2022-0045-0059 | 3 | This alternative confuses a true NEPA No Action with a Cumulative Impacts Analysis, also required by NEPA. BOEM cannot legally conflate the two, as it affects the analysis results. The No Action alternative, in a true NEPA sense, would analyze a disapproval of the Revolution Wind project, and include only projects that BOEM has already approved (i.e. Vineyard Wind and South Fork Wind Farm). A Cumulative Impacts Analysis would include all future foreseeable projects- which would include additional wind farms in all currently leased BOEM areas, as well as the potential for new leases in the Central Atlantic Call Area.<br>However, the DEIS uses the No Action Alternative for its Cumulative Impacts Assessment, despite the fact that the two are not the same. The DEIS states, “The No Action Alternative cumulative effects assessment provides an assessment for impacts with and without approval of additional wind farms in BOEM lease areas. Through these assessments, the No Action Alternative | As disclosed in the EIS, BOEM anticipates impacts from the Proposed Action alone to be long term and up to moderate adverse. In the context of cumulative activities, the overall impacts to navigation were concluded to be up to moderate adverse. The impacts of each alternative are analyzed in relation to the current baseline, which only includes those offshore wind projects constructed or in which construction is actively underway. Cumulative impacts of each alternative are also analyzed separately in relation to the future baseline, which includes future offshore wind projects in which a commercial lease has been issued and a COP has been submitted to BOEM for review. Impact-levels are defined in each resource section, and conclusions drawn for each alternative align with the respective impact level. Planned offshore wind projects are considered reasonably foreseeable activities, i.e., planned actions that could occur during the life of the |

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| | | provides a baseline against which all action alternatives are evaluated." 9 This conflation of a true NEPA No Action Alternative and a true NEPA Cumulative Impacts Analysis only serves to downgrade the impacts from the project.<br>If BOEM were to conduct a true No Action Alternative, it would analyze the current state of two approved projects, with no other approved projects in the ocean. Comparing the action alternatives against this background would show a significant impact, because compared to the two existing approved projects the approval of Revolution Wind would increase the number of turbines in the ocean substantially. However, if BOEM conflates the No Action Alternative with the Cumulative Impacts Analysis and compares approval of the Revolution Wind project against the potential for thousands of turbines in the additional 25/26 other BOEM leases, plus the potential for more in the Central Atlantic Call Area, the addition or subtraction of the Revolution Wind turbines appears more insignificant. For example, BOEM states that under the No Action Alternative, 3,008 WTGs and OSS foundations would exist in the analysis area.10 This makes the 100 WTGs of the Proposed Action seem negligible. However, 100 turbines compared to the up to 15 turbines of the South Fork Wind Farm and up to 84 turbines of the Vineyard Wind project,11 the Revolution Wind project would in fact double the number of turbines in the water.<br>Similarly, on the October 11, 2022 BOEM virtual public hearing webinar for Revolution Wind, BOEM personnel stated that impacts to navigation were the same with or without the Proposed Action. This is simply not true but is the illusion created by conflating a No Action alternative with a Cumulative Impacts Analysis. One hundred WTGs in the middle of heavily transited and fished area will certainly have a major navigational impact. See charts below for examples of fishing and transit activity presented by NOAA Fisheries to BOEM, developers and others at the Dec. 3, 2018 RODA transit lane workshop:12 (4 images attached to NOTES column in this row)<br>Navigation necessary for the above activity will undoubtedly be impacted by the Proposed Action. If the 100 WTGs of the Proposed Action did not exist, the depicted fishing and transit activity in the project area could continue to occur unobstructed. By installing 100 WTGs directly in the path of the depicted transit and fishing activity, much if not all of the activity will become unsafe or inoperable in the WTG area. The cumulative impact of adjacent and surrounding projects will be tremendous and further complicate and bar safe navigation. In reality, the presence or lack of fixed structure in the Revolution Wind project area will make a big difference to navigation. BOEM cannot pass the red face test if it contends that the Proposed Action will have the same impact on navigation whether or not it is built. That is a ludicrous position. However, if BOEM couches the No Action Alternative in a Cumulative Impacts Analysis to contend that there is no measurable difference between 3,008 turbines and 3,108 turbines, then it has downplayed impacts based on a technicality that is a misrepresentation of the intent and requirement of NEPA.<br>BOEM cannot conflate the No Action Alternative with the Cumulative Impacts Analysis. NEPA requires transparent, clear cut, and complete analysis for both. We request that BOEM separate the two and conduct a full and appropriate NEPA analysis under each.<br>Footnote 9: DEIS, p. 2-4.<br>Footnote 10: DEIS, p. 3.9-40.<br>Footnote 11: See https://www.boem.gov/renewable-energy/state-activities/record-decision-south-fork and https://www.boem.gov/renewable-energy/state-activities/final-record-decision-vineyard-wind-1.<br>Footnote 12: See presentation here: https://rodafisheries.org/wp-content/uploads/2019/08/20181203_TransitCorridorWorkshop_VMSandAISdata.pdf and meeting documents here: https://rodafisheries.org/portfolio/december-3-2018-workshop-documents/. Presentation also attached. | Revolution Wind Project and potentially could contribute to cumulative impacts when combined with impacts from the Proposed Action and other alternatives. Appendix E (Planned Activities Scenario) describes the methodology used for assessing impacts from planned activities in the EIS. Using the methodology described in Appendix E, each resource-specific Environmental Consequences section in Chapter 3 of this Draft EIS discusses cumulative impacts. Finally, the analysis of the No Action Alternative has been reorganized to provide better clarity and impact-level conclusions for the No Action have been reviewed and revised in the Final EIS. |
| BOEM-2022-0045-0100 | 21 | NMFS understands agencies are currently working together to address this comment. Similar to the Ocean Wind DEIS and Revolution Wind DEIS, the No Action alternative presumes the full approval of all foreseeable wind development projects with the exception of the proposed action, enabling the PDEIS to diminish the intensity of the project's impacts within a context where all other potential projects are assumed to have been approved.<br>Essentially, the No Action Alternative conflates the description of the baseline with a cumulative effects analysis. Importantly, this minimizes the impacts of the proposed action and action alternatives because they are compared to the No Action Alternative with a significantly inflated baseline. | The impacts of each alternative are analyzed in relation to the current baseline, which only includes those offshore wind projects constructed or in which construction is actively underway. Cumulative impacts of each alternative are also analyzed separately in relation to the future baseline, which includes future offshore wind projects in which a commercial lease has been issued and a COP has been submitted to BOEM for review. Impact-levels are defined in each resource section, and conclusions drawn for each alternative align with the respective impact level. The analysis of the No Action Alternative has been reorganized to provide better clarity and impact-level conclusions for the No Action have been reviewed and revised in the Final EIS. |

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| BOEM-2022-0045-0101 | 35 | • Execute the no-build option (Alternative A) if Project impacts to water quality; marine mammals; coastal and benthic habitats; and culturally, economically, and historically significant shellfish populations and fisheries cannot be determined before the Project is built. | Thank you for your comment. After consideration of the public comments on the DEIS and analysis of those comments and other information (including the adverse and beneficial impacts of each alternative), BOEM has identified a preferred alternative in Section 2.1.7 of the Final EIS. BOEM's selected alternative, along with any additional mitigation measures required by BOEM, will be disclosed in the Record of Decision. |

## Preferred Alternative

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| BOEM-2022-0045-0072 | 1 | One issue that has not been adequately discussed in the DEIS is the presentation of an alternative that combines part or all of the four proposed alternatives that achieves the project purpose as well as avoiding and minimizing impacts to coastal and ocean resources and uses (Habitat Impact Minimization, No Surface Occupancy in One or More Outermost Portions, Reduction of Surface Occupancy to Reduce Impacts to Culturally Significant Resources, Selection of a Higher Capacity Wind Turbine Generator). According to the DEIS, only Alternative F, the Higher Capacity Wind Turbine Generator alternative, would potentially contain a combination of the other alternatives. The Final Environmental Impact Statement (FEIS) should consider a final project layout that combines aspects of the four alternatives in an effort to minimize impacts while meeting the project purpose. | Thank you for your comment. After carefully considering the EIS alternatives, including comments from the public on the Draft EIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0062 | 1 | Save The Bay supports the development of offshore wind infrastructure that is responsibly sited, built to minimize impacts to offshore species and habitat, and carefully weighs the benefits of renewable energy against unavoidable or negative environmental impacts. With these concerns in mind, Save The Bay strongly supports the habitat benefits provided by Alternatives C1 and C2, and urges BOEM to select Alternative C1 as the preferred alternative.<br>Alternative C1 protects and preserves critical benthic habitat that supports important species like Atlantic cod. While both C1 and C2 are preferable to the proposed action (Alternative B), Save The Bay supports Alternative C1 over Alternative C2 due to the increased protection of contiguous complex habitat, given the unknowns related to specific cod spawning locations. It is imperative that offshore wind be developed conscientiously, by minimizing impacts to critical habitat and limiting negative cumulative effects. Alternative C1 provides important protections while allowing Revolution Wind to meet its power purchase agreement obligations.<br>The habitat features on and around Cox Ledge, consisting of glacial moraine, provide unique bottom features that support a diversity of fish and other marine life. These areas were identified in the Rhode Island Ocean Special Area Management Plan (Ocean SAMP) as Areas of Particular Concern that should be avoided based on the biodiversity they support. Unfortunately, when BOEM approved the subdivision of Revolution Wind's Lease Area (OCS-A 0486) for the South Fork Wind Project, alternatives that were protective of Cox Ledge glacial moraine were not possible due to the division of the leased area and limited size of the new lease area (OCS-A 0517). Selection of Alternative C1 or C2 ensures that key, remaining moraine is undeveloped. Alternative C1 is the most protective and should be selected to protect these remaining Areas of Particular Concern, as identified by the Ocean SAMP, NOAA's Greater Atlantic Regional Fisheries Office, and others, particularly with the loss of habitat that will result from the South Fork project. Additional glacial moraine does not need to be sacrificed to move forward with this project. | Thank you for your comment. After carefully considering the EIS alternatives, including comments from the public on the Draft EIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0071 | 9 | Overall, in recognition of the wide range of adverse impacts on fisheries, fishery species, and habitats across all action alternatives as described in the DEIS, we recommend approval of a combination of Alternatives C-F to minimize the footprint of the project and therefore reduce the magnitude of adverse impacts. If the full extent of these alternatives cannot be combined, we support approval of Alternatives C, D, and F prior to consideration of Alternative E as visual impacts are outside the realm of the mission of the Councils. | Thank you for your comment. After carefully considering the EIS alternatives, including comments from the public on the DEIS, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |
| BOEM-2022-0045-0086 | 12 | Revolution Wind appreciates BOEM's guidance in the DEIS which highlights that BOEM could select the implementation of a single Alternative "or a combination of the alternatives retained for detailed analysis in this EIS." Recognizing that each Alternative only addresses one primary impact at a time, we are committed to working with BOEM to develop a layout representing a balanced approach addressing each impact of concern. The Revolution Wind preferred alternative should be a combination of these Alternatives that successfully evaluates and weighs environmental impacts while ensuring the Project meets the stated Purpose and Need by being commercially viable, technically feasible for construction, and utilizing technology currently available to meet its commitments under PPAs. | Based on the information received during the scoping effort and other information, such as the location of sensitive natural resources, BOEM identified alternatives to the proposed action that might reduce possible impacts. The DEIS evaluated a reasonable number of alternatives covering the full spectrum of alternatives, each of which was rigorously explored and objectively evaluated, as well as those other alternatives that were eliminated from detailed study with a brief discussion of the reasons for eliminating them (40 CFR 1502.14). The decision-maker may select elements from several alternatives discussed (40 CFR 1505.1 (e)). Various parts of separate alternatives that are analyzed in the DEIS can also be combined to develop a new, complete alternative in the FEIS as long as the reasons for doing so are explained and it is supported by the analysis. After carefully considering the EIS alternatives, including comments and input from the public, cooperating agencies, and the applicant, BOEM has developed a Preferred Alternative as described in Section 2.1.7 of the FEIS. |

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| BOEM-2022-0045-0110 | 16 | As discussed below, for the purposes of mitigating impacts to benthic resources, finfish, invertebrates, and EFH, we recommend that BOEM select Alternative C: Habitat Impact Minimization Alternative (in combination with Alternative E to address tribal cultural resource concerns, and, as needed, Alternative F, the use of higher capacity turbines). The Revolution Wind Farm Project overlaps in significant part with Cox Ledge, which contains important complex habitat and Atlantic cod spawning habitat. Because Alternative C would avoid, minimize, and mitigate impacts to such habitats–including impacts from the presence of structures, noise, anchoring and cable emplacement, etc.–more so than the other alternatives, BOEM should select this option. BOEM proposes both an Alternative C1 and an Alternative C2. While we do not make a specific recommendation regarding these two sub alternatives, we note that Alternative C2 is likely the preferred sub alternative because it would reduce impacts to spawning Atlantic cod more than Alternative C1. 43 | Thank you for your comment. After consideration of the public comments on the Draft EIS and analysis of those comments and other information (including the adverse and beneficial impacts of each alternative), BOEM has identified the preferred alternative as described in Section 2.1.7 of the Final EIS. BOEM will not make any final decision until a ROD is issued. |

## Proposed Action

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| BOEM-2022-0045-0024 | 1 | Using nature-based design elements significantly increases species settlement, richness, and abundance. Furthermore, nature-based design elements allow the structure to actively provide carbon sequestration, decrease the magnitude and frequency of maintenance leading to increased structural lifespan. Ecological concrete is an alternative to traditional concrete and armor rock, for both scour and cable protection, that enhances and encourages the growth of flora or fauna when placed in a marine environment. Studies have indicated that ecological concrete enhances biodiversity and species richness within a short period from deployment. Using ecological concrete also supports compliance with strict environmental regulations. | BOEM has not identified a preferred or required form of scour protection in the FEIS; however, BOEM's proposed mitigation measures outlined in Appendix F (Table F-2 and Table F-3) includes certain requirements or limitation to the types of cable protection that should be used. These requirements are consistent with *BOEM's Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR Part 585* which states "If needed, cable protection measures should reflect the pre-existing conditions at the site. This mitigation measure chiefly ensures that seafloor cable protection does not introduce new obstructions for mobile fishing gear. Thus, the cable protection measures should be trawl-friendly with tapered or sloped edges. If cable protection is necessary in “non-trawlable” habitat, such as rocky habitat, then the lessee should consider using materials that mirror the benthic environment." Mitigation resulting from BOEM's Magnuson-Stevens Fishery Conservation and Management Act consultation have also been incorporated into the FEIS. |
| BOEM-2022-0045-0070 | 1 | Table 2.1-7 provides a summary of the potential ports that could be used to support the Project. There is an additional facility in the Port of New Bedford that needs to be included in this table. Working is underway to develop the The New Bedford Foss Marine Terminal, which will provide an additional full-service base of operations and terminal logistics facility to support offshore wind projects off Massachusetts and the northeastern seaboard. The site being redeveloped for this purpose is the former Sprague/Eversource power plant. The 30-acre property was selected for its proximity to offshore wind blocks south of Martha's Vineyard and Nantucket islands. The New Bedford Foss Marine Terminal will provide storage and laydown yards for equipment and materials, berth facilities for tug and barge operations, and will host crew transfer vessel (CTV) and service operation vessel (SOY) support services. The redevelopment will also create much needed new office space for project teams and a marine coordination center for technicians involved in offshore wind projects. Construction of the terminal facility is anticipated to be completed in the Spring of 2023. We recommend that BOEM conducts a thorough review of this facility, along with the existing New Bedford Marine Commerce Terminal facility, as they relate to the potential uses and services including storage, marshalling, fabrication, construction and/or O&M activities, and electrical activities and support. | Thank you for the comment. The EIS evaluates the ports identified by the applicant in the COP as a component of the Proposed Action, which does not include the Foss Marine Terminal. See Section 3.3.10 of the COP. The cumulative analysis however extends to other past, current, and future projects in the analysis area, and has been adjusted to include this project at the Port of New Bedford. Text edits have been made in Appendix E Planned Activities Scenario under Dredging and Port Improvement Projects. |
| BOEM-2022-0045-0116 | 3 | My question is: what happens with a disaster? And what happens? | Thank you for your comment. An event of this nature is described in Section 2.2, Table 2.2-1. In the event of a non-routine or low-probability event, Revolution Wind would consult with local, state, and federal agencies as well as other groups to communicate the hazard according to mitigation measure Nav-8 in Appendix F, Table F-1.<br>Revolution Wind would follow statutory requirements for submitting notifications, as described in 30 CFR Section 585.831. 30 CFR Section 585.703 further defines the obligation to submit a report on repairs. In regard to loss of large structural elements, it is expected that surveys, such as those to be performed after a major storm event, would be conducted to evaluate seabed conditions and determine the location of lost structural elements. Results of surveys would be shared with relevant regulatory authorities, and remedial plans, including those for recovery of materials, would be agreed and implemented subject to other provisions contained within 30 CFR 585.<br>Asset integrity inspection plans are being developed by Revolution Wind to define periodic inspections of infrastructure and seabed conditions and provide ongoing assurance of asset integrity. These inspection plans address both structural elements within the wind farm and export and array cable burial conditions. Inspection plans would also define specific requirements for inspections following extreme weather events. In the event that, following such storm events, damage or disturbance is identified and demands remedial activities or repairs, these would be notified and implemented in accordance with provisions defined within 30 CFR 585. |

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| BOEM-2022-0045-0116 | 4 | How many years before you decommission these towers? | Please refer to Chapter 2.1.2.5 Decommissioning. In accordance with applicable regulations and a BOEM-approved decommissioning plan, Revolution Wind would have up to 2 years to decommission the Project following termination of the lease (up to 35 years post-construction). |
| BOEM-2022-0045-0115 | 6 | Good afternoon, everybody. Thank you for the opportunity of a comment today. My name is Rachel Krasna with E-concrete. We were interested in commenting on the scouring and skull protection measures. So just as a quick overall um we just wanted to come and suggest that using nature-based design elements will significantly increase. Vc. Settlement, Richness and abundance so using nature-based design, almost allow the structures to actively promote and provide part of the situation. We have decreased magnitude and frequency of maintenance leading to increased structural lifespan. Ecological concrete is an alternative to traditional concrete and iraq for both scour and people protection. So it enhances, encourages the growth of flora and fauna and place and rain environment. The studies have indicated that ecological concrete enhances biodiversity and species richness with a short period from deployment using ecological concrete, also supports compliance with strict environmental regulations. So thank you for that and thank you for the opportunity to comment. | Thank you for the comment. |
| BOEM-2022-0045-0122 | 6 | ii. Instead of being manned, BOEM personnel stated that crew vessels may be on station where needed. If this is the case, then the DEIS should describe how the vessels should be lighted in greater detail. Crew vessels, as well as OSSs, may have work lights, deck lights, and other unregulated lighting that may produce a significant amount of light pollution depending on if they are anchored. If underway, the only lights should be running lights. | Thank you for the comment. Construction and operational lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations. Revolution Wind will comply with Federal Aviation Administration (FAA) and USCG requirements for lighting while using lighting technology (e.g., low intensity strobe lights) that minimizes impacts on sensitive receptors. USCG-approved navigation lighting is required for all vessels during construction and decommissioning of the Project. All vessels operating between dusk and dawn are required to turn on navigation lights. Cable laying may occur 24 hours a day during certain periods.<br>Adequate lighting will be utilized on vessels to ensure worker safety throughout construction including for foundation, WTG, OSS and cable installation. As is required under International Maritime Organization (IMO) requirements for vessels over 500 gross tonnage, the deck area of vessels will be illuminated for the safety of operations and personnel during installation and as needed during transit to facilitate ongoing work on deck. Vessel lighting will be sufficient to meet IMO convention requirements, but the use of any unnecessary or excess lighting will be avoided.<br>Lighting during O&M for WTGs and OSSs have been further detailed in new Figure 2.1-4 and Figure 2.1-6. Lighting that will be visible for viewers on the shore (refer to Section 3.19 Visual Resources) would be primarily limited to lighting required under FAA and USCG regulation as well as lighting on OSS signboards and maintenance lighting. Because the additional lighting must not significantly interfere with navigation lighting as required by USCG, the visibility of additional lighting is anticipated to be limited.<br>Signboard lighting is limited to three low intensity white lights illuminating each of the four sides of the OSS (see Figure 2.1-6). Maintenance lighting is anticipated to be in place on WTG and OSS platforms and would be utilized in the rare instance that maintenance during the night is required and for additional worker safety. These working lights will be diffuse and pointed down towards the platform and similarly cast little light in other directions. |
| BOEM-2022-0045-0116 | 8 | Beverly Wright, a Member of the Wampanoag Tribe. And last winter, or maybe it was the winter before, the towers in Texas did not operate because the weather was so cold. And there were thousands of people without power. How would they affect us, when we're -- I'm assuming that we're colder than in Texas? | Thank you for the comment. Information related to WTG and OSS design is found in COP Section 3.3.8.1. WTG support structures (i.e., towers and foundations) will be designed to withstand 500-year hurricane wind and wave conditions, and the external platform level will be designed above the 1,000-year wave scenario. The OSSs will be designed to at least the 5,000-year hurricane wind and wave conditions in accordance with the American Petroleum Institute standards.<br>The WTGs will be designed following Class I-B specifications of the standards IEC-61400-1/IEC-61400-3. The design is specifically suited for offshore wind sites with referenced wind speeds of 112 miles per hour (mph) (50 meters per second [m/s] over a 10-minute average) and 50-year extreme gusts of 157 mph (70 m/s over a 3-second average) as well |

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| | | | as air temperatures greater than -4° F (-20° C) and less than 122° F (50° C). However, standard environmental operating conditions for the proposed WTGs include cut-in wind speeds of 7 to 11 mph (3 to 5 m/s) and cut-out wind speeds of 55-80 mph (25-35 m/s), and air temperatures between -4º F and 104º F (-20º C and +40º C). The WTGs will automatically shut down outside of these operational limits. |
| BOEM-2022-0045-0091 | 9 | The final offshore wind development plan should require the project developer to describe how it intends to handle the end of the project's estimated operating life. This should include a consideration and evaluation of several potential options, including repowering and/or refurbishing at one or more stages of the project's projected lifespan, as well as ultimate decommissioning.17 Consideration of these issues at the outset may positively impact design and construction decisions from the perspective of both environmental mitigation and overall project cost. Decommissioning considerations should take into account the environmental and ecological impacts of both a wholesale dismantling and removal of all structures and associated apparatus (essentially retuning the site to a "pre-build state") as well as a more selective approach in which some elements of the project may remain in place. The impact of decommissioning on the surrounding ecosystem should be the first and highest consideration. Consideration of the reuse and recycling of decommissioned equipment should also be part of the process, with disposal/landfilling of material to be considered as a last resort.18 There have been several decommissioned offshore wind facilities in Europe19 and BOEM should look to these for lessons to be learned. While quite different from an offshore wind facility, there may also be lessons to be learned from the much longer history of decommissioning offshore oil and gas facilities.20 In addition, the United Kingdom has issued guidelines for decommissioning offshore renewable energy facilities21 and Ontario Ministry of the Environment and Climate Change has more recently published an "Assessment of Offshore Wind Farm Decommissioning Requirements."22 While these sources will undoubtedly yield useful information, it is important to bear in mind that ultimately any decommissioning plan must be uniquely tailored to the environment in which the project is operating and where the work will occur. We understand that developers that have proceeded to this stage of the permitting process have demonstrated their financial capacity to decommission their projects in an environmentally sound manner. We also note that , in dismissing evaluation of an alternative specifically focused on ensuring adequate security to ensure appropriate project decommissioning, that BOEM has referenced its existing policies that "ensure that the government will not incur decommissioning expenses due to company bankruptcy."23 Notwithstanding these provisions, project approval should require a post a decommissioning bond, in an amount to be determined by the project owner becomes insolvent or is otherwise unable to meet its obligations under the project proposal. The amount of the bond should be based upon the expected decommissioning cost.24 | BOEM's regulations are designed to ensure that a lessee or grantee can efficiently decommission their offshore wind facilities on the OCS. Those regulations require the lessee to provide financial assurance to cover decommissioning costs. BOEM requires leaseholders to prepare conceptual decommissioning plans when their project is first proposed and requires more detailed plans for evaluation at the time decommissioning is requested.<br><br>Conceptual decommissioning plans in the COP must include broad coverage of not only deconstruction and site clearance activities, but also potential impacts to the surrounding environment and potential mitigation measures. Operational conceptual decommissioning plans include methods of removal and site clearance for all management systems and structures, platforms, shore connections and sea-bottom appurtenances, and all bottom-founded and installed structures. Other topics covered in the COP's decommissioning plans are noise and vibration levels, chemical use and management, potential discharges to the sea, and air, electrical systems, and power requirements. For a complete list of BOEM's conceptual decommissioning plan requirements for a COP, see BOEM's Information Guidelines for a Renewable Energy COP at: https://www.boem.gov/COP-Guidelines/. |
| BOEM-2022-0045-0123 | 9 | Proposed Mitigation Measures<br>The CHRVEA at pg. 60 includes, "Mitigation measures for historic properties, including NHLs, would be stipulated in the MOA and detailed in the historic property treatment plans attached to the MOA. These same mitigation measures, committed to by Revolution Wind in the MOA and identified in COP Appendix BB – Cultural Resources Avoidance, Minimization, and Mitigation Measures, would also be incorporated by BOEM into COP approval." NPS does not appear to have access to Appendix BB. All copies of the COP list this appendix as "Confidential/FOIA-Exempt." NPS requests access to this appendix to understand the measures the project proponent is proposing. | Access to the information in Appendix BB of the COP was provided to the NPS through review of the FOE and draft MOA under the NHPA Section 106 consultation process. |
| BOEM-2022-0045-0069 | 11 | Two alternating current (AC) export cables at 4-6 ft. burial depth: efforts should be made to avoid not achieving target burial depth to minimize impacts to fishing activities within the cable route. If a cable cannot be buried to 4 ft., or is located at a crossing with existing cables, and mattressing is installed, all cable mattress locations should be made available to the public and mattressing should be designed to limit the creation of new fishing 'hangs'. | Thank you for the comment. As noted in COP Section 3.3.3.2, cable protection strategies are anticipated to be required for 10% of the export cable route in areas where burial cannot occur, sufficient burial depth cannot be achieved due to seabed conditions, or to avoid risk of interaction with external hazards. The location of the export cable and cable protection will be provided to NOAA's Office of Coast Survey after installation is completed so that they may be marked on nautical charts. Text edits have been made. |
| BOEM-2022-0045-0118 | 11 | And we're very concerned about the decommissioning. We don't think there's ever, ever going to be enough money in that. And we do believe that they're going to default at the end of the decommissioning. | Decommissioning obligations are accrued by the lessee or grantee upon acceptance and signature of the lease or grant and are maintained by the lessee or grantee until the decommissioning process is completed or there has been a BOEM-approved transfer of the lease or grant (30 CFR §585.901). The decommissioning process is made up of the following three distinct stages: decommissioning application, decommissioning notice, and the final notice. These procedures ensure that an offshore wind farm on the OCS will be fully |

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| | | | decommissioned and the site will be cleared through both regulatory requirements and the incentive of reimbursement of past financial assurances. The regulatory requirements include compliance with NEPA, ESA, Magnuson-Stevens Fishery Conservation and Management Act, CZMA, and other Federal, state, and local regulations. Detailed Project decommissioning impacts will be evaluated under a separate NEPA process at the end of the Project life cycle. BOEM contracts an independent, third-party consultant to develop an estimate of the decommissioning costs based on the details of the project supplied by the lessee. BOEM uses this estimate in determining the amount of financial assurance required to be provided by the lessee. The estimate is conservative and includes all management costs that would be incurred by BOEM if it was to contract the decommissioning work to a third-party contractor. The amount is subject to revision at any time during the lifetime of the project based on future economic conditions. |
| BOEM-2022-0045-0059 | 12 | BOEM mentioned on its October 11, 2022 BOEM virtual public hearing webinar for Revolution Wind that specific financial security requirements for decommissioning are required by 30 CFR 585 but that security dollar amounts are kept private. We request that the dollar amounts for decommissioning be made public. The payments that BOEM receives for individual lease sales are made public; the decommissioning security amounts for each project should also be made public. The project itself takes place on public lands of the US OCS, and if the security amounts for decommissioning are not substantial enough to cover actual decommissioning in the future, the public resources and lands of the OCS and the American people will permanently suffer, leaving our oceans forever a wasteland of decrepit steel and cables. BOEM has a public duty to ensure that US public resources are well maintained. Given that BOEM has given the developer wide deference in analysis pertaining to its own project approval, we do not have confidence that BOEM has not done so with decommissioning security costs as well. Lease sale dollar figures are made public; they are not proprietary developer financial details. Neither are securities that the US federal government requires for the future maintenance of US public resources. The amounts required by BOEM for decommissioning securities should be included in an updated DEIS. | Decommissioning obligations are accrued by the lessee or grantee upon acceptance and signature of the lease or grant and are maintained by the lessee or grantee until the decommissioning process is completed or there has been a BOEM-approved transfer of the lease or grant (30 CFR §585.901). The decommissioning process is made up of the following three distinct stages: decommissioning application, decommissioning notice, and the final notice. These procedures ensure that an offshore wind farm on the OCS will be fully decommissioned and the site will be cleared through both regulatory requirements and the incentive of reimbursement of past financial assurances. The regulatory requirements include compliance with NEPA, ESA, Magnuson-Stevens Fishery Conservation and Management Act, CZMA, and other Federal, state, and local regulations. Detailed Project decommissioning impacts will be evaluated under a separate NEPA process at the end of the Project life cycle. |
| BOEM-2022-0045-0069 | 12 | Horizontal directional drilling (HDD) of the cable at Quonset landfall is the preferred over other installation techniques (e.g., open cut, jet plowing). | Thank you for the comment. |
| BOEM-2022-0045-0065 | 12 | There is a discrepancy between the amount of expected unexploded ordinance (UXO) described in the DEIS and the amount found by Ørsted in the project area to date. This discrepancy, along with the significant concern regarding impacts to the environment and human safety, are well documented in the letter submitted by Seafreeze Ltd. to this docket. | Since publication of the DEIS, BOEM has received updated survey information on the number and location of UXO identified by Revolution Wind. Text edits have been made. |
| BOEM-2022-0045-0101 | 13 | Storm Damage—Hurricane-Induced Line Outages<br>MP-THPO Comments and Concerns<br>• What happens if export cables are damaged due to hurricanes? | In the event of significant facility damage, Revolution Wind would follow statutory requirements for submitting notifications to BOEM, as described in 30 Code of Federal Regulations (CFR) Section 585.831. 30 CFR Section 585.703 defines the obligation to submit a report on repairs. Surveys, such as those to be performed after a major storm event, would be conducted to evaluate seabed conditions. Results of surveys would be shared with relevant regulatory authorities, and remedial plans would be agreed to and implemented subject to other provisions contained within 30 CFR 585. |
| BOEM-2022-0045-0101 | 15 | Section 2.2 of the DEIS, Non-Routine Activities and Low-Probability Events, states the following:<br>Revolution Wind designed the Project components to withstand severe weather events. However, severe flooding or coastal erosion could require repairs during construction and installation activities. Although highly unlikely, structural failure of a WTG (i.e., loss of a blade or tower collapse) would result in temporary hazards to navigation for all vessels.<br>Recommended Action Items.<br>Develop mitigation measures for the following conditions:<br>• A hurricane or nor'easter.<br>• The performing of repairs after weather events to marine habitats, vessel traffic, etc. | In the event of significant facility damage, for example loss of large structural elements into the ocean, Revolution Wind would follow statutory requirements for submitting notifications, as described in 30 Code of Federal Regulations (CFR) Section 585.831. 30 CFR Section 585.703 further defines the obligation to submit a report on repairs. In regard to loss of large structural elements, it is expected that surveys, such as those to be performed after a major storm event, would be conducted to evaluate seabed conditions and determine the location of lost structural elements. Results of surveys would be shared with relevant regulatory authorities, and remedial plans, including those for recovery of materials, would be agreed and implemented subject to other provisions contained within 30 CFR 585.<br>Asset integrity inspection plans are being developed by Revolution Wind to define periodic inspections of infrastructure and seabed conditions and provide ongoing assurance of asset |

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| | | | integrity. These inspection plans address both structural elements within the wind farm and export and array cable burial conditions. Inspection plans would also define specific requirements for inspections following extreme weather events. In the event that, following such storm events, damage or disturbance is identified and demands remedial activities or repairs, these would be notified and implemented in accordance with provisions defined within 30 CFR 585. |
| BOEM-2022-0045-0102 | 16 | The MWT does not know what the OSSs entail. For example, what types of lubricants and chemicals will be used in the OSS and the turbines themselves? U.S. Environmental Protection Agency (EPA) regulations do not sufficiently address perfluoroalkyl and polyfluoroalkyl substances (PFAs) (also known as “forever” chemicals), which are becoming more common in local waterways. | Bisphenol A (BPA) is often used as a building block in epoxy used for blades, however, the BPA used in the WTG blades becomes inert. More specifically it is chemically reacted to an epoxy compound, which further reacts in the curing process, thereby becoming part of the polymer network that makes up the epoxy plastic in the blade material. Therefore, no exposure of BPA is expected from the cured material. The safety data sheets provided by Siemens Gamesa’s suppliers for the materials used in the Siemens Gamesa blades do not mention PFAS. Therefore, it is Siemens Gamesa’s understanding that there is either no use of PFAS or only usages in quantities below the regulatory thresholds for disclosure. In addition, suppliers are required to comply with the Ørsted Code of Conduct for Business Partners and undertakes activities to ensure that subcontractors comply with (i) the Ørsted Code of Conduct for Business Partners or (ii) another suitable framework acceptable to the Contractor with similar expectations regarding basic compliance with applicable laws, respect for labor and human rights, environmental management, and anticorruption. According to the EPA action plan for BPA (https://www.epa.gov/sites/default/files/2015-09/documents/bpa_action_plan.pdf), BPA is expected to biodegrade under environmental conditions, although conflicting results have been obtained using biodegradation screening tests. However, the weight of evidence suggests that it is not expected to be persistent in the environment, and rapid degradation is expected to occur.<br><br>With regards to the estimated volumes of potential emissions of coating materials from the wind turbines, there have been studies carried out by industry majors which indicated that total material released from wind turbine blades estimated to be as low as 50 grams per blade per year or 150 grams per turbine with 3 engine blades per year (https://factcheck.vlaanderen/factcheck/windturbines-verliezen-geen-62-kg-per-turbine-aan-microplastic). Emissions to the natural environment of any compounds present in the wind turbine blades and the coating used is therefore expected to be low. EIS Section 3.21.2.3 summarizes the maximum potential quantities of hazardous materials consisting of oils, fuels, lubricants for the WTGs and OSSs as presented in COP Tables 3.3.5-2 and 3.3.8-2. All fluids are contained and there are no proposed discharges of chemical or lubricants proposed for Revolution Wind. Furthermore, the OSSs will be designed with a minimum of 110 percent of secondary containment for all identified oils, grease and lubricants, and they will contain integral low-pressure sensors to detect sulfur hexafluoride (SF6) leakage. |
| BOEM-2022-0045-0102 | 17 | · Review the chemical makeup of the products proposed for use in the WTGs and OSSs for toxicity and to determine whether these products contain PFAs.<br>· Expressly forbid the use of any and all PFAs in all Project phases. | An analysis of the toxicity of the fluids used in offshore wind turbines and substations can be found on BOEM's website at https://www.boem.gov/renewable-energy-research-completed-studies, by clicking on the "Environmental Fates and Effects" tab, and selecting Environmental Risks, Fate, and Effects of Chemicals Associated with Wind Turbines on the Atlantic Outer Continental Shelf. Bisphenol A (BPA) is often used as a building block in epoxy used for blades, however, the BPA used in the WTG blades becomes inert. More specifically it is chemically reacted to an epoxy compound, which further reacts in the curing process, thereby becoming part of the polymer network that makes up the epoxy plastic in the blade material. Therefore, no exposure of BPA is expected from the cured material. The safety data sheets provided by Siemens Gamesa’s suppliers for the materials |

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| | | | used in the Siemens Gamesa blades do not mention PFAS. Therefore, it is Siemens Gamesa's understanding that there is either no use of PFAS or only usages in quantities below the regulatory thresholds for disclosure. In addition, suppliers are required to comply with the Ørsted Code of Conduct for Business Partners and undertakes activities to ensure that subcontractors comply with (i) the Ørsted Code of Conduct for Business Partners or (ii) another suitable framework acceptable to the Contractor with similar expectations regarding basic compliance with applicable laws, respect for labor and human rights, environmental management, and anticorruption. According to the EPA action plan for BPA (https://www.epa.gov/sites/default/files/2015-09/documents/bpa_action_plan.pdf), BPA is expected to biodegrade under environmental conditions, although conflicting results have been obtained using biodegradation screening tests. However, the weight of evidence suggests that it is not expected to be persistent in the environment, and rapid degradation is expected to occur.<br><br>With regards to the estimated volumes of potential emissions of coating materials from the wind turbines, there have been studies carried out by industry majors which indicated that total material released from wind turbine blades estimated to be as low as 50 grams per blade per year or 150 grams per turbine with 3 engine blades per year (https://factcheck.vlaanderen/factcheck/windturbines-verliezen-geen-62-kg-per-turbine-aan-microplastic). Emissions to the natural environment of any compounds present in the wind turbine blades and the coating used is therefore expected to be low. Section 3.21.2.3 summarizes the maximum potential quantities of hazardous materials consisting of oils, fuels, lubricants for the WTGs and OSSs as presented in COP Tables 3.3.5-2 and 3.3.8-2. All fluids are contained and there are no proposed discharges of chemical or lubricants proposed for Revolution Wind. Furthermore, the OSSs will be designed with a minimum of 110 percent of secondary containment for all identified oils, grease and lubricants, and they will contain integral low-pressure sensors to detect sulfur hexafluoride (SF6) leakage. |
| BOEM-2022-0045-0122 | 17 | a. Onshore Activities:<br>It was unclear based on conversations with BOEM personnel at the October 4, 2022, Public Hearing whether there would be any onshore activity on Martha's Vineyard, and in Aquinnah in particular. It was indicated that crew may be stationed on Martha's Vineyard further exacerbating the on-island housing crisis. The planned onshore activity on Martha's Vineyard should be clarified and specified. | Revolution Wind is not proposing to use housing, port facilities, or other infrastructure on Martha's Vineyard. |
| BOEM-2022-0045-0101 | 18 | Storm Damage—WTG Collapse and Blade Loss<br>MP-THPO Comments and Concerns<br>• Although project proponents and BOEM have each stated that wind turbines are designed to withstand high winds in storm conditions, they have done so without citing actual design parameters such as wind shear and wind speeds. (such as category five hurricanes) What is the mitigation for a storm system causing a collapse of these turbines? Lubricants could spill (or even just leak), and other disasters may occur from turbine collapse. The General Electric (GE) Haliade 12–13 megawatt (MW) turbine—the only specific example of real-world testing—is from dry land.<br>• What is the plan if a WTG blade breaks off, and which agency is tasked with this mitigation?<br>• How will fiberglass in the ocean be addressed?<br>Research and Document Review Summary<br>*WTG Collapse—DEIS*<br>Section 2.2 of the DEIS—Non-Routine Activities and Low-Probability Events—states the following:<br>Revolution Wind designed the Project components to withstand severe weather events. However, severe flooding or coastal erosion could require repairs during construction and installation activities. Although highly unlikely, structural failure of a WTG (i.e., loss of a blade or tower collapse) would result in temporary hazards to navigation for all vessels.<br>Additionally, Table 2.2-1 provides the following:<br>Revolution Wind designed the Project components to withstand severe weather events...Although highly unlikely, structural | In the event of significant facility damage, for example loss of large structural elements into the ocean, Revolution Wind would follow statutory requirements for submitting notifications, as described in 30 Code of Federal Regulations (CFR) Section 585.831. 30 CFR Section 585.703 further defines the obligation to submit a report on repairs. In regard to loss of large structural elements, it is expected that surveys, such as those to be performed after a major storm event, would be conducted to evaluate seabed conditions and determine the location of lost structural elements. Results of surveys would be shared with relevant regulatory authorities, and remedial plans, including those for recovery of materials, would be agreed and implemented subject to other provisions contained within 30 CFR 585.<br>Asset integrity inspection plans are being developed by Revolution Wind to define periodic inspections of infrastructure and seabed conditions and provide ongoing assurance of asset integrity. These inspection plans address both structural elements within the wind farm and export and array cable burial conditions. Inspection plans would also define specific requirements for inspections following extreme weather events. In the event that, following such storm events, damage or disturbance is identified and demands remedial |

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| | | failure of a WTG (i.e., loss of a blade or tower collapse) would result in temporary hazards to navigation for all vessels.<br>Table F-1 contains the following environmental protection measure (EPM):<br>WQ3—Oil spill response plan (OSRP), Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP (COP Appendix D).<br>*WTG Collapse—COP*<br>COP Appendix D—Emergency Response Procedures/Oil Spill Response Plan—contains Appendix F—Ørsted Construction, Operation, and Decommissioning Phase Emergency Response Procedures. Scenario 24 in Appendix F outlines the basic procedures for addressing floating installation parts within the wind farm but includes neither recovery nor salvage plans for collapsed WTGs or OSSs or their components.<br>Additionally, Appendix G within COP Appendix D provides the chemical inventories for each WTG and OSS. Appendix G also notes that both the WTGs and OSSs have been designed with a minimum of 110 percent of secondary containment of all identified oils, grease, and lubricants. The nacelle canopy is designed to contain 1,030 gallons (3,900 liters) of liquid. Furthermore, Appendix G addresses worst-case discharge scenarios, which it defines as a structural failure of the OSS. This event could be caused by the OSS being dropped during construction or by a catastrophic natural disaster. A structural collapse of the substation would cause subsequent ruptures of the transformer's oil reservoir and generator's diesel tank; all spilled fuel and oils from the OSS facility would create a worst-case discharge of contained fluids within the area of operations. Similarly, a major casualty event could occur if one or more offshore WTGs experienced a structural failure or was impacted by a catastrophic natural disaster. In this scenario, the WTGs could be damaged such that they fall into the ocean, possibly releasing up to 6,947 gallons of oil products into the ocean. COP Appendix D also lists two oil spill response organizations (OSROs) with which the developer has preliminary contractual agreements.<br>Per COP Section 3.3.5, Offshore Substations, OSS devices containing SF6 (sulfur hexafluoride) will be equipped with integral low-pressure SF6 leak detectors.<br>*WTG Collapse—November 2021 South Fork Wind Farm Record of Decision (ROD)*<br>Sections 1.1.2 and 1.1.2.4 of Appendix A in the ROD provide mitigation requirements for marine debris awareness and elimination and required marine debris recovery plans, respectively. Per Appendix F of the DEIS, however, the only proposed EPMs or mitigation measures are marine debris awareness training and marking for marine debris elimination; no EPMs or mitigation measures for response and marine debris recovery are provided.<br>*Blade Loss*<br>The following are recent incidents in which WTG blade loss occurred:<br>• On April 6, 2022, a wind turbine lost its rotor and blades in the Ørsted Anholt offshore wind farm in Danish waters.<br>• On October 24, 2021, an installation vessel dropped a hub and three 61-meter turbine blades into the Irish Sea at the Vattenfall Ormonde offshore wind farm.<br>Neither the DEIS nor the COP specifically address these incidents of concern. Although Appendix F within COP Appendix D outlines the basic procedures for addressing the recovery of floating installation parts within the wind farm (Scenario 24), neither recovery nor salvage plans for sunken wind farm components are included. | activities or repairs, these would be notified and implemented in accordance with provisions defined within 30 CFR 585. |
| BOEM-2022-0045-0122 | 18 | b. Decommissioning:<br>A very quick search of the internet reveals how decommissioning WTGs have caused major issues for jurisdictions. With so many WTGs planned, will BOEM make sure leasees post bonds to ensure the removal of the WTGs when economic, technical, or other circumstances, whether anticipated or not anticipated, cause decommissioning? | Decommissioning obligations are accrued by the lessee or grantee upon acceptance and signature of the lease or grant and are maintained by the lessee or grantee until the decommissioning process is completed or there has been a BOEM-approved transfer of the lease or grant (30 CFR §585.901). The decommissioning process is made up of the following three distinct stages: decommissioning application, decommissioning notice, and the final notice. These procedures ensure that an offshore wind farm on the OCS will be fully decommissioned and the site will be cleared through both regulatory requirements and the incentive of reimbursement of past financial assurances. The regulatory requirements include compliance with NEPA, ESA, Magnuson-Stevens Fishery Conservation and Management Act, CZMA, and other Federal, state, and local regulations. Detailed Project decommissioning impacts will be evaluated under a separate NEPA process at the end of the Project life cycle. BOEM contracts an independent, third-party consultant to develop an estimate of the decommissioning costs based on the details of the project supplied by the lessee. BOEM uses this estimate in determining the amount of financial assurance required |

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| | | | to be provided by the lessee. The estimate is conservative and includes all management costs that would be incurred by BOEM if it was to contract the decommissioning work to a third-party contractor. The amount is subject to revision at any time during the lifetime of the project based on future economic conditions. |
| BOEM-2022-0045-0101 | 19 | Recommended Action Items<br>*WTG Collapse.*<br>Develop mitigation measures to address the following:<br>• The various impacts of a hurricane or nor'easter, including salvage plans for collapsed WTGs and OSSs and the agency tasked to perform the mitigation measures.<br>• The cumulative impact of performing repairs after weather events to marine habitats, vessel traffic, etc.<br>• The potential impacts of catastrophic WTG structural failure on vessel navigation and traffic, including the impacts of debris fields within and outside the boundaries of the wind farm.<br>• Response to and recovery of wind farm-related marine debris.<br>*Blade Loss*<br>Identify mitigation measures for the presence of non-OSRP-related wind farm debris in the ocean. | In the event of significant facility damage, for example loss of large structural elements into the ocean, Revolution Wind would follow statutory requirements for submitting notifications, as described in 30 Code of Federal Regulations (CFR) Section 585.831. 30 CFR Section 585.703 further defines the obligation to submit a report on repairs. In regard to loss of large structural elements, it is expected that surveys, such as those to be performed after a major storm event, would be conducted to evaluate seabed conditions and determine the location of lost structural elements. Results of surveys would be shared with relevant regulatory authorities, and remedial plans, including those for recovery of materials, would be agreed and implemented subject to other provisions contained within 30 CFR 585.<br>Asset integrity inspection plans are being developed by Revolution Wind to define periodic inspections of infrastructure and seabed conditions and provide ongoing assurance of asset integrity. These inspection plans address both structural elements within the wind farm and export and array cable burial conditions. Inspection plans would also define specific requirements for inspections following extreme weather events. In the event that, following such storm events, damage or disturbance is identified and demands remedial activities or repairs, these would be notified and implemented in accordance with provisions defined within 30 CFR 585. |
| BOEM-2022-0045-0102 | 19 | Has the soil been tested along the cable routes, and what harmful contaminants are in the sediment? | Revolution Wind has conducted sediment, soil, and groundwater investigations in the course of planning, design and permitting for the project. In accordance with the Rhode Island Rules and Regulations for Dredging and the Management of Dredged Materials (250-Rhode Island Code of Regulations (RICR)-150-05-2; the Regulations) and as part of its Application for State Water Quality Certification and Marine Dredging and Associated Activities (July 2021), Revolution Wind conducted an investigation of sediment characteristics within the footprint of the proposed horizontal directional drill (HDD) exit pits at the Landfall Work Area. As directed by the Regulations, Revolution Wind researched dredging projects proximate to the HDD exit pits, consulted with the Rhode Island Department of Environmental Management (RIDEM) and the Rhode Island Coastal Resources Management Council (CRMC) (the Regulatory Agencies), prepared a sediment sampling plan that considered areas impacted by past spill events or otherwise known or suspected to contain contamination, and areas near outfalls, fueling docks or pumps, and collected environmental sediment cores at representative locations along the cable landfall route within approximately 1,000 feet of shore. Sediment cores were collected, handled, and assessed in strict accordance with procedures outlined in the Regulations. Twenty-one sediment samples were submitted for laboratory analysis. Laboratory analytical results were compared with the dredge material disposal criteria outlined in the Regulations. The sediment investigation methodology and results were submitted to the Regulatory Agencies as part of the Revolution Wind Application for State Water Quality Certification And Marine Dredging and Associated Activities.<br>Separately, Revolution Wind performed environmental due diligence investigations within the footprint of the proposed Onshore Components including the proposed Onshore Substation (OnSS), Interconnection Facility (ICF), Onshore Transmission Cable Route, and Landfall Work Area. Revolution Wind prepared a Phase I Environmental Sites Assessment (ESA) for the Project Site in accordance with the American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Site |

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| | | | Assessment Process (ASTM Designation: E1527-13), All Appropriate Inquiry (AAI) which identified Recognized Environmental Conditions (RECs) associated with portions of the Site and adjacent properties. The Phase I ESA was provided as Appendix V of the COP.<br>The entire footprint of the Onshore Components falls within the boundary of a Formerly Used Defense Site (FUDS) and several RECs of past activities were identified in the Phase I ESA. Based on the findings of Phase I ESA, a Limited Subsurface Investigation is warranted. A memo regarding onshore sampling is currently being prepared for distribution to RIDEM and will be provided to BOEM upon its completion and submittal to that agency. |
| BOEM-2022-0045-0122 | 19 | c. Emergency plan:<br>The DEIS states that the emergency plan is confidential. How can the public be assured that the plan properly protects the environment and the people if the plan is confidential? | The Revolution Wind Emergency Response Plan (ERP) addresses emergencies and non-routine events that have a potential to impact people, environment, assets, and reputation. The ERP is submitted as part of the Revolution Safety Management System (SMS) in compliance with 30 CFR 585.810. The ERP will be reviewed and approved by the U.S. Coast Guard (USCG) and Department of the Interior (DOI). Another response plan, The Oil and Hazardous Substance Response Plan (OSRP), is written in compliance with 33 USC 1321 and includes information identified in 30 CFR part 254. The OSRP is reviewed and accepted by the Bureau of Safety and Environmental Enforcement (BSEE). These plans are confidential for a variety of reasons, including but not limited to the fact that they contain contact information for individuals which is private, and that the plans contain information which may be considered to be intellectual property, but they are reviewed by applicable regulatory agencies which are familiar with the requirements for the documents. They will be updated and implemented as necessary and as required. |
| BOEM-2022-0045-0101 | 20 | Capabilities of Existing Infrastructure<br>MP-THPO Comments and Concerns<br>Because the existing grid/infrastructure is currently incapable of accepting power from a new [power] source[s], and only now this year are power infrastructure improvements on terrestrial lands beginning to be addressed, no reason currently exists to disturb or change any ASL in the Project area. The MPTN further believes that (1) the current overall power grid condition and infrastructure issues are within the scope of Revolution Wind and (2) there exists a cumulative impact of previous and planned offshore wind projects in the region.<br>Research and Document Review Summary<br>Neither the DEIS nor the COP address interconnection points. ISO New England, however, completed a 2021 interconnection process feasibility study for offshore wind in New England.<br>Recommended Action Item<br>Avoid the risk of disturbing or changing any ASL in the Project lease area until a definitive conclusion is reached that the existing grid can accept this and future new power sources. | Electricity generated by the Project will connect into the existing onshore regional electric transmission grid at the Rhode Island Energy Davisville Substation in North Kingstown, Rhode Island. The Project’s ISO-New England System Impact Study concluded that upgrades to the existing Davisville Substation and electrical grid beyond the substation are necessary for the Project’s interconnection. The execution of any upgrades at the existing substation and of the broader electrical grid, and the specific permitting, engineering, and design requirements to achieve the upgrades, will be performed pursuant to the Project’s Large Generator Interconnection Agreement. Revolution Wind is not responsible for maintaining the existing electrical grid; however, it will remain responsible for the maintenance of the Project components, including onshore cables, through the lifespan of the Project. BOEM's authority under the OCSLA to approve certain activity on the OCS does not include authority to regulate the electrical grid. Generally, analysis of the electric grid is outside of the scope of this EIS. |
| BOEM-2022-0045-0102 | 20 | Provide the results of any completed soil/core sample testing for contaminants that may be distributed due to cable installation—particularly in Narragansett Bay and the water column. Conduct such testing if none has been completed to date. | Revolution Wind has conducted sediment, soil, and groundwater investigations in the course of planning, design and permitting for the project. In accordance with the Rhode Island Rules and Regulations for Dredging and the Management of Dredged Materials (250-Rhode Island Code of Regulations (RICR)-150-05-2; the Regulations) and as part of its Application for State Water Quality Certification and Marine Dredging and Associated Activities (July 2021), Revolution Wind conducted an investigation of sediment characteristics within the footprint of the proposed horizontal directional drill (HDD) exit pits at the Landfall Work Area. As directed by the Regulations, Revolution Wind researched dredging projects proximate to the HDD exit pits, consulted with the Rhode Island Department of Environmental Management (RIDEM) and the Rhode Island Coastal Resources Management Council (CRMC) (the Regulatory Agencies), prepared a sediment sampling plan that considered areas impacted by past spill events or otherwise known or suspected to contain contamination, and areas near outfalls, fueling docks or pumps, and collected environmental sediment cores at representative locations along the cable landfall route within approximately 1,000 feet of shore. Sediment cores were collected, handled, |

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| | | | and assessed in strict accordance with procedures outlined in the Regulations. Twenty-one sediment samples were submitted for laboratory analysis. Laboratory analytical results were compared with the dredge material disposal criteria outlined in the Regulations. The sediment investigation methodology and results were submitted to the Regulatory Agencies as part of the Revolution Wind Application for State Water Quality Certification And Marine Dredging and Associated Activities.<br>Separately, Revolution Wind performed environmental due diligence investigations within the footprint of the proposed Onshore Components including the proposed Onshore Substation (OnSS), Interconnection Facility (ICF), Onshore Transmission Cable Route, and Landfall Work Area. Revolution Wind prepared a Phase I Environmental Sites Assessment (ESA) for the Project Site in accordance with the American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM Designation: E1527-13), All Appropriate Inquiry (AAI) which identified Recognized Environmental Conditions (RECs) associated with portions of the Site and adjacent properties. The Phase I ESA was provided as Appendix V of the COP.<br>The entire footprint of the Onshore Components falls within the boundary of a Formerly Used Defense Site (FUDS) and several RECs of past activities were identified in the Phase I ESA. Based on the findings of Phase I ESA, a Limited Subsurface Investigation is warranted. A memo regarding onshore sampling is currently being prepared for distribution to RIDEM and will be provided to BOEM upon its completion and submittal to that agency. |
| BOEM-2022-0045-0103 | 26 | The operational footprint of IAC protection area is calculated as 74.1 acres (page 2-7 table 2.1-2). The footnote for this table states:<br>‡‡ The general disturbance corridor width for the IAC is 131 feet (40 meters). IAC protection is calculated by multiplying a portion (10%) of the cable route by the disturbance corridor.<br>If the operational footprint of the cable protection area is calculated as described using the entire disturbance width of 131 feet, it would result in an area of 246.1 acres. Similarly, based on the figures provided for IAC construction and installation footprint of 2,471 acres, cable protection estimated at 10% of the disturbance corridor would be 247.1 acres.<br>However, Table 2.1-8 (page 2-18) states that, for the RWEC, cable protection is for 10% of route length up to 39.4 ft (12 m) wide. Assuming all cable protection is of similar width, the resulting total permanent impact area would be ~74 acres for the estimated 10% of total cable route. It would be useful if more specific cable protection widths and other design features related to cable protection were detailed in the analysis, and the estimates of the operational footprint of cable protection clarified. A typical project section showing cable protection in graphic form would be helpful in this regard. Recommendation: We recommend that the FEIS clarify cable protection width and other design features. | Anticipated seafloor disturbance and secondary cable protection information is outlined COP Appendix X2 Table 4-1. Text edits have been made in EIS Chapter 2 and clarifications made in Table 2.1-8. Disturbance estimates are not additive as disturbance types may overlap. |
| BOEM-2022-0045-0103 | 27 | The footnote provided to Table 2.1-2 (page 54) indicates that rock placement is the most frequently used solution for scour protection for WTG monopole foundations.<br>Recommendation: We recommend that BOEM identify rock protection as the preferred method for scour protection where practicable, as it more closely represents natural benthic conditions than concrete mattress protection and would likely provide more beneficial habitat. | BOEM has not identified a preferred or required form of scour protection in the FEIS; however, BOEM's proposed mitigation measures outlined in Appendix F (Table F-2) include certain requirements or limitation to the types of cable protection that should be used. These requirements are consistent with *BOEM's Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR Part 585* which states "If needed, cable protection measures should reflect the pre-existing conditions at the site. This mitigation measure chiefly ensures that seafloor cable protection does not introduce new obstructions for mobile fishing gear. Thus, the cable protection measures should be trawl-friendly with tapered or sloped edges. If cable protection is necessary in "non-trawlable" habitat, such as rocky habitat, then the lessee should consider using materials that mirror the benthic environment." Mitigation resulting from BOEM's Magnuson-Stevens Fishery Conservation and Management Act consultation have also been incorporated into the FEIS. |
| BOEM-2022-0045-0101 | 27 | Recommended Action Items<br>• Investigate the feasibility of reducing the overall expected power output of RWF. Doing so would allow for fewer WTGs regardless of the chosen alternative. | BOEM's regulations require BOEM to analyze Revolution Wind's proposal to build a commercial-scale wind energy facility on the Renewable Energy Lease Number OCS-A 0486. The purpose and need in the EIS reflect the requirement per those regulations, |

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| | | | whereas BOEM's purpose as stated in Section 1.2 is to determine whether to approve, approve with modifications or disapprove Revolution Wind's COP, is needed to fulfill BOEM's duties under the lease. BOEM considered reasonable alternatives during the EIS development process that would avoid or minimize adverse impacts in accordance with NEPA implementing regulations. BOEM's screening criteria is presented in Appendix K, Additional Analysis for Alternatives Dismissed, of the Final EIS. |
| BOEM-2022-0045-0103 | 28 | Recommendation: We recommend that the FEIS provide detailed information on how frequently and at what scale cable maintenance/repair/replacement will occur, as well as the level of impacts associated with cable maintenance/repair/replacement. | Transmission cable maintenance is outlined in section 3.5.2 of the COP. Routine transmission cable maintenance and survey activities are applicable to all of the cable types. Text edits have been made. |
| BOEM-2022-0045-0086 | 63 | Page 2-9, Section 2.1.2.1.1: The statement "The WTGs could be accessed from either a vessel via a boat landing" is not correct. The WTG foundations do not have a boat landing for access. | Thank you for the comment. Section 3.3.4.1 of the COP on page 92 states "Secondary structures on each WTG monopile foundation will include a boat landing or alternative means of safe access (e.g., Get Up Safe – a motion compensated hoist system allowing vessel to foundation personnel transfers without a boat landing), ladders, a crane, and other ancillary components." However, based on additional information provided by Revolution Wind in response to a request for information, Section 2.1.2.1.1 of the EIS has been updated to edit out the term "boat landing" from the WTG description. |
| BOEM-2022-0045-0086 | 64 | Page 2-18, Table 2.1-8: The operational footprint of the RWEC is defined as the project easement (1640-ft x 42 miles = 8,349 acres). COP Table 3.3.3-5 reports the operational footprint of the RWEC as equivalent to the area of secondary protection (RWEC-OCS = 17.8 acres; RWEC-RI 42.7 acres; total 60.5 acres). The same DEIS table incorrectly identifies the construction and installation footprint as equivalent to the area of secondary cable protection (60.5 acres). | Thank you for the comment. Additionally, after publication of the DEIS, RW provided updated estimates for secondary protection needed for the RWEC-RI (a reduction from 10% to 5%). Edits have been made. |
| BOEM-2022-0045-0086 | 65 | Page 2-18, Table 2.1-8: Table 2.1-8 omits temporary disturbance associated with cable burial trials and omega joints. Values in the table match the habitat mapping report, but do not include values from the following text from the habitat mapping report: "Additional cable burial trials may occur outside of this particular 40-m cable disturbance corridor; these trials will occur within the area surveyed and mapped and will occur within a 40-m corridor. Up to 10 trials over a 250-m length each may be conducted for the RWEC; at present, the division of these trials between the RWEC–OCS and the RWEC–RI is unknown and an even split (5 per) is assumed for these calculations. These trials would add an additional maximum area of seafloor preparation of approximately 24.7 acres (12.36 acres for the RWEC–OCS and 12.36 acres for the RWEC–RI). Further, four omega joints will be required for the RWEC, two will be required per cable, one each along the RWEC–OCS and along the RWEC–RI; these will be buried and will require a seafloor preparation corridor that is 250-m long and 205-m in width, 165-m in addition to the standard 40- m width. These 4 omega joints will add an additional maximum area of seafloor preparation of 40.8 (20.4 acres for the RWEC–OCS and 20.4 acres for the RWEC–RI). Therefore, the total maximum area of seafloor disturbance would be approximately 1,390 acres (1324.5 acres for the 40-m seafloor preparation and installation corridor, 24.7 acres for cable burial trials, and 40.8 acres for omega joints), 625.9 acres associated with the RWEC–OCS and 764.2 acres associated with the RWEC–RI." | Thank you for the comment. Edits have been made. |
| BOEM-2022-0045-0086 | 66 | Page 2-22, Section 2.1.2.2.3: Language within this section states "Installation of the RWEC at the landfall work area would be accomplished using a horizontal directional drilling (HDD) methodology originating offshore incorporating either a cofferdam configuration or an exit pit with no surface casing and goal posts (see Table 2.1-8)." The statement of originating offshore is inaccurate, and inaccurately notes "no surface casing," although surface casing is included in Section 3. We recommend revising this sentence to read "... HDD methodology originating onshore to the seaward exit pit within RI State Waters and may incorporate a temporary cofferdam or temporary surface casing with supporting goal posts." | Thank you for the comment. Edits have been made. |
| BOEM-2022-0045-0086 | 67 | Page 2-24, Section 2.1.2.3: The DEIS statement of "Construction could begin as early as the first quarter of 2023", does not agree with the indicative schedule provided on the following page or within the July 21, 2022 Revolution Wind COP. | Thank you for the comment. Edits have been made. |
| BOEM-2022-0045-0086 | 68 | Page 2-30, Section 2.1.2.3.1: The Revolution Wind Export Cable Segments paragraph states that offshore submarine joints would be located within the 131-foot-wide (40-m-wide) disturbance corridor. COP section 4.1.1.2 reports that up to four omega joints may be required for the RWEC, two per cable, and one each along the RWEC–OCS and along the RWEC–RI. These will be buried and will require a seafloor preparation corridor that is 820 ft (250 m) long and 673 ft (205 m) in width. The anticipated disturbance corridor at the submarine joints is 205 meters. | Thank you for the comment. Edits have been made. |

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| BOEM-2022-0045-0086 | 69 | Page 2-33, Section 2.1.2.3.2: The statement that "once construction is complete, temporary disturbance areas beyond the operational footprint of both the OnSS and ICF would be restored to preconstruction conditions" is not comprehensive. Recommend revising to note that The OnSS and ICF will include other improvements outside the operational footprint including driveways, maintained landscaping, etc., up to 7.1 acres at OnSS and 4.0 acres for the ICF. | Thank you for the comment. Edits have been made. |
| BOEM-2022-0045-0086 | 70 | Page 2-35, Section 2.1.2.4.2: Following a recent sale, National Grid is no longer applicable in the following sentence and should be replaced by Rhode Island Energy or simply applicable standards: "Onshore Equipment would be maintained in accordance with National Grid standards." | Thank you for the comment. Text edits have been made. |
| BOEM-2022-0045-0086 | 96 | Various locations throughout the DEIS includes an out-of-date onshore cable route. Recommend updating with the new route that is found within the July 2022 Revolution Wind COP. | Thank you for the comment. Edits have been made. |

## Public Involvement

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| BOEM-2022-0045-0025 | 1 | Is there any educational campaign planned to reduce consumption of electricity? As houses get bigger, cars go electric and we depend more and more on electronics, it would seem appropriate to promote limiting use of electricity as well as producing alternative energy. In addition, is there any policy in place that would limit the cost of electricity in the future. Here on Martha's Vineyard there has been a substantial increase in the cost of electricity that has our local residents very concerned. Unlike our reputation, we are the poorest county in Massachusetts. | The action analyzed in BOEM’s Programmatic EIS for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf was the establishment of the Marine Minerals Management Service Alternative Energy and Alternate Use Program on the Federal Outer Continental Shelf. Educational campaigns to promote reduction of energy use or implementing policy to limit cost of electricity are outside of the scope of this environmental review. BOEM’s regulations require BOEM to analyze Revolution Wind’s proposal to build a commercial-scale wind energy facility on the Renewable Energy Lease Number OCS-A 0486. The purpose and need in the EIS reflect the requirement per those regulations. BOEM’s purpose and need as stated in Section 1.2 is to determine whether to approve, approve with modifications or disapprove Revolution Wind’s COP to fulfill BOEM’s duties under the lease. BOEM considered reasonable alternatives during the EIS development process that would avoid or minimize adverse impacts in accordance with NEPA implementing regulations. |
| BOEM-2022-0045-0059 | 1 | BOEM’s public meeting process for the Revolution Wind project is significantly flawed. Although the project is based on three Power Purchase Agreements (PPAs) for the states of Rhode Island and Connecticut, with the export cables running through Narragansett Bay in the state of Rhode Island, BOEM is conducting only one public hearing in the state of Rhode Island for the project, none in Connecticut, and two in the state of Massachusetts- one on Martha’s Vineyard- a state with no connection to the project.1 Although we state and recognize in our comments throughout BOEM’s history of offshore wind leasing that affected fisheries stakeholders are federally permitted to fish in the entire Greater Atlantic Region and affected by many projects not associated with the state where their vessels homeport, we point out that for Revolution Wind, BOEM has gone out of its way to include multiple in-person public meetings in the state of Massachusetts while ignoring the states which supposedly justify the Proposed Action. We request that BOEM justify its reasoning for this meeting schedule and its lack of public inclusivity.<br>For fisheries stakeholders desiring to attend a public meeting, all in person meetings are being held during the week of the Mid Atlantic Fisheries Management Council meeting, and one of the two virtual hearings has also been scheduled during a New England Fishery Management Council meeting. The meetings scheduled by BOEM for this project appear to exclude any meaningful fishery stakeholder participation.<br>The DEIS states that Martha’s Vineyard may experience visual impacts as a result of the project. If BOEM considers visual impacts a more important NEPA/OSCLA consideration than cable impacts on federally and state permitted fisheries stakeholders, we would request that BOEM make that clarification, as this is the only explanation for multiple meetings in the state of Massachusetts and only one or none elsewhere where affected fisheries stakeholders would have attended. | Thank you for sharing your concerns with us. BOEM is committed to working with states, Tribes, and stakeholders on our shared ocean resources. In-person meeting locations were selected to be close to the landing site, key port locations, and locations near resources of tribal concern. BOEM also held two virtual meetings to allow for participation by stakeholders that were unable to attend in-person, and provided recordings of the virtual meetings on the BOEM project website. BOEM values the perspective of the fishing industry and regularly engages with commercial and recreational fishermen to understand their concerns from both a biological and socioeconomic impact perspective. This has been accomplished through focused engagement with Regional Fishery Management Councils, participation in state-led fishery advisory group meetings, and the convening of a National Academies Fisheries Steering Committee. |
| BOEM-2022-0045-0119 | 1 | I want to say that I am very disappointed that BOEM refused to schedule more than one meeting in the State of Rhode Island, despite the fact that the export cable makes landfall in Rhode Island, and the fact that Rhode Island is supposedly going to be purchasing the power from this project. Um Massachusetts, which didn't have any of those things, had two meetings um as opposed to our one, and the only Rhode Island meeting was scheduled during the um Fishery Management Council meeting, so that fishery stakeholders were prevented from participating | Thank you for sharing your concerns with us. BOEM is committed to working with states, Tribes, and stakeholders on our shared ocean resources. In-person meeting locations were selected to be close to the landing site, key port locations, and locations near resources of tribal concern. BOEM also held two virtual meetings to allow for participation by stakeholders that were unable to attend in-person, and provided recordings of the virtual meetings on the BOEM project website. BOEM values the perspective of the fishing industry and regularly engages with commercial and recreational fishermen to understand their concerns from both a biological and socioeconomic impact perspective. This has been accomplished through focused engagement with Regional Fishery Management Councils, participation in state-led fishery advisory group meetings, and the convening of a National Academies Fisheries Steering Committee. |
| BOEM-2022-0045-0089 | 2 | Our enclosed comments are not complete due to the extensive nature of the materials already available such as the over 1600 pages of Draft Environmental Impact Statement with Appendices and the 151 page Fisheries Research and Monitoring Plan dated October 2021 and our limited ability to conduct a complete technical review. We ask that any comment period regarding this project remain open for an extended time (at least 6 months) to allow RISAA and other fisheries representatives to spend more time reviewing the extensive amount of technical materials. | NEPA requires a 45-day comment period on Draft EISs, a period that may be extended at the discretion of the agency issuing the document. Based on the concerns and comments raised during this review period, BOEM determined that 45 days was adequate. Fishing is an important use of the Exclusive Economic Zone that BOEM must consider in its decision-making. BOEM regularly engages with commercial and recreational fishermen to |

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| | | | understand their concerns from both a biological and socioeconomic impact perspective. This is accomplished through focused engagement with Regional Fishery Management Councils, participation in state-led fishery advisory group meetings, and the convening of a National Academies Fisheries Steering Committee. BOEM incorporates fishing industry recommendations into the leasing process by: issuing guidelines to leaseholders or including lease stipulations to develop and implement a fisheries communication plan, developing a fishing industry webpage, and working closely with state partners to address regional fisheries monitoring associated with potential impacts from offshore wind development. |
| BOEM-2022-0045-0119 | 2 | I would request that BOEM would extend the comment period and schedule another Rhode Island hearing on this project. | NEPA requires a 45-day comment period on Draft EISs, a period that may be extended at the discretion of the agency issuing the document. Based on the concerns and comments raised during the review period, BOEM determined that 45 days was adequate and that another Rhode Island hearing was not warranted. The public comment period included two virtual hearings in addition to the in-person meeting in Rhode Island, as well as a virtual meeting room webpage with the same posters, presentations, and opportunities to provide comment as afforded during the in-person hearings. |
| BOEM-2022-0045-0116 | 7 | Okay. Jeffrey Madison, I'm the Town Administrator for the Town of Aquinnah. Not looking for a lot of answers, but just to comment on the meeting this evening. The Town of Aquinnah was never provided notice of this, despite the -- of the meeting -- despite the fact that, you know, we have been carrying -- a number of town residents have been carrying on discussions with Revolution Wind for the past -- I don't know -- five, six months, and noticed that the Town of Aquinnah was not listed as a Consulting Party. As the Owners of the Gay Head Lighthouse, the Edwin Vanderhoop Homestead, the land on which the shops are located at the Aquinnah Cliffs, we insist on being included as a Consulting Party. And we've been treated as such by Revolution -- Representatives of Revolution Wind, if not BOEM. So, I've entered these comments into the record. I will be contacting BOEM to include the consideration for mitigation to the impacted properties that I've mentioned. Thank you very much. | Thank you for the comment. BOEM has reached out to the Town of Aquinnah to meet and review the notification process and has extended an invitation to the Town of Aquinnah to be a consulting party on the RWF project. Additionally, BOEM published advance notice of five public hearing dates, times, and locations and the due date for receipt of comments in the Federal Register Notice of Availability and request for comments on the Draft Environmental Impact Statement for the Revolution Wind Farm on September 2, 2022 (87 FR 54248, pages 5428-54250, agency docket no. BOEM-2022-0045, document number 2022-18915). Two of the five public hearings were virtual meetings held to allow for participation by stakeholders that were unable to attend in-person and provided recordings on their BOEM project website. BOEM also published advance notice of five public hearing dates, times, and locations and the due date for receipt of comments in six newspapers located throughout the project area, including two in Connecticut, two in Massachusetts, and two in Rhode Island. Each newspaper ran the notification once a week for two weeks in advance of the first public hearing. |
| BOEM-2022-0045-0116 | 12 | Berta Welch again. How is it that the island -- if this is the only meeting on the island -- public meeting, how is it there's only 12 Islanders here? I'm just wondering how this was advertised. It -- that doesn't seem correct | Thank you for the comment. BOEM published advance notice of five public hearing dates, times, and locations and the due date for receipt of comments in the Federal Register Notice of Availability and request for comments on the Draft Environmental Impact Statement for the Revolution Wind Farm on September 2, 2022 (87 FR 54248, pages 5428-54250, agency docket no. BOEM-2022-0045, document number 2022-18915). Two of the five public hearings were virtual meetings held to allow for participation by stakeholders that were unable to attend in-person and provided recordings on the BOEM project website. BOEM also published advance notice of five public hearing dates, times, and locations and the due date for receipt of comments in six newspapers located throughout the project area, including two in Connecticut, two in Massachusetts, and two in Rhode Island. Each newspaper ran the notification once a week for two weeks in advance of the first public hearing. |

## Purpose and Need

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| BOEM-2022-0045-0059 | 2 | In the DEIS Purpose and Need for the Proposed Action, BOEM relies heavily on the speculative Power Purchase Agreements (PPAs) dictated by the state mandates of Connecticut and Rhode Island to have 2,000 MWs and 100% renewable energy by 2030, respectively.2 It indeed apparently bases its entire NEPA review on three PPAs speculatively entered by the developer and the states of Connecticut and Rhode Island in 2019, long before the Revolution COP was ever submitted to BOEM for review.3 In fact, very single alternative other than the legally mandated "No Action Alternative" takes great pains to mention that it would fulfill the existing PPAs.<br>For example: Alternative B, "The Proposed Action includes up to 100 WTGs ranging in nameplate capacity of 8 to 12 MW sufficient to fulfill at a minimum the existing PPAs (total of 704 MW)"; Alternative C, "This alternative allows for the fulfillment of the existing PPAs, which total 704 MW"; Alternative D, "Under this alternative, BOEM could select one, all, or a combination of the following three alternatives, while allowing for the fulfillment of the existing PPAs"; Alternative E, "Allows for the fulfillment of the existing three PPAs"; Alternative F "this alternative would be sufficient to fulfill the minimum existing PPAs (total of 704 MW….)". 4<br>We request that BOEM identify the section(s) of NEPA that lists speculative PPAs conducted by the developer years prior to COP submission as a limiting parameter for NEPA alternative consideration and/or review. We are unaware of any legislative provision that allows BOEM to conduct NEPA review in such a manner and artificially limit its range of alternatives to only those favorable to complete fulfillment of a PPA, particularly when such PPA is privately and speculatively contracted by the developer years prior to analysis and/or COP submission.<br>This arbitrary and capricious decision taken by the agency is artificial constraint of NEPA and does not allow for full analysis or full consideration of mitigation for adverse impacts caused by the project that BOEM may already be aware of or may discover during NEPA review. Nor does it allow for BOEM to fulfill its legal responsibilities under OSCLA. Considering that the DEIS phase is the only phase of the entire BOEM offshore wind leasing process where impacts to other ocean users are considered, as required by both NEPA and OSCLA, BOEM is in violation of these statutes by only conducting analysis on and by only considering alternatives that fulfill in whole the project goals and pre-existing PPAs of the developers applying for approval. BOEM has bowed its legislative duties to the interests of private economic parties engaging in speculative contracts.<br>To put in perspective in the BOEM process, BOEM has often known of pre-existing conflicts, in particular fisheries conflicts, prior to siting an offshore wind lease on fishing grounds or prior to offshore wind COP approval when such conflicts have become apparent during the public comment/NEPA analysis phase of the project.5 However, BOEM, rather than removing those areas from the lease or from consideration for buildout at the outset of its process so as to deconflict, contends that it will consider all impacts and possible alternatives for mitigation at the DEIS stage, after a developer submits a COP, and then approve/disapprove in whole or in part accordingly. It is at this stage that BOEM portends to comply with OSCLSA and prevent interference with reasonable uses of the ocean, such as commercial fishing. But BOEM, at the DEIS stage, will only consider alternatives that fulfill PPAs contracted before the COP was submitted to it for analysis. Therefore, it cannot deconflict. If BOEM refuses to consider pre-existing fisheries conflicts in its process, but is willing to consider pre-existing speculative PPAs as its sole criteria for alternative analysis, how can BOEM conduct objective analysis? It cannot.<br>No type of permitting occurs in this manner. A simple analogy would be if an individual contracted with a builder to construct a shed on his property, prior to obtaining planning permission to construct the shed. If the town planning board reviewed the application, subject to all town and state zoning laws and standards, disapproved the shed or could only approve a smaller shed, or in a different location, the individual would have to negate his previous contract with the shed builder and re-contract pursuant to the restrictions imposed by the town zoning board. No town zoning board in the United States would adjust their rules and regulations or permit approvals to accommodate the individual simply because the individual had already speculatively contracted with the shed builder prior to submitting his permit to the town. Yet this is exactly what BOEM is doing with unprecedented and giant infrastructure projects in our oceans, which will have unprecedented impacts to existing ocean users and the natural environment, among others. Not only is this poor planning but it flies in the face of reason on every level.<br>BOEM's recent NEPA standardization, "Process for Identifying Alternatives for Environmental Reviews of Offshore Wind Construction and Operations Plans pursuant to the National Environmental Policy Act (NEPA)" 6, on which it bases its rationale for the alternatives chosen for analysis in the Revolution Wind DEIS is flawed, arbitrary and capricious, as it only analyzes alternatives that allow for full pre-existing PPAs. We incorporate herein our comments on this issue previously submitted to | Section 8(p) of the Outer Continental Shelf Lands Act (OCSLA), it's implementing regulations, and Lease OCS-A 0486 require BOEM to analyze Revolution Wind's proposal to build a commercial-scale wind energy facility on the Renewable Energy Lease Number OCS-A 0486 and either approve it, disapprove it, or approve it with modifications. The purpose and need in the EIS reflect the requirement per those regulations. Changes to BOEM's renewable energy program are outside of the scope of this environmental review and would be analyzed through a separate process. BOEM's purpose and need, as stated in Section 1.2, is to determine whether to approve, approve with modifications or disapprove Revolution Wind's COP, is needed to fulfill BOEM's duties under the lease. BOEM considered reasonable alternatives during the EIS development process that would avoid or minimize adverse impacts in accordance with NEPA implementing regulations. BOEM's screening criteria is presented in Appendix K, Additional Analysis for Alternatives Dismissed, of the Final EIS. Under the NEPA regulations at 40 CFR § 1508.1(z), "reasonable alternatives means a reasonable range of alternatives that are technically and economically feasible, and meet the purpose and need for the proposed action."<br><br>Offshore wind projects rely on offtake agreements to obtain upfront financing for the capital costs of constructing the project. Without its existing offtake agreement, Revolution Wind would not construct its proposed project, or any of the action alternatives described in the DEIS. BOEM finds that the unique position of offtake agreements necessitates more deference than a typical contract between two private for-profit entities. An alternative that fails to meet the main goal of the applicant would be equivalent to analyzing a no action alternative. Therefore, BOEM considers it appropriate under NEPA to analyze alternatives that would allow lessees to meet the obligations under their offtake agreements. |

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| | | BOEM in our comments on BOEM's Draft Fisheries Mitigation Guidance (BOEM-2022-0033-0003)7 and BOEM's Notice of Intent to Prepare a Programmatic Environmental Impact Statement for Future Wind Energy Development in the New York Bight (BOEM-2022–0034)8.<br>Footnote 2: DEIS, p. ES-1.<br>Footnote 3: DEIS, p. ES-2.<br>Footnote 4: DEIS, p. ES-3-5.<br>Footnote 5: See, for example, the Equinor and Vineyard Wind projects.<br>Footnote 6: See https://www.boem.gov/sites/default/files/documents/renewable-energy/BOEM%20COP%20EIS%20Alternatives-2022-06-22.pdf and https://www.boem.gov/newsroom/notes-stakeholders/boem-standardizes-process-environmental-reviews-offshore-wind.<br>Footnote 7: See our complete comments here: https://www.regulations.gov/comment/BOEM-2022-0033-0090 and here: https://www.regulations.gov/comment/BOEM-2022-0033-0088.<br>Footnote 8: See our comments here: https://www.regulations.gov/document/BOEM-2022-0034-0007/comment?filter=Seafreeze. | |
| BOEM-2022-0045-0071 | 4 | The DEIS purpose and need section references the national 30-GW offshore wind energy goal. The section also indicates that biodiversity and ocean co-use should be protected. We suggest expanding on this to make it clear that the project will avoid risks to the health of marine ecosystems, ecologically and economically sustainable fisheries, and ocean habitats. BOEM should clearly acknowledge that if these risks cannot be avoided, they should be minimized, mitigated, and compensated for. We are concerned that including the three current power purchase agreements summing to 704 MW as a component of the purpose and need limits BOEM's ability to approve a smaller project than that proposed by the developer. This will limit BOEM's ability to avoid and minimize negative impacts of the project while still meeting the purpose and need. Also, given multiple reasons to consider reducing the number of turbines associated with this project (habitat, space-use conflicts, transit, and visual impacts) we are concerned that the upper size limit for this project is 880 MW, which represents a 25% increase over 704 MW. The large range in potential total operating capacity makes it difficult to estimate and subsequently reduce and/or mitigate impacts effectively. | BOEM evaluated the alternatives using the screening criteria presented in Appendix K, Section K.1, Alternatives Screening Criteria. Consistent with those criteria, and because the underlying action triggering the NEPA review is an authorization decision on Revolution Wind's COP, an alternative that fails to meet the main goal of the applicant as outlined in the COP would be equivalent to analyzing a no action alternative. When meeting an offtake agreement(s) is the primary goal of the applicant's proposal, 3 PPAs in the case of Revolution Wind, BOEM considers it appropriate under NEPA to analyze in detail only those alternatives that would allow lessees to meet the obligations under their offtake agreements. The alternatives in the EIS consider a reasonable range of alternatives that reduce the project footprint to the extent practicable while still meeting the purpose and need. |
| BOEM-2022-0045-0065 | 10 | BOEM's recently-announced policy to identify NEPA alternatives directly contradicts the suggestions from RODA and fishing industry representatives across the country, for nearly a decade, to improve its approach to environmental analysis.13 NEPA must be approached to fulfill the agency's purpose and need, not that of a project applicant (although the applicant's interests and objectives may be taken into account).14 The purpose of NEPA is "to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation."15 Typically a purpose and need statement must incorporate this overarching purpose in conjunction with action-specific legislation, which in this case is the Outer Continental Shelf Lands Act (OCSLA).16 An appropriate purpose and need statement for this action would lead BOEM to prioritize OCSLA and NEPA's focus on environmental safeguards and eliminating damage to the environment. An agency cannot circumvent its NEPA obligations "by adopting private interests to draft a narrow purpose and need statement that excludes alternatives that fail to meet specific private objectives" nor can it "craft a purpose and need statement so narrowly drawn as to foreordain approval of" a project proposed by a private party.17 Yet, the Revolution Wind DEIS evidences how the combination of BOEM's new policy and its current sequencing of NEPA lead to exactly that unsavory result. Since states' OSW goals and private power purchase agreements are signed prior to (and outside of) environmental review, predicating such review on their terms inherently predisposes its outcome. The only time sufficient planning flexibility exists to modify project plans to avoid or minimize fishing impacts is at the lease planning phase. Once lease boundaries are drawn, mitigation is possible through project design but power procurement contracting greatly limits the flexibility to achieve such a goal. Thus, BOEM's sequencing of its project review under NEPA significantly weakens any weight the agency has committed to afford robust and consequential mitigation for fisheries if it only reviews mitigation alternatives after these opportunities are lost. This regulatory sequence also prematurely limits environmental mitigation options such as siting in areas with low conflicts with fisheries or marine mammals. An agency policy to review fisheries considerations at the latest stages of project planning, once projects are locked in to lease boundaries and procurement terms, frustrates attempts to incorporate meaningful mitigation measures and we therefore again urge BOEM to reconsider its treatment of fisheries under NEPA. If anything, the NEPA environmental analysis should inform power purchase contracts, not the inverse.18 Finally, the purpose and need for action | Section 8(p) of the Outer Continental Shelf Lands Act (OCSLA), its implementing regulations, and Lease OCS-A-0486 require BOEM to analyze Revolution Wind's proposal to build a commercial-scale wind energy facility on the Renewable Energy Lease Number OCS-A 0486 and either approve it, disapprove it, or approve it with modifications. The purpose and need in the EIS reflect those requirements. The purpose of BOEM's action is to determine whether to approve, approve with modifications, or disapprove Revolution Wind's COP. BOEM's action is needed to fulfill its duties under the lease, which require BOEM to make a decision on the lessee's plans to construct and operate a commercial-scale offshore wind energy facility within the Lease Area (the Proposed Action). BOEM considered reasonable alternatives during the EIS development process that would avoid or minimize adverse impacts in accordance with NEPA implementing regulations. BOEM's screening criteria is presented in Appendix K, Additional Analysis for Alternatives Dismissed, of the Final EIS. Mitigation and monitoring measures identified for consideration in the EIS and Record of Decision are summarized at the end of each resource area (Sections 3.4–3.22). Appendix F Environmental Protection Measures (EPM), Mitigation, and Monitoring further describes the EPMs committed to by the developer in the COP, and additional mitigation and monitoring measures being considered by BOEM. Any implemented mitigation will be coordinated with applicable agencies. |

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| | | under this section of OCSLA differs vastly from public messaging by BOEM, OSW developers, and states, which cite climate change and job creation as the main justifications for OSW projects. If these are central to the purpose of the project, they should be stated as such and thoroughly evaluated in this and other DEIS documents. If not, they should not be cited in public statements as primary rationales for permitting. | |
| BOEM-2022-0045-0100 | 17 | Additional language provided in the Purpose and Need does not reflect the agreed upon template language previously coordinated with BOEM, and its relevance is not clear. Specifically, the final paragraph on this page states, "In making this determination, the Secretary retains wide discretion to weigh those goals as an application of their technical expertise and policy judgment (DOI 2021). This determination is made at the record of decision (ROD) stage. If BOEM disapproves the Revolution Wind COP, per 30 CFR 585.628(f)(2), BOEM will inform Revolution Wind of the reasons and allow Revolution Wind an opportunity to resubmit a revised COP addressing the concerns identified." Please ensure that the P&N is consistent with language previously agreed upon and that included language is clearly relevant. This language may be more applicable in sections of the document discussing Regulatory Frameworks (1.3). | BOEM has reviewed and updated the Purpose and Need language as appropriate in relation to BOEM's authority. |
| BOEM-2022-0045-0100 | 19 | Please ensure that the P&N is consistent with previously agreed upon language and reads as follows: "The purpose of the NMFS action—which is a direct outcome of Revolution Wind's request for authorization to take marine mammals incidental to specified activities associated with the Project (e.g., pile driving)—is to evaluate (insert developer name)'s request pursuant to specific requirements of the MMPA and its implementing regulations administered by NMFS, considering impacts of the applicant's activities on relevant resources, and if appropriate, issue the permit or authorization." | Thank you for the comment. The requested edits have been incorporated into Section 1.2 of the FEIS. |

## Suggested New Alternative

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| BOEM-2022-0045-0065 | 9 | This EIS should explicitly include alternatives for analysis that serve to mitigate the project's impacts to fishing, including the specific requests above, those raised during scoping and in previous comment letters incorporated by reference above, and those listed on RODA's website (attached hereto as Appendix IV).8 Unfortunately, only of the alternatives in the DEIS (transit lanes) would serve as a mitigation measure and it is not afforded a "hard look" in the analysis. BOEM's practice to date has been to incorporate mitigation measures under consideration as appendices or Record of Decision conditions rather than analyzing them fully as alternatives.<br>Since the scoping period for this DEIS, BOEM issued a new policy that has the effect of excluding alternatives from environmental review that would in fact reduce or mitigate fisheries impacts. The "Process for Identifying Alternatives for Environmental Reviews of Offshore Wind Construction and Operations Plans pursuant to the NEPA"9 released in June 2022 standardizes the alternatives BOEM will consider during the NEPA process and clarifies BOEM's policy of considering only a narrow range of alternatives consistent with a developer's preferred project plans.10 Indeed, it affords the terms of cost-competitive procurement agreements "more deference than a typical contract between two private for-profit entities," although such contracts are nearly entirely driven by profit and energy maximization and without environmental review. The document only references mitigation in the context of what should not be considered as a NEPA alternative; that is, it suggests actions with "substantially similar effects" to other options should be considered outside of the range of alternatives.11 We urge BOEM to reconsider this policy. Specifically, for the Revolution Wind and all other proposed OSW projects, the agency should include alternatives for analysis in each of its environmental review documents describing specific fisheries mitigation solutions and afford these full, neutral consideration. Stand-alone alternatives will more clearly inform public comment and allow better evaluation of potential mutual benefits or tradeoffs. As a public agency, BOEM's consideration of alternatives should include those that reasonably mitigate impacts to fishing whether or not a developer has voluntarily proposed to incorporate them in its Construction and Operations Plan (COP) and whether or not they could require reasonable modifications to private contracts. This is especially true, as in the case of this Revolution Wind DEIS, when highly affected members of the public have properly proposed specific fisheries mitigation alternatives for analysis and public input through the scoping process. The DEIS provides clear evidence of the failure of this policy with regard to fisheries mitigation. While acknowledging that significant scientific uncertainty exists over the impacts to Atlantic cod of this and other OSW projects in the region, BOEM nevertheless states "the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives."12 This admission not only ignores the very existence of a "No Action" alternative, but shows that BOEM's construction of NEPA alternatives is not affording genuine consideration to strategies that would reduce fisheries impacts. | Thank you for your comment. BOEM's regulations require BOEM to analyze Revolution Wind's proposal to build a commercial-scale wind energy facility on the Renewable Energy Lease Number OCS-A 0498. The purpose and need in the EIS reflect the requirement per those regulations, whereas BOEM's purpose as stated in Section 1.2 is to determine whether to approve, approve with modifications or disapprove Revolution Wind's COP, is needed to fulfill BOEM's duties under the lease. As part of the NEPA process alternatives were considered and screened if it was outside the jurisdiction of the lead agency as described in Appendix K. Mitigation and monitoring measures identified for consideration in the EIS and Record of Decision are summarized at the end of each resource area (Sections 3.4–3.22). Appendix F Environmental Protection Measures (EPM), Mitigation, and Monitoring further describes the EPMs committed to by the developer in the COP, and additional mitigation and monitoring measures being considered by BOEM. |

# Resource Areas and Appendices

## Air and Climate

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| BOEM-2022-0045-0114 | 2 | While I realize that BOEM is following NEPA's avoid/minimize/mitigate mantra, together with your interpretation of the necessary level of alternatives analysis, I think the document is lacking in an upfront assessment of the broad environmental and economic benefits against some specific, modest, well mitigated impacts. First and foremost, the primary environmental benefit of the Project, the elimination approximately 1.5 million tons of CO2 per year is completely lost in the weeds. This is the primary driver for the Project and the benefit against which the Project's modest and well mitigated impacts must be weighed and balanced. | Thank you for your comment. Table 3.4.-12 estimates the annual and lifetime avoided emissions for the operation of the Project in lieu of the same amount of energy being produced by existing fossil fuel-dependent energy sources. |
| BOEM-2022-0045-0086 | 2 | The Project will bring significant economic and environmental benefits to the communities within the State of Rhode Island, the State of Connecticut, and other states that will be part of the offshore wind installation and operation supply chain. The Project will generate enough clean energy to power more than 350,000 Rhode Island and Connecticut homes annually. Through displacement of conventional generation, the Project is expected to displace over 1 million metric tons of carbon emissions annually, the equivalent of removing 150,000 cars from the road, leading to overall cleaner air and water directly because of the Project. | Thank you for your comment. |
| BOEM-2022-0045-0110 | 6 | We agree that offshore wind projects “produce less net greenhouse gas (GHG) emissions over the life of the projects when compared to other energy sources currently in use.”23 We urge BOEM to expand its analysis of offshore wind’s beneficial climate impacts. The DEIS details many of the pressing impacts that climate change presents to communities, people, wildlife, and natural resources,24 as well as the benefits offshore wind brings from carbon and other pollutant emissions reductions.25 However, the DEIS does not account for the climate benefits of displacing full life-cycle emissions of gas generation, which includes the release of the highly potent global warming potential of methane emissions (84 times that of CO2 on a 20-year time frame) emitted during the extraction and in the transmission and compression of gas. The DEIS also does not monetize these climate benefits using the social cost of carbon to illustrate differences between the social benefits of the Project and the relative social cost of the alternatives.<br>We recommend integrating the social and environmental costs of greenhouse gas emissions into the evaluation of project impacts and impacts of alternatives. The Interagency Working Group on Social Cost of Carbon has produced estimates for the social cost of carbon in order to “allow agencies to incorporate the social benefits of reducing carbon dioxide (CO2) emissions into cost-benefit analyses of regulatory actions that impact cumulative global emissions.” The working group presents values for social costs from 2015 to 2030, assuming discount rates of 5 percent, 3 percent, 2.5 percent and the 95th percentile of the 3 percent discount rate. These values range from $11 to $212 (in 2007 dollars per metric ton of CO2)26 and could be used to monetize the costs imposed by the net greenhouse gas emissions associated with failing to procure the approximately 33 GW of offshore wind contemplated by this DEIS. | The EIS does not take into account the full life-cycle emissions of gas generation because it is not being compared to the full life-cycle of the wind project. For simplicity's sake, the focus is on the generation of electricity via wind vs. fossil-fuel generated electricity The text has been revised to include additional social cost of carbon discussion. |
| BOEM-2022-0045-0086 | 13 | Appendix E.2 on page 3.4-23, first paragraph of Section 3.4.2.2.3 of the DEIS states "The Proposed Action’s construction emissions (see Tables 3.4-9 and 3.4-10) would noticeably increase emissions of regulated pollutants over the construction emissions generated by other offshore wind projects associated with the No Action Alternative (see Table 3.4-4). Therefore, total cumulative construction-related air emissions from all planned offshore wind energy projects, including the Proposed Action, in the OCS air permit area would consist of an estimated 29,333 tons of NOX, 189 tons of SO2, 915 tons of PM10), and 2,186,369 tons of CO2." Revolution Wind recommends that instead of "in the OCS Permit area" it should state "in the Massachusetts Wind Energy Area", since many of the other offshore wind project emissions would be occurring outside of Revolution Wind's OCS Permit area. Revolution Wind also recommends the same change in the third paragraph of the same section regarding O&M emissions. | The text has been revised. |
| BOEM-2022-0045-0086 | 14 | Appendix E.2 on page 3.4-23, second paragraph of Section 3.4.2.2.3 states "Table 3.4-14 combines the total estimated construction emissions contributed by the Proposed Action within the OCS air permit area with the estimated local construction emissions that occur beyond the OCS air permit area and within 15.5 miles of shore (RWF-New Jersey, RWF-Massachusetts, RWEC-Rhode Island, etc.).” However, the emissions represent general conformity emissions, which includes emissions within 25 miles of shore, not 15.5 miles as the paragraph suggests. Revolution Wind recommends updating the DEIS text accordingly. | Table 3.4-14 shows the total estimated construction emissions contributed by the Proposed Action within 25 miles of the estimated Project center (corresponding to the OCS Lease Area); and onshore construction areas and ports that may be used for the Project (RWF-New Jersey, RWF-Massachusetts, RWEC-Rhode Island, etc.) within 25 miles of the estimated area/port center. |

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| BOEM-2022-0045-0086 | 15 | Appendix E2 on pages 3.4-21 and 3.4-22 of the DEIS states that the Environmental Protection Agency (EPA)'s Co-Benefits Risk Assessment (COBRA) screening model Desktop Edition, Version 4.1 was used to estimate the health impacts of avoided emissions in the United States and in the combined area of Connecticut, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Virginia. Over the course of 5 years, the statistical lives saved within the entire United States is between 5.44 and 12.31. This 5-year estimate is representative of the avoided emissions during operations only. This would represent a long-term minor beneficial impact due to avoided health events. Revolution Wind agrees with this conclusion that the Project will have long-term minor beneficial impact due to avoided health events. | Thank you for your comment. |
| BOEM-2022-0045-0103 | 17 | In Table F-1, EPM AQ-4, the DEIS indicates that air emissions will be mitigated because marine engines with a model year of 2007 or later and non-road engines complying with the Tier 3 standards (in 40 CFR 89 or 1039) or better will be used to satisfy best available control technology (BACT) or lowest achievable emission rate (LAER). However, EPA has previously required the use of the Tier 4 engines (in 40 CFR 1042) as LAER for project vessels operating as OCS sources if Tier 4 engine vessels are available at the time of deployment.1,2 EPA notes that it is currently reviewing the application submitted by Revolution Wind on August 12, 2022 and has not determined BACT or LAER for the Revolution Wind project at this time.<br>Recommendation: EPA recommends that the FEIS clarify BACT or LAER requirements for vessels operating as OCS sources may be as stringent as Tier 4 engine standards, and will be determined by EPA's OCS air permit. Furthermore, the Anticipated Enforcing Agency in Table F-1 for EPA AQ-4 (i.e. BACT and LAER requirements) should be the U.S. EPA. | The text has been revised. |
| BOEM-2022-0045-0103 | 18 | Section 3.4.1 of the DEIS indicates that the geographic analysis area depicted in Figure 3.4-1 encompasses the region subject to EPA's review as part of an OCS permit for the Project under the Clean Air Act (CAA). EPA notes that according to the scale on Figure 3.4-1, it appears that 25 statute miles were used to depict the geographic analysis area in Figure 3.4-1. However, EPA interprets the regulations at 40 CFR part 55 to use nautical miles for the purposes of determining potential emissions from the source.<br>Recommendation: EPA recommends that the FEIS use nautical miles to define the geographic analysis area and update Figure 3.4-1 if necessary. | Nautical miles were used to depict the geographic analysis area in Figure 3.4-1. For consistency in this EIS, in-text distances in miles are reported in statute miles (miles used in the traditional sense). Nautical miles are reported for marine navigation and other marine-specific resources. |
| BOEM-2022-0045-0103 | 19 | The DEIS states that a visibility or deposition modeling analysis was not conducted as part of this EIS analysis because both Lye Brook Wilderness and Brigantine Wilderness Class I areas are located more than 155 miles away from the Lease Area.<br>Recommendation: EPA recommends the FEIS indicate that as part of EPA's OCS air permit, the project will be evaluated for compliance with NAAQS and PSD increment for operating emissions and a significant impact level and AQRV analysis at the Lye Brook Wilderness Area for construction emissions. | The text has been revised. |
| BOEM-2022-0045-0103 | 20 | In Table F-1, EPM number AQ-1, the DEIS identifies the use of low-sulfur fuel as mitigation for impacts of air emissions. EPA notes that the majority of emissions from the project over its lifetime are emissions from vessel engines, particularly during the construction phase of the project.<br>Recommendation: EPA recommends that as an additional mitigation measure BOEM require RWF to pursue the procurement of the most efficient and lowest emitting vessels available during the vessel-contracting stage of the project. As part of this process, the FEIS should provide a discussion of the various options that are available to reduce these emissions. In addition, the FEIS should consider options for reducing emissions from ongoing operations and maintenance activity, such as the purchase of lower emitting or electrified crew vessels. In addition, the FEIS should explore the feasibility of requiring other mitigation measures such as anti-idling practices and the retrofitting of older equipment and vessels with the cleanest, most efficient technologies to further ensure air quality impacts will be minimal. | Project approval is contingent on complying with conditions of the OCS air permit. No change made in the EIS. |
| BOEM-2022-0045-0103 | 21 | Many of the ports proposed for use by the project are in areas that may have existing air quality issues and/or environmental justice concerns.<br>Recommendation: In addition to the mitigation measures identified in Table F-1, EPA recommends that BOEM's FEIS explore the feasibility of requiring emission reduction best practices for ports such as vessel speed reduction requirements, Tier 4 Final EPA certified equipment, or the use of marine shore power systems. More information regarding air emissions reduction methods at ports can be accessed at https://www.epa.gov/ports-initiative. | Thank you for the comment. BOEM does not have the authority to regulate activity or enforce mitigation measures in ports, which are subject to any state laws regarding anti-idling. If Tier 4 equipment is required, it would be required by the OCS Air Permit. The text has been revised to recommend limiting engine idling time in the lease area. |

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| BOEM-2022-0045-0103 | 22 | The DEIS notes that "…state and local agencies would be responsible for managing actions to help minimize and avoid air quality impacts on nearby neighborhoods during construction." The FEIS would benefit from a more complete discussion of this issue.<br>Recommendation: EPA encourages BOEM to coordinate with local and state authorities and that the FEIS incorporate a discussion of that coordination and any related actions developed to minimize construction period air quality impacts to neighborhoods. We also recommend that Section 3.4.2.2.3 include a discussion whether cumulative air emissions of regulated contaminants may have greater impacts in areas already in non-attainment. | Additional mitigation and monitoring measures to minimize impacts to air quality in adjacent neighborhoods during onshore construction may arise from the OCS Air Permit and coordination with Federal and State resource agencies under other statutes, such as the Coastal Zone Management Act. BOEM does not have the authority to regulate activity or enforce mitigation measures in ports or onshore, however, any BOEM COP approval (with or without modification) would require that Revolution Wind obtain an OCS Air Permit and comply with all permit requirements during construction activities. The EIS analysis assumes compliance with all other federal and state permit requirements under other statutes when evaluating impacts.<br><br>Section 3.4.2.2.3 has been revised to expand the discussion of impacts in areas of non-attainment. |
| BOEM-2022-0045-0103 | 23 | EPA agrees with the following statements in section 3.4 of BOEM's DEIS: "The CAA amendments of 1990 established the nonattainment designations as marginal, moderate, and serious. If a region is designated as nonattainment for a NAAQS, the CAA requires the state to develop a state implementation plan (SIP). A SIP provides for the implementation, maintenance, and enforcement of the NAAQS, and includes emission limitation and control measures to attain and maintain the NAAQS. The CAA also prohibits federal agencies from approving any activity that does not conform to a SIP, and this prohibition applies only with respect to nonattainment or maintenance areas (i.e., areas that were previously nonattainment and for which a maintenance plan is required). Conformity to a SIP means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards." EPA does not share the view, however, that BOEM's approval of the COP is not subject to the requirement to show conformity. | Thank you for the comment. BOEM acknowledges EPA's general disagreement with the concluding sentences of BOEM's Draft EIS on page 3.4-3 regarding the applicability of General Conformity. BOEM will continue to engage with EPA and state partners on this subject. |
| BOEM-2022-0045-0103 | 25 | The FEIS would benefit from a more robust consideration of climate change risks to the proposed action in the description of the affected environment.<br>Recommendation: We recommend that the discussion be expanded to include consideration of climate resiliency measures, particularly for infrastructure that may be vulnerable to the impacts associated with climate change (such as sea level rise, more frequent storms, etc.). This discussion would provide additional details regarding the durability of the proposed infrastructure (including WTGs and buried cables at all locations) in the face of more severe weather and more severe sea states. | Thank you for the comment. The text has been revised to include discussion of climate resiliency measures for the infrastructure. |

## Appendices

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| BOEM-2022-0045-0086 | 89 | Appendix E2, Page 3.14-3, Figure 3.14-1: This figure seems misplaced in a discussion about landfall location. By having all the BOEM lease areas identified is misleading, creating a sense that it is part of the GAA. | Figure 3.14-1 illustrates the geographic analysis area (GAA) for Land Use. Because the Proposed Action may include activities located at one or more ports on the Atlantic Coast, the Land Use GAA includes these ports which are outlined in bold blue and identified as such in the figure legend. The BOEM Lease Areas located along the Atlantic Coast are included for spatial reference. A written description of the Land Use GAA with details regarding potential port use is provided in Section 3.14.1 prior to Figure 3.14-1. |
| BOEM-2022-0045-0100 | 202 | The second sentence should refer to consultations, as NMFS does not issue a permit or authorization under the ESA. Critical habitat is missing from the third sentence. | Thank you for your comment. Edits have been made. |
| BOEM-2022-0045-0100 | 203 | This section is being mischaracterized by its placement in the section called "Consultations". The action being taken under the MMPA is not a consultation; it is an authorization. Please retitle the section "Consultations and Authorizations". | Thank you for your comment. Edits have been made. |
| BOEM-2022-0045-0100 | 205 | Please clarify what the values in table E.4-1 represent, and how they were calculated. Please provide a clear explanation above the table, and indicate in the table heading what the values represent. | Thank you for the comment. Edits have been made. |
| BOEM-2022-0045-0100 | 214 | Figures should be provided illustrating all available cod spawning data in the project area. For clarity, the habitat complexity delineations with large boulder overlay should also be included. | Thank you for your comment. Figure K-1, Figure K-2, and Figure K-3 in Appendix K include boulder overlays. Additionally, Figure 3.6-3 and Figure 3.6-5 have been added in Section 3.6 Benthic Habitat and Invertebrates. |

## Bats

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| BOEM-2022-0045-0086 | 71 | Page 3.5-5, Section 3.5.1.1: Under the "Light" subheading, suggest replacing "the wind turbines may also be lit with aviation lighting" with "The wind turbines will be lit with aviation lighting, although the duration of lighting will be minimized by ADLS". | Suggested text has been revised where indicated. Text in Section 3.5.1.1 under Light IPF was relocated to Section 3.5.2.2.2 under Light IPF (BOEM reorganized the No Action Alternative section). |
| BOEM-2022-0045-0110 | 109 | The DEIS concludes that the Proposed Action (and all action alternatives) would have overall negligible adverse impacts on bats and negligible to minor adverse cumulative impacts to bats.309 The DEIS bases this finding on repeated claims that bats "rarely" occur offshore310 and that, coupled with the offshore Project Area being far from shore311 and wide spacing of WTGs,312 and the COP and DEIS claim that impacts to individual cave-hibernating bats "are unlikely"313 and that "very few individuals" of migratory tree bats would be exposed to operating turbines.314 However, as discussed below, these claims are not well supported by research and thus it is inappropriate to conclude that impacts to bats will be negligible.<br>Both BOEM and Revolution Wind acknowledge uncertainty around bats' use of the offshore environment.315 In both the COP and DEIS, very limited data are presented on bats' use of the mid-Atlantic OCS and these sparse data are insufficient to draw conclusions about bat risk from the proposed project. Both the COP and the DEIS, however, overly downplay migratory tree bat and cave bat activity offshore and do not properly account for bats' potential attraction to offshore structures, such as WTGs. | The NEPA analysis uses the best available data for assessing potential impacts to bat species in Section 3.5.1 of the EIS (e.g., Hatch et al. 2013, Dowling and O'Dell 2018, Stantec 2016, 2018, Peterson et al. 2014, Sjollema et al. 2014). Conclusions on the severity of impacts are based on survey data regarding bat occurrences in the offshore environment. |
| BOEM-2022-0045-0110 | 110 | Both the COP and DEIS claim that only "small numbers"316 migratory tree bats' use of the OCS and that cave bats are "generally not observed offshore"317 and "typically do not occur on the OCS."318 Although both the COP repeatedly points to Revolution Wind's distance from shore as significantly minimizing impacts,319 these documents do not adequately acknowledge research that has found bats to be widespread in the offshore environment, including at distances further offshore than the Project Area. | While the potential for these species to be present is acknowledged both in Appendix AA of the COP and the EIS, studies suggest relatively low bat activity/use in the offshore environment compared to onshore (e.g., Stantec 2016, 2018, 2019; Sjollema et al. 2014, etc.). The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional information about bats in the offshore environment will be gleaned from these monitoring activities. |
| BOEM-2022-0045-0110 | 111 | In offshore bat surveys of the Great Lakes, Gulf of Maine, and Mid-Atlantic, migratory tree bats were widespread, with eastern red bats detected at 97 percent of all surveyed sites (and 100 percent of sites in the Mid-Atlantic), including the most remote fixed site (41.6 km from mainland) and potentially on shipboard surveys over 100 km offshore.321 Eastern red bats alone accounted for 40 percent of all detected bat activity offshore. Hoary bats and silver-haired bats had less total activity offshore but were still widespread, found at 95 percent and 89 percent of all sites, respectively.322 Data in Motus also indicate eastern red bats and hoary bats have made cross-water flights near Long Island.323 These limited data do not support BOEM's claim that migratory bats' use of the OCS and infrequent and limited and that "very few individuals would encounter operating WTGs[.]"324<br>Additionally, the DEIS and COP describe bat use of the offshore environment as seasonal and therefore exposure to turbines is low.325 However, seasonal exposure does not imply low risk, as that the best available science on bats and wind energy interactions from land-based wind energy in North America indicates that seasonal exposure of bats to wind turbines326 can cause significant fatalities.327 With limited research available on bats offshore, BOEM cannot dismiss the evidence from land-based wind that even temporally limited (e.g., during seasonal migrations) interactions with turbines can cause significant impacts, in particular on migratory tree bats such as eastern red bats, silver-haired bats, and hoary bats. | While the potential for these species to be present is acknowledged both in Appendix AA of the COP and the EIS, studies support low bat activity/use in the offshore environment compared to onshore (e.g., Stantec 2016, 2018, 2019; Sjollema et al. 2014, etc.). The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional information about bats in the offshore environment will be gleaned from these monitoring activities. |
| BOEM-2022-0045-0110 | 112 | Both the COP and the DEIS are emphatic that that cave-hibernating Myotis bats' use of the wind farm area is expected to be low328 and therefore exposure to WTGs (and thus potential for collision) will be minimal to low,329 "if exposure occurs at all[.]"330 These findings rely, in part, on two inaccurate claims, that (1) in the Mid-Atlantic, Myotis bat species have never been detected further than 11.5 km offshore,331 and (2) cave-hibernating bats are rare in the offshore environment.332 Peterson et al. (2016) detected Myotis calls at several Mid-Atlantic sites further offshore than 11.5 km, including at the Chesapeake Light Tower in Virginia, 24.8 km from the mainland.333 Additionally, bat calls classified as high frequency, unknown species were detected as far as 130 km offshore in the Mid-Atlantic.334 While it is not possible to attribute these unidentified calls to species, high frequency, unknown species calls can include calls from Myotis species.<br>Furthermore, cave-hibernating bats may be found offshore more frequently than the assessments in the COP and DEIS indicate. Acoustic survey efforts in the Mid-Atlantic identified Myotis calls at 63 percent of sites surveyed, and Myotis species were present at 89 percent of sites surveyed across the Gulf of Maine, Mid-Atlantic, and Great Lakes.335 Motus data also | While the potential for these species to be present is acknowledged both in Appendix AA of the COP and the EIS, studies support low bat activity/use in the offshore environment compared to onshore. The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional information about bats in the offshore environment will be gleaned from these monitoring activities. |

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| | | indicate that Indiana bats, little brown bats, and eastern small-footed bats—all Myotis species—have made potentially made cross-water flights in the New York Bight and the Project Area. | |
| BOEM-2022-0045-0110 | 113 | The DEIS further states that the federally listed337 "[n]orthern long-eared bats are not expected to occur within the Lease Area[,]"338noting that even if they were to migrate over water, "most movements would likely be near the mainland."339 Because "there is little evidence of use of the offshore environment by northern long-eared bats, exposure is expected to be minimal, and this species is not further assessed."340 While limited offshore movement data exist, the presence of northern long-eared bats on both Martha's Vineyard and Nantucket indicates that this species can cross open water and the species has been tracked making long distance flights over water in the Gulf of Maine.341 Moreover—and acknowledged within the DEIS—a northern long-eared bat was acoustically detected 34 km offshore around South Fork Wind Farm.342 Given the potential for the species to use the offshore environment, the detection of a northern long-eared bat during South Fork surveys, and the lack of survey effort to provide evidence of absence, BOEM should not consider exposure and risk to northern long-eared bats and other cave bats to be negligible and instead require Revolution Wind to conduct monitoring to better understand the potential presence of and collision risk to northern long-eared bats in the offshore Project Area. | While the potential for this species to be present is acknowledged both in Appendix AA of the COP and the EIS, studies support relatively low bat activity/use in the offshore environment compared to onshore. Offshore use and potential effects to NLEB are analyzed in detail in the BA (BOEM 2022). The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional information about bats in the offshore environment will be gleaned from these monitoring activities. |
| BOEM-2022-0045-0110 | 114 | Moreover, the federally endangered Indiana bat is inappropriately excluded from analysis because the DEIS and COP state that is not believed to be present in Rhode Island.343 Data submitted to Motus indicate that, in 2015, a tagged Indiana bat was detected on Cape Cod and Nantucket. BOEM should acknowledge the potential presence of Indiana bats in the Project Area and require Revolution Wind to monitor for their potential presence. | The single Indiana bat detection in 2015 was located outside the RWF project area. This information has been added to the EIS. Indiana bat was not identified by the USFWS as being potentially affected under Section 7 of the ESA compliance. The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional information about bats in the offshore environment will be gleaned from these monitoring activities. |
| BOEM-2022-0045-0110 | 115 | Although the DEIS acknowledges that offshore structures, including offshore turbines, may attract bats344 and that bats are attracted to land-based wind turbines,345 this attraction effect is not well accounted for in how it could increase collision risk (which BOEM describes as having negligible to minor impact on bat populations346). In fact, the DEIS explicitly states that the wide spacing of the turbines will allow "bat species to avoid individual WTGs and minimize risk of potential collision."347 This assertion is starkly at odds with the best available scientific information on bats and wind turbines which indicates that bats will change course not to avoid, but to approach wind turbines.348 BOEM must consider the potential that bats could be attracted to offshore wind turbines—which would dramatically increase collision risk—and update the impact assessment accordingly.<br>The COP and DEIS's survey data are likely insufficient to determine bat exposure to the offshore Project Area. While pre-construction surveys represent an important first step in assessing bats' use of the offshore environment (including information on which bat species may be present), pre-construction monitoring is likely inappropriate for predicting post-construction fatality risk for bats. At land-based wind facilities, pre-construction bat activity does not correlate with post-construction fatalities,349 possibly due to bats' attraction to turbine structures (as discussed earlier).350 Furthermore, recent research at buoys, vessels, and the two Dominion found considerable differences in bat activity in the presence of turbines as compared to open water.351 This once again underscores that BOEM should not draw conclusions about Revolution Wind's impacts on bats based on sparse pre-construction data. | BOEM's analysis is based on the best available data, the wide turbine spacing will likely reduce the chance of encountering a turbine and thus reducing collision risk. However, there is uncertainty about how bats respond to turbines in the offshore environment. The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional information about bats in the offshore environment will be gleaned from these monitoring activities. |
| BOEM-2022-0045-0110 | 116 | Because of the significant data gaps that preclude meaningful impact analyses for bats and offshore wind development, robust monitoring, especially post-construction monitoring, will be critical to better understanding potential impacts to bats from Revolution Wind's operations. As new technologies become available for monitoring impacts at offshore wind facilities, such as strike detection technology, BOEM should require Revolution Wind to commit to deploying these and, if monitoring reveals that impacts to bats are non-negligible, BOEM should require Revolution Wind to employ minimization strategies and deterrent technologies. | The Avian and Bat Post-Construction Monitoring Framework is described in Appendix G and Table F-2 of the EIS and is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional information about bats in the offshore environment will be gleaned from these monitoring activities. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. |
| BOEM-2022-0045-0110 | 117 | Because, as discussed above, pre-construction acoustic activity does not accurately predict post-construction fatalities for bats at land-based wind facilities, a commitment to post-construction monitoring is critical to yielding a better understanding about how bats interact with offshore wind turbines.<br>We commend Revolution Wind for their commitment to two years of post-construction acoustic monitoring for bats and deploying Motus towers.352 We appreciate the acknowledgement of the need for adaptive monitoring and management353 but are concerned that the proposed measures that are described as adaptive mitigation for birds and bats (measures Bird-11 | The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional information about bats in the offshore environment will be gleaned from these monitoring activities. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation |

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| | | and Bat-9) only commit Revolution Wind to document and report dead or injured birds and bats.354 We underscore the importance of BOEM's proposed measure that, "should bird and bat impacts deviate substantially from the impact analysis included in the this EIS, then Revolution Wind must make recommendations for new mitigation measures or monitoring methods." | measures could be considered by decision makers and incorporated into the Record of Decision. |
| BOEM-2022-0045-0110 | 118 | Revolution Wind's proposal for two years of post-construction acoustic monitoring356 is an excellent first step. We recommend that Revolution Wind install bat detector stations at nacelle height (rather than on convertor stations, turbine platforms, and/or buoys) so as to detect activity when bats are in the rotor swept zone and more likely at risk for collision. Additionally, BOEM should require that all acoustic data be reported and submitted to Bat Acoustic Monitoring Portal, BatAMP. | This technical suggestion may be considered in the development of the final monitoring plan. The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional information about bats in the offshore environment will be gleaned from these monitoring activities. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. |
| BOEM-2022-0045-0110 | 119 | We are excited to see Revolution Wind proposing to install and upgrade Motus towers and support radio-tagging of ESA-listed birds. We recommend that Revolution Wind also support the tagging of bats, which are underrepresented in Motus, to support understanding of bat activity offshore. Additionally, we suggest that BOEM require deployment of Motus towers pre-construction in coordination with USFWS's offshore Motus network, as BOEM is requiring new lessees in both the New York Bight and Carolina Long Bay.358<br>We also urge Revolution Wind to keep Motus towers deployed, active, and maintained for as much of the lifetime of the project as possible. Data from these towers will not only inform Revolution Wind's adaptive management but also, as multiple offshore wind projects are developed, a long-term network of Motus towers in the offshore environment will shed much needed light on species' movements offshore. This would also support Revolution Wind's commendable intention to coordinate their monitoring with efforts from other offshore wind projects in the area. | This technical suggestion may be considered in the development of the final monitoring plan. The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional information about bats in the offshore environment will be gleaned from these monitoring activities. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. |
| BOEM-2022-0045-0110 | 120 | Revolution Wind should report the results of all carcass detections on vessels and project structures,360 not just carcasses of ESA-listed species, to BOEM and USFWS. We also note that assessing bat fatalities based on carcasses found on vessels and structures is unlikely to provide a meaningful estimate of bat fatalities, as carcasses can fall far from the wind turbine, based on carcass size, wind speed, turbine height, and other factors. BOEM should consult with experts to determine what, if any, inferences about total fatalities can be made from carcasses detected on vessels and project structures. | Annual Bird and Bat mortality reporting is included as a mitigation measure in Table F-2 in EIS Appendix F. |
| BOEM-2022-0045-0110 | 121 | As mentioned above, we strongly support BOEM's proposed measure that Revolution Wind recommend new mitigation measures or monitoring measures "[i]f the reported post-construction monitoring results…indicate bat impacts deviate substantially from the impact analysis included in this EIS[.]"362 However, there is a lack of clarity as to what would trigger this adaptive management. The post-construction monitoring for bats that Revolution Wind has proposed—two years of acoustic monitoring—will provide information on bat activity in the Project Area. It will not, however, provide information on bat collisions, which are potentially the greatest source of impact to bats from offshore wind development. No research or methods are presented to translate bat activity into bat impacts nor are we aware of any methods accepted by subject matter experts to do so.<br>Because the proposed monitoring methods are unlikely to provide estimates of bat collisions from Revolution Wind's offshore operations, we recommend that Revolution Wind improve their adaptive monitoring proposal to include a commitment to deploy collision detection technologies. Although we support Revolution Wind's intent to "work with BOEM, USFWS, and other relevant regulatory agencies, to determine the need for adjustments to monitoring approaches, consideration of new monitoring technologies, and/or additional periods of monitoring, based on an ongoing assessment of monitoring results[,]"363 Revolution Wind did not propose the use of "[e]merging technologies, such as multi-sensor radar/camera collision detection systems" as these technologies "have not yet been broadly deployed offshore or demonstrated to effectively reduce uncertainties related to potential impacts on birds and bats."364 While we agree that no collision detection technologies are validated and commercially available for use offshore, BOEM should require Revolution Wind to commit to deploying collision detection technology, once available, even if their commercial availability falls outside of the two to three year post-construction window proposed by Revolution Wind. Strike detection technology is in development, with one technology to be tested on an offshore wind turbine in early 2023.365 Revolution Wind should work with agency staff and researchers to determine the appropriate duration of post-construction fatality monitoring using their current proposed | The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional information about bats in the offshore environment will be gleaned from these monitoring activities. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. |

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| | | methods and for after collision detection systems are installed.<br>The above recommendations should be included in the to-be-developed Avian and Bat Post-Construction Monitoring Plan,366 and this plan should be made publicly available. | |
| BOEM-2022-0045-0110 | 122 | As discussed above, assessing cumulative effects is essential to understanding impacts, and this is particularly important for bats, where the best available scientific information indicates that cumulative impacts from land-based wind energy have the potential to cause significant population-level declines.367 Revolution Wind's DEIS states that the Proposed Action and other reasonably foreseeable projects will result in negligible to minor adverse cumulative impacts on bats.368 but insufficient research is provided to support this claim, especially given the issues discussed above with the project-level impact analysis for bats.<br>Of particular concern for the accuracy of BOEM's cumulative impact analysis for bats is the geographic analysis area. BOEM defined the geographic analysis area as 100 mi offshore and 5 mi inland.369 This is at odds with the geographic analysis area used for bats for Vineyard Wind 1, where the area extended 100 mi inland.370 BOEM presents no research in the DEIS to support the assumption that bats found offshore exclusively use near-coast habitat on land (i.e., five miles or less from the coasts) to support this limited geographic scope.<br>A survey of available research on bat migration does not support BOEM's rationale for their more limited scope of analysis in Revolution Wind's DEIS. Although the migratory movements of bats, especially migratory tree bats, are poorly understood, many species of bats—both long-distance migrants like migratory tree bats but also cave bats—are capable of flights in excess of 100 km, indicating that bats found offshore in wind development areas could also be found significant distances inland. Research from Canada found that 20 percent of little brown bat movements exceeded 500 km,371 which is further supported by data from tracked little brown bats, which shows individuals using both coastal areas and making long-distance flights to locations significantly further inland than 5 mi.372 Hoary bats, which are capable of long distance flights over water,373 have been recorded traveling over 1,000 km374 and are thought capable of migrations in excess of 2,000 km.375 Furthermore, in addition to little brown bats, data in Motus tracks movements of individual silver-haired bats, eastern red bats, hoary bats, eastern small-footed bats, and Indiana bats from coastal areas on the east coast to areas in excess of 100 mi inland.376 These movements do not support a geographic analysis area that extends only 5 mi inland but rather suggest that bats exposed to offshore wind energy projects could be found far inland (and therefore exposed to land-based wind energy facilities) and that a geographic analysis area that extends 100 mi inland would be more appropriate.<br>BOEM should conduct a thorough review of the literature on bat migration and radio- and GPS-tagged bats and select a boundary that better reflects the potential habitat use of exposed bats. This revised boundary will likely require an updated analysis to reflect that bats exposed to offshore wind projects could not only be exposed to multiple offshore wind facilities but also be exposed to land-based wind energy projects. | Comment noted. Just because a bat is physically capable of traveling long distances does not mean that they regularly do and it certainly does not mean that they regularly travel those distances over open ocean. The onshore limit for the geographic analysis is defined by where the activities are likely to be and not by the theoretical distance bats can travel. |

## Benthic Habitat and Invertebrates

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| BOEM-2022-0045-0098 | 1 | Some uncertainty also exists about the effects of some impact-producing factors (IPFs) on benthic resources. For example, the available information on invertebrate sensitivity to electromagnetic fields (EMFs) is equivocal (Hutchinson et al. 2020), and sensitivity to sound pressure and particle motion effects is not well understood for all species (e.g., squid sensitivity to vibration effects transmitted through sediments). However, information from monitoring studies of European wind facilities and, more recently, the Block Island Wind Farm in the United States provides no indication of biologically significant adverse effects. LICFA questions the accuracy of this information, specifically that regarding impact-producing factors (IPFs) on benthic resources. There are a variety of studies that have taken place more recently that those on pg 3.6-39 that state “Most invertebrates are insensitive to hearing injury as they lack the specialized organ systems evolved by vertebrates to sense sound pressure (Popper et al. 2001),” and “Particle motion effects dissipate rapidly and are highly localized around the noise source, with detectable effects on invertebrates typically limited to within 3 to 6 feet of the source (Edmonds et al. 2016; Payne et al. 2007.)” In fact, in “The importance of particle motion to fishes and invertebrates,’ from The Journal of the Acoustical Society of America 143, 470 (2018) 1; By Drs Arthur Popper and Anthony Hawkins, they state the opposite. In that paper, they petition regulators and scientists to research and fill data gaps in order to better understand the interactions between particle motion and aquatic animals, and highlight “the importance of particle motion to fishes and invertebrates; and sound propagation through both water and the substrate.” In their conclusions they state “EIAs (Environmental Impact Assessments) intended to examine the potential effects of sound on fishes and invertebrates often overlook key factors, and especially the sensitivity of many of these animals to the particle motion component of sound rather than sound pressure. There are several reasons why these assessments fail to deal with particle motion adequately. These include the difficulty in measuring and modeling particle motion, the lack of experimental data on the responses of fishes and invertebrates to potentially damaging levels of particle motion, and the absence of guidelines—based on particle motion— that indicate the levels of particle motion that are likely to have adverse effects upon animals.” Popper and Hawkins described further the gaps in knowledge that needed to be addressed re particle motion before making any broad brush statements re effects to fish and invertebrates in 2019, 2 “An overview of fish bioacoustics and the impacts of anthropogenic sounds on fishes,” | Thank you for your comment. The noise impact analysis for invertebrates has been revised to incorporate the most current available science on invertebrate sensitivity to noise impacts. We acknowledge that particle motion effects on some species associated with intense noise sources (i.e., impact pile driving and UXO detonation) may have more extensive and severe effects on certain invertebrate species. |
| BOEM-2022-0045-0096 | 2 | Reduce impacts to complex benthic habitat, namely Cox Ledge, to the greatest extent practicable<br>As noted in the DEIS, a large portion of the project area includes complex benthic habitat known as Cox Ledge. This area plays host to a wide range of marine resources which rely on the unique and complex glacial moraine habitat for feeding, spawning, and development at various developmental stages. As noted by the National Marine Fisheries Service (NMFS) June 2021 scoping comments for the NOI to prepare an EIS for the Revolution Wind Project, Cox Ledge “is known to support spawning aggregations of Atlantic cod.” See NMFS Scoping Comments, June 2021. NMFS went on to express their concern regarding impacts any development of the area would have on Atlantic cod habitat and populations. Id.<br>The CRMC agrees with NMFS concerns regarding impacts to Cox Ledge and Atlantic cod habitat and builds on those comments to state a preference for a reduced number WTG positions and a reduced inter array cable (IAC) footprint. The DEIS states that noise produced during impact-pile driving for WTG foundation installation will kill or damage eggs and larvae within 1,680 feet of the foundation. See DEIS at 3.6-40. Additionally, the recovery of the complex habitat which hosts these eggs and larvae will be long-term (i.e. two years to longer than the life of the project). See DEIS at 3.6-41 to 3.6-42. By reducing the number of turbine positions and footprint of IACs, these long-term impacts to the complex habitat and marine resources will be mitigated. | Comment and recommendation noted. No change made in EIS. |
| BOEM-2022-0045-0069 | 5 | Conduct high resolution benthic habitat characterization and avoid areas of sensitive benthic habitats. These habitats provide refuge and structure for juvenile fish and invertebrates, as well as spawning areas for adult life history stages.<br>The NOAA Greater Atlantic Regional Fisheries Office recently developed benthic habitat mapping recommendations to better inform Essential Fish Habitat consultations: https://media.fisheries.noaa.gov/2021-03/March292021_NMFS_Habitat_Mapping_Recommendations.pdf?null. These recommendations should be followed to ensure avoidance of sensitive habitats. | Revolution Wind has conducted the recommended benthic habitat mapping and characterization survey to support COP development. This analysis was conducted consistent with the NOAA 2021 guidance and was used to support the impact analysis presented in the DEIS. |

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| BOEM-2022-0045-0059 | 10 | We contest the DEIS conclusion that "The available research indicates that invertebrates are similarly insensitive to UXO detonation, meaning that only those invertebrates within a short distance from the blast impact footprint would be able to detect the associated particle motion effects."62 The DEIS similarly states "Construction-related sources of sound pressure and vibration that could affect invertebrates are impact and vibratory pile driving, construction vessels and HRG surveys, and UXO detonation. In general, mollusks…are less sensitive to noise-related injury than many fish because they lack internal air spaces and are therefore less vulnerable to sound pressure injuries on internal organs than vertebrates (Popper et al 2001)." 63<br>Sandwiched in between the above statements, BOEM acknowledges the particular effects of sound sensitivity and particle motion exposure to squid, quotes various studies on the subject, but then concludes "These findings suggest that squid could experience injury or behavioral effects from intense underwater noise exposure, but evidence for this type of effect is limited and additional research is needed."64 BOEM cannot identify data, then ignore it, and conclude that impacts to squid will be "minor". Cumulatively, for the Revolution Wind and surrounding projects, as well as projects up and down the coast, the impacts to longfin squid, whose habitat significantly overlaps with multiple offshore wind leases, are prospectively very high. As squid is the most significant part of Seafreeze's business, we have a high degree of interest in protecting this species or suffer huge potential losses. BOEM must separate out squid from other invertebrates and conduct a spatial and temporal analysis for this species compared to offshore wind leasing and construction activities, including the Proposed Action. We have attached a new troubling study entitled "Commercial cuttlefish exposed to noise from offshore windmill construction show short range acoustic trauma", accepted by the scientific journal Environmental Pollution in July 2022.65 Cuttlefish are similar species to squid. We request that BOEM add this into its analysis for Revolution Wind as well as the cumulative spatial and temporal analysis for squid in particular. We request that the result of this analysis be incorporated into the DEIS. This analysis should also include information from both the DEIS combined with the information from squid particularly that eggs and larvae are expected to experience death is approximately one quarter of a mile.66 For longfin squid, which has eggs and larvae that overlap both inside and outside the MA/RI Wind Energy Area in time and space with planned construction activities, this is concerning. We request that analysis include this aspect of potential resource threat as well, including the consecutive years of construction in the area expected. | Thank you for your comment. The noise impact analysis for invertebrates has been revised to incorporate the most current available science on invertebrate sensitivity to noise impacts. We acknowledge that particle motion effects on some species associated with intense noise sources (i.e., impact pile driving and UXO detonation) may have more extensive and severe effects on certain invertebrate species. |
| BOEM-2022-0045-0065 | 13 | The DEIS correctly highlights uncertainty regarding: (1) biological productivity; and (2) oceanographic processes including seasonal stratification, due to lack of information in either direction from monitoring studies to date.19 However, it incorrectly concludes that the available information on each supports a reasoned choice among alternatives. With regard to the first, the DEIS references uncertainty only "about the long-term effects of changes in biological productivity resulting from the creation of new habitat types along the Atlantic OCS in the form of a distributed network of artificial reefs." In a case of clear bias, it does not mention the destruction of soft-bottom habitat critical to life stages of various marine organisms, including commercially important fishery stocks. As to the second, the DEIS conflates project-specific fisheries monitoring with the ability to predict oceanographic process changes, concluding that the former provides no evidence of the latter. These topics are almost entirely irrelevant to each other. | The DEIS identifies the extent of short-term to permanent impacts on soft-bottomed habitats. That analysis includes the estimated acres exposed to long-term to permanent displacement of this habitat type and/or its conversion to different habitat types resulting from the presence of structures, scour protection, and cable protection (see Section 3.6.2.2.2). As defined in DEIS Section 3.3, permanent impacts are those impacts that are anticipated to last for the life of the project. The extent of soft-bottom habitats exposed to displacement or conversion by the project represents a small percentage of the habitat available to marine organisms in the northern mid-Atlantic OCS. Those habitats would be expected to fully recover when the proposed project is decommissioned and removed at the end of project life. Those habitats would not be irreversibly lost, therefore the term "destruction" is not appropriate in this context. |
| BOEM-2022-0045-0071 | 14 | In terms of habitat impacts, the Councils are concerned about the impacts of boulder removals required for cable installation, especially when done via plow. The FEIS should specify plow width and the size of the area that will be impacted. The nature of this impact is very different from dredging used to harvest seafood, and the scientific literature on fishing gear impacts is unlikely to provide a reasonable proxy for the impacts of boulder clearance plows. For example, fishermen attempt to avoid boulders to reduce the risk of costly damage to fishing gear. | Thank you for your comment. The disturbance corridor width for boulder relocation is 40 meters. This activity may be conducted using a plow or by boulder pick/grab, to be determined based on vessel availability. |

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| BOEM-2022-0045-0069 | 14 | Construction and decommissioning of offshore wind farms may lead to loss of sediment and thus certain habitats. During any construction, local water turbidity may increase, as suspended solids and contaminants within the sediments may be mobilized and transported by prevailing water movements.<br>• These mobilized sediments may also smother neighboring habitats of sessile species, as well as the living organisms themselves (Gill 2005).<br>• Suspended sediment poses a threat to fish within the construction area, as it may physically clog their gills and limit oxygen intake (Lake and Hinch 1999). Larval states are more vulnerable than adult life history stages due to more limited mobility, as well as larger gills and higher oxygen consumption in proportion to body size (Auld and Schubel 1978; Partridge and Michael 2010).<br>• Sediment dispersal may also smother eggs and benthic suspension feeders by clogging the feeding or respiratory apparatus. Some benthic epifauna and deep burrowing infauna may also be unable to escape burial by displaced sediment. While sedimentation events are generally brief, seabed communities may be greatly altered and take years to recover (Maurer et al. 1986).<br>• The RODEO study of the benthic habitat changes at the BIWF documented heavy colonization of the turbine structures by blue mussels three years post-construction, demonstrating changes in the dominant biota. Black sea bass were found in large numbers and appeared to benefit from added structure (Hutchison et al. 2020).<br>o The study also found that the BIWF did not demonstrate the same strong vertical epifaunal zonation as observed on European farms. This may suggest that after three years, the habitat is still in a successional state and additional monitoring is needed to document the final successional stage (Hutchison et al. 2020). As such, longer benthic assessments should be conducted on projects moving forward.<br>• Soft sediments are generally preferred for wind farm development, as hard substrates may create challenges in turbine foundation and transmission cable installation.<br>o Grabowski et al. (2014) suggest that soft sediment habitats have an inherent ability to recover more rapidly from anthropogenic impacts than other substrates. However, Henriques et al. (2014) contend that this is not appropriate logic to develop such areas due to the high number of affected species and possible consequences of impacts on those species for ecosystem structure and function (Grabowski et al. 2014; Henriques et al. 2014). | Comment noted. The analysis of and impact determination for TSS effects considers the effects referenced in the comment. Additional references noted in the comment were reviewed and incorporated where appropriate. |
| BOEM-2022-0045-0086 | 23 | The DEIS concludes negligible to minor long-term effects on benthic invertebrates from High Voltage Alternative Current (HVAC) Electromagnetic Field (EMF). However, the DEIS does not identify any replicated, demonstrated adverse effect of AC fields at levels produced by the submarine cables. Where the label "adverse" is applied to electric or magnetic fields it is not specified what effect is identified as adverse, whether the effect would apply to an individual or a population, and whether the effect is temporary or permanent. For clarity, it would be appropriate to define what constitutes an adverse effect with respect to potential exposure to EMF so that cited scientific literature can be interpreted. Moreover, the DEIS reports minor to moderate long-term adverse effects on benthic invertebrates from High Voltage Direct Current (HVDC) transmission cables. As this project has been designed and planned to include HVAC cables, it is not appropriate to assess effects for HVDC cables. We believe that this may set a precedent for future projects. | Impact terminology are defined in DEIS Section 3.3, Table 3.3-2. As stated, a "minor" impact is an impact that could occur and/but the affected resource would recover completely without remedial or mitigating action. Text was revised to further differentiate the anticipated effects of HVAC (vs. HVDC) exposure. |
| BOEM-2022-0045-0110 | 24 | BOEM has also stated that for each alternative, it plans to require Revolution Wind to employ micrositing of WTGs in the RWF to minimize impacts on large-grained complex and complex benthic habitats "to the greatest extent practicable."116 While Alternative C would reduce impacts to complex benthic habitats, this alternative would still result in construction occurring in complex habitats in some areas and we agree that BOEM must, therefore, require micrositing for this alternative as well. To reduce impacts to complex habitats to the greatest extent possible, BOEM should require micrositing for whichever Alternative is ultimately selected. | Comment and recommendation noted. No change made in EIS. |
| BOEM-2022-0045-0086 | 24 | Section 3.6 page 3.6-45 of the DEIS, the estimates for sediment heating presented in the DEIS (an increase of 10 to 20 degrees Celsius [°C] within 2 ft of the cable surface) are high and were apparently estimated without the inclusion of site-specific variables. Site-specific characteristics like the size of interstitial spaces, sediment grain size and percolation of water through the sediments can all contribute to the dispersion of any heat generated. Because of this, we would caution that these figures could overestimate heating at the site. | Text was revised to indicate that the estimates provided are conservative. As stated, even when the most extensive substrate heating effect is considered the impacts to invertebrates would be negligible. |

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| BOEM-2022-0045-0110 | 26 | BOEM's proposed anchoring plan would require Revolution Wind to develop an anchoring plan to avoid or minimize adverse impacts during project construction and operations. The anchoring plan would delineate sensitive large-grained complex and complex habitats, as well as eelgrass and kelp beds, and identify areas where anchoring is restricted. Because the anchoring plan would help "minimize long-term impacts to large-grained complex and complex habitats, limiting the extent of long-term impacts on habitat forming invertebrates and benthic habitat structure," BOEM should require Revolution Wind to conduct such a plan.119 | Comment and recommendation noted. As stated in Table 3.6-29, Revolution Wind has committed to develop an anchoring plan to avoid and minimize impacts to complex benthic habitats. BOEM would require Revolution Wind to develop and implement an anchoring plan as a condition of the project. |
| BOEM-2022-0045-0100 | 28 | Global comment: The approach to the analysis does not allow for a meaningful evaluation between the project alternatives. This is particularly true for Alternative C would reduce impacts to benthic habitats by approximately one-third, and even further if combined with Alternative F; however that is not apparent or considered in your analysis. We disagree with BOEM's assessment that there is no difference in impacts to benthic habitats and invertebrates among the action alternatives. | Comment noted. Appendix E-4 of the EIS provides calculations of WTG numbers, footprint, and scour protection associated with Alternatives C through F. The EIS was updated to disclose the additional reduction of acreage for other action alternatives based on these calculations, as feasible by resource. Project design has not occurred for Alternative C, D, E or F; therefore, GIS calculations for the IAC, OSS-link cable, and RWEC are not available. In these cases, the EIS uses the Proposed Action as the most conservative proxy estimate and indicates that best professional judgment suggests that the footprint of the IAC, OSS-link cable, and RWEC would change and be slightly reduced to match the reduced number of WTGs under these two alternatives. |
| BOEM-2022-0045-0100 | 29 | Global comment: We appreciate that additional literature and supporting information is included in the DEIS. We have provided some additional specific references that should be included in the DEIS in other comments within this section (see below). We also appreciate that the temporal impacts are defined in a manner consistent with our recommend timeframes. However, the provided analysis still relies heavily on perceived beneficial effects from the construction and installation of artificial structures and materials, as well as unsupported statements and conclusions. Please refer to our prior comments on other OSW NEPA documents to assist you in developing a more accurate analysis of the expected project impacts. | Comment noted. |
| BOEM-2022-0045-0100 | 30 | Global comment: The impact analysis for this section still largely ignores the complex benthic habitats present in the lease area. The lease area overlaps with Cox Ledge and supports a highly complex mix of substrates, with more than half of the lease area supporting highly complex natural rocky habitats. The analysis minimizes adverse effects to these natural habitats and heavily relies on potential, perceived beneficial "reef effects" to balance/offset the extensive adverse impacts to important, highly complex natural rocky habitats that would occur under the proposed action. The Proposed Action analysis should include a reasonable analysis of the expected long-term and permanent effects to benthic habitats, in the context of Cox Ledge. This should include the potential *adverse* effects that may occur as a result of the expected artificial reef effects from the presence of structures within highly complex, natural rocky habitats that occur throughout the lease area. Given the expected long-term and permanent effects that would occur on a regional scale to the extensive complex habitats in this lease area on Cox Ledge; effects to benthic habitats should be classified as major adverse impacts, consistent with BOEM's significance criteria definition. | Comment noted. The analysis was refined to incorporate a more detailed characterization of impacts to complex benthic habitat. However, BOEM does not agree that those impacts would constitute permanent effects at a regional scale, as those impacts would affect a small percentage of available habitat and would recover with mitigation (i.e., decommissioning at end of project life). These conclusions are not consistent with a major impact per the DEIS criteria. |
| BOEM-2022-0045-0100 | 31 | Global comment: Please check and clarify all presented calculated impact areas. The presented calculated areas in the tables and text do not align and it is not clear why. For example, the RWF calculation in Table 3.6-1 states the maximum work area is 58,143 acres, however this calculated area does not align with any of the disturbance areas presented in the analysis of project alternatives, or the sum of calculated maximum disturbance areas for the proposed action. Similarly, there are conflicting reported impacts to complex habitats. The proposed action is stated to result in 2,602 acres of large grained complex and complex habitats in the conclusion for the proposed action (page 3.6-36), however in the alternatives section is it stated that impacts from the proposed action are estimated to be 2,057 acres for large grained complex and complex habitats. | Comment noted. The maximum work area bounds the area where permitted project-related impacts may occur, not the anticipated extent of those impacts. Regarding the apparent discrepancy in impacts to complex habitats, the comparison provided in the alternatives section is limited to impacts resulting from RWF construction as RWEC impacts would be the same across all alternatives. All calculations were reviewed for consistency and text was revised for clarity, as appropriate. |

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| BOEM-2022-0045-0100 | 32 | Global comment: The basis for the calculated impacts for the alternatives are unclear, particularly the percentages of habitat types that would be impacted. For example, Table 3.6-11 indicates that impacts for the "estimated maximum extent of seafloor disturbance" from the export cable, inter- array cable (IAC), and vessel anchoring for the two habitat alternatives would result in similar, or larger proportional impacts to complex habitats than the proposed action. This is inaccurate as this alternative considers removal of turbines and cables within complex habitats. Table 3.6-13 indicates that the viewshed alternative would result in proportionally less impacts to complex habitats than both the proposed action and habitat impact minimization alternative. This also appears inaccurate as the removal of turbines and the associated IAC and vessel anchoring impacts from predominantly soft- bottom impacts would not result in such substantial reduction in impacts to large-grained complex habitats (by nearly half) and complex habitats combined. The analysis appears to suggest the removal of turbines from areas supporting near-contiguous large-grained complex and complex habitats would not result in a substantial reduction in impacts to large-grained complex and complex habitats. It does not appear that the habitat types are being accurately considered in the evaluation of alternatives. In addition to verifying these calculations and clarifying the basis for the habitat impact calculations presented, we recommend the DEIS present impact calculations for each alternative (including the proposed action) and include impact calculations, with appropriate tables, specific to lease area impacts. This will provide clarity for the comparison of the proposed action and action alternatives. | The impact acreage for each alternative was calculated from GIS using benthic habitat and project configuration data layers provided by the applicant, impact radii and buffer widths for foundation and cable installation from the COP, respectively, and preliminary alternative configurations developed by BOEM. All calculations were reviewed for consistency and revised as needed to reflect refinement of the alternatives in the FEIS. As stated, each of the alternatives would reduce the total acres of impacts in complex habitat types compared to the proposed action. However, while the total impact footprint in those habitat types may decrease, the proportional distribution of impacts could increase as a percent of the total for some alternatives. |
| BOEM-2022-0045-0100 | 33 | The geographic analysis area for Benthic Habitat should be revised. We appreciate the provided rationale on how the area was selected, however the rationale is not based upon either the expected extent of impacts or a resource-based region of interest. Rather, the rationale highlights that the area for analysis was based upon encapsulating all project components regardless of their connectivity or the exposure of the area to project impacts. In order to allow for a meaningful analysis of the proposed project impacts and evaluation of project alternatives, the geographic analysis area should be selected based upon the extent of potential project effects, including indirect effects, and may define the regional context of the selected analysis area. Please modify the geographic analysis area. | Comment noted. The geographic analysis areas presented in Appendix E of the DEIS are based on geographic distribution of organisms that could be affected by the cumulative effects of the Proposed Action and other proposed offshore wind projects on the Mid-Atlantic OCS. BOEM has reviewed the discussions of geographic area within the FEIS and deemed it appropriate for analysis. Consideration of benthic habitat function that extend beyond the GAA is provided in the Invertebrates (for habitat-forming organisms) and the EFH and Finfish sections of the DEIS. The EIS language was revised to clarify this point. |
| BOEM-2022-0045-0100 | 34 | The No Action alternative relies on all other potential wind lease areas moving forward, except the proposed action. This only serves to dilute the analysis and evaluation of the proposed action. Further, the concluding effects determinations are not supported by the analysis provided. For example, it is stated that "vessel traffic, ...port expansion, and channel deepening activities; ongoing commercial fishing activities would contribute to ongoing adverse impacts on benthic habitat." However, there is no mention or analysis of such activities outside the conclusion statement. An analysis of each stated activity in the concluding significance determination should be provided. Additionally, it is stated that "BOEM anticipates that the planned and future offshore wind activities would have no effect on benthic habitat composition within the GAA for benthic habitat." It is unclear how BOEM is defining "benthic habitat composition," and we consider it unreasonable to determine that other planned OSW activities would not affect benthic habitats within the GAA as currently defined. Multiple other projects are proposed within the RI/MA WEA that are likely to have not only overlapping effects within the Revolution Wind lease area and cable corridor, but also within the broader defined GAA. The effects determination for the "No Action" alternative should be revised to include an evaluation of all activities discussed in the conclusions and to provide appropriate justification for all determinations presented. | Thank you for your comment. Vessel Traffic and Ports (and associated ancillary activities) for ongoing activities under all Alternatives are discussed in Appendix E (Planned Activities Scenario). In this Appendix, port expansion or channel deepening activities are analyzed under Dredging and Port Improvement Projects. In addition BOEM is coordinating with the interagency team, specifically USACE and USCG, which monitors and permits those activities. Components of commercial fishing are broken down into their impact producing factors described under bycatch and presence of structures: entanglement, gear loss, gear damage. |
| BOEM-2022-0045-0100 | 35 | Figure 3.6-2 illustrates habitat delineations and large surficial boulders. However, the large-grained boulder delineations are overlapping the surficial boulder points, obscuring the view of large boulders within this habitat category delineation. The figure should be revised to include the surficial boulders as the top layer in the figure so the full extent of boulders in the lease area is visible. | Revised figures showing boulder features have been developed and are incorporated in Section 3.6.2.2. |
| BOEM-2022-0045-0100 | 36 | The geographic analysis area for Invertebrates includes the entire OCS south to Cape Hatteras, NC. This is not a reasonable analysis area to evaluate the project as it only serves to dilute the effects of the project specific impacts to invertebrates. A more reasonable geographic analysis area, that allows for a meaningful evaluation of the proposed action and proposed alternatives, should be selected. | The geographic analysis areas presented in the DEIS are based on geographic distribution of organisms that could be affected by the cumulative effects of the Proposed Action and other proposed offshore wind projects on the Mid-Atlantic OCS. BOEM has reviewed the discussions of geographic area within the FEIS and deemed it appropriate for analysis. |

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| BOEM-2022-0045-0100 | 37 | Similar to the comment on Benthic Habitat, the No Action alternative for Invertebrates focuses on the planned development of all other wind lease areas with some analysis provided for potential climate change effects. We understand that BOEM is coordinating with the agencies to address No Action scenario concerns. However, the conclusion states "moderate" adverse impacts would occur from "reasonably foreseeable activities other than offshore wind" but the listed activities are not discussed or addressed in the analysis. Further, it is stated that all other foreseeable offshore wind development would similarly result in "moderate" adverse impacts, as well as "moderate beneficial impacts." The provided impact assessments and rationale do not include support for these impact determinations. The No Action alternative should be modified to allow a meaningful evaluation of the No Action alternative, inclusive of a scientifically supported analysis for all activities listed in the concluding effects determination. | The conclusion of both adverse and potential beneficial impacts is based on the understanding that habitat conversion effects resulting from project construction and the presence of structures will benefit some finfish and EFH species at the expense of others depending on their habitat preferences. The best available science indicates that reef effects resulting from the presence of structures clearly benefits some fish and invertebrate species that associate with hard substrates and/or vertical structures in the water column. Related reef effects on food web productivity and changes in predator prey relationships are also likely to benefit some species at the expense of others, but the specific nature of these effects is difficult to predict with certainty. These complex effects will interact with changes in commercial and recreational fishing and other activities, also likely resulting in additional effects that are difficult to predict. These uncertainties are acknowledged in the EIS. The FEIS has been revised to clarify these points and the basis for conclusions where appropriate. |
| BOEM-2022-0045-0100 | 38 | Please include the best available science for the analysis of noise impacts. This includes: Sole et al. 2022; Jezequel et al. 2022; van der Knapp et al. 2022; Siddagangaiah et al. 2022 | Thank you for directing us to these references. Solé et al. 2022 and Jézéquel et al. 2022 have been incorporated into the invertebrates impact analysis. Van der Knapp et al. 2022 and Siddagangaiah et al. 2022 address effects on finfish and have been incorporated into Chapter 3.13. |
| BOEM-2022-0045-0100 | 39 | If sound data from Block Island Wind Farm are used in the analysis, please provide a comparison of specifications of BIWF turbines with those planned for Revolution Wind. | Insufficient information is available to estimate operational noise levels from the larger WTG designs proposed for Revolution Wind. Modeling suggests that operational noise could approach levels associated with sensory injury in certain cephalopod species in recent research. However, the available information about operational noise levels is insufficient to draw this conclusion. In the interest of precaution, the effect determination for invertebrates has been revised to negligible to minor to reflect this understanding. The narrative and effect determinations for invertebrates have been revised, with appropriate caveats, to clarify this point. |
| BOEM-2022-0045-0100 | 40 | Non-native species have been observed on offshore wind structures throughout Europe and at Block Island. Please integrate the best available science into the analysis of non-natives and characterize the potential for structures to facilitate the establishment and range expansion of non-native species. | Information on non-natives was incorporated. |
| BOEM-2022-0045-0100 | 41 | The characterization of hydrodynamic effects relies entirely on Johnson et al. 2021, a BOEM report that did not undergo traditional peer-review. There is a growing body of scientific knowledge on wind wake effects and their potential impacts. Please include the best available science in this analysis. This includes the following: Christiansen et al. 2022; Dorrell et al. 2022; Daewel et al. 2022; Raghukumar et al. 2022; Floeter et al. 2022; Chen et al. 2021; | Thank you for directing us to these references. The hydrodynamic effects analysis considers sources other than Johnson et al. 2021, references were revised accordingly. |
| BOEM-2022-0045-0100 | 72 | In Table 3.9-24, under Noise, please note that some species may experience mortality at close range to construction noise or due to long-term operational noise and vibrations that may cause shellfish to close their shells and reduce respiration and feeding. | EIS analysis has been revised to incorporate current science on invertebrate sensitivity to noise. |
| BOEM-2022-0045-0086 | 72 | Page 3.6-29, Table 3.6-4: Regarding the percentage split for the OSS link: there should not be any large-grained complex, while the DEIS lists 12%. The percentages listed should be 0%, 22%, and 78%. The maximum bed disturbance footprint does not equal the sum from the values in this table. The sum across all rows would be 6,631, and not 6,615. The percentage values appear to be averages, and as noted above, the OSS is incorrect in the rows. | Based on the OSS-link shapefile, the 40 m wide disturbance corridor around the cable route overlaps the stated percentage of habitats classified as large-grained complex. The 5,247 acre impact footprint total includes overlapping anchoring impacts. For example, jackup vessel anchoring is expected to occur in areas previously disturbed by seabed preparation and/or general vessel anchoring impacts. Similarly, general anchoring impacts are expected to overlap areas previous impacted by seabed preparation. Table footnotes were revised to clarify. |

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| BOEM-2022-0045-0086 | 73 | Page 3.6-30, Section 3.6.2.2.1: The statement: "Vessel and pull-ahead anchoring would impact an additional estimated 3,178 acres of seafloor" is not accurate, and the number does not match the DEIS table or provided data. The total area in which permanent and temporary impacts related to foundation installation would occur is 3,172 acres, but actual temporary and permanent impacts are estimated at 834 acres. | Quantities were reviewed and corrected. The total anchoring impact area is 3,179 acres, which reflects the area of potential anchoring impacts that could occur within the 200-meter impact radius around each foundation (3,163 acres), jack up vessel anchoring (21.1 acres, completely overlapped by the general anchoring area), and pull-ahead anchoring (16.1 acres, as calculated by the lessee). As stated, anchoring impacts in soft-bottomed habitats would be short-term in duration. Anchoring in complex habitats could have long-term to permanent impacts, although the anchoring plan would reduce those impacts by an as yet an unspecified amount. The text has been revised to clarify these points. |
| BOEM-2022-0045-0086 | 74 | Page 3.6-31, Section 3.6.2.2.1: Revolution Wind would like clarification on where the following numbers originated: seafloor preparation, specifically boulder relocation and sandwave leveling, and cable installation activities would impact approximately 158 and 743 acres of large-grained complex and complex habitat, respectively, and 2,375 acres of soft-bottom habitat within the RWF and RWEC construction footprints. | The acreage totals were calculated from total cable length using the estimated percentage of each cable route requiring boulder clearance and cable protection as presented in the COP. These percentages were assumed not to overlap, and were apportioned to soft bottomed and complex habitats, respectively. Based on new information provided by Revolution Wind in January 2023, the impact acreages presented in the FEIS were revised to reflect the lessee's determination that sandwave leveling and dredging will not be required for cable installation. Impact acreages were calculated from the affected cable lengths using a 23m average disturbance corridor width~~s~~ for boulder relocation (provided by lessee in January 2023) and a 12m disturbance corridor width for cable protection as presented in the COP. |
| BOEM-2022-0045-0086 | 75 | Page 3.6-33, Section 3.6.2.2: Please confirm the values used in the text. Several of the values presented do not match the benthic habitat report submitted as an appendix to the Revolution Wind COP. | Values were calculated from GIS benthic habitat data provided by Inspire. Foundation locations and cable corridors were buffered using the disturbance radii and widths presented for each feature in the COP, respectively, to determine the impact area by habitat type. We are not clear which values in the benthic habitat mapping report the commenter is referring to. |
| BOEM-2022-0045-0086 | 76 | Page 3.6-36, Section 3.6.2.2.4: Please clarify the values used to determine the acreage featured in the following sentence: "Long-term to permanent habitat disturbance effects on 2,602 acres of large-grained complex and complex habitats would constitute a moderate adverse effect on benthic habitat." | Please see the response to FDMS Submission # BOEM-2022-0045-0086, comment # 75. The total combines the estimated footprint affected by the presence of structures, scour, and cable protection, and the estimated area exposed to long-term impacts from boulder clearance and anchoring activities in large-grained complex and complex habitats across the RWF and RWEC. |
| BOEM-2022-0045-0086 | 77 | Page 3.6-54, Section 3.6.2.4.1: Please clarify the method(s) used to calculate the values shown in the following: "For example, Alternative C emphasizes avoiding and minimizing impacts to complex benthic habitat and reducing the overall impact footprint. This alternative would reduce benthic habitat impacts from 6,615 acres to 4,374 to 4,440 acres, depending on the configuration selected. Impacts to large-grained complex and complex benthic habitat would decrease from an estimated 2,057 acres to 1,443 to 1,469 acres, depending on configuration. Impacts to these habitat types would be long term to permanent in duration. The proposed configurations of Alternative E would produce a similar reduction in impacts to large-grained complex and complex benthic habitat to 1,223 to 1,461 acres, depending on configuration". | Please see the response to FDMS Submission # BOEM-2022-0045-0086, comments 75 and 76. Values have been checked and revised as appropriate. |
| BOEM-2022-0045-0086 | 78 | Page 3.6-55, Table 3.6-11: Please clarify the methods used to derive the numbers in Table 3.6- 11. For example, the maximum acres for the Proposed Action given, 6,615 acres, is the same as in the last row of Table 3.6-4, however, the percent values are different. | Please see the response to FDMS Submission # BOEM-2022-0045-0086, comment 75. Values have been reviewed for consistency and revised as appropriate. |
| BOEM-2022-0045-0086 | 79 | Page 3.6-57, Table 3.6-14 and Table 3.6-16: Please cite if BOEM conducted its own GIS analysis for the alternatives or clarify apparent discrepancies in values presented versus those provided. | Please see response to FDMS Submission # BOEM-2022-0045-0086, comment 75. As stated, the totals presented in the DEIS reflect BOEM's best estimate of overlapping impacts. This accounts for the discrepancies identified by the commenter. Text will be revised to clarify. Values have been checked and revised as appropriate. |
| BOEM-2022-0045-0086 | 80 | Page 3.6-59, Table 3.6-17: The footnote indicates that all cable protection will be placed in complex habitat. More cable protection will likely be placed in complex habitat, but that is not known at this stage and is an inaccurate statement. | Text was revised to clarify likelihood vs. certainty. |

## Birds

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| BOEM-2022-0045-0064 | 2 | 2. Adverse Impacts to the Character of the Norman Bird Sanctuary<br>In addition to the adverse visual impacts, the Project will likely have adverse impacts to avian species and other migratory species (bats and butterflies) that may impact the character of the setting as a bird sanctuary and an historic farm that has a long history of supporting these species. The description of Paradise Farm in the historic listing includes the following analysis of the importance of being a sanctuary to the character of this historic property:<br>Combining her Colonial Revival impulses with a love of bird life, Mabel Norman had expressed interest in the mechanics of establishing a bird sanctuary by late 1914.27 (See correspondence dated 9 November 1914 from Henry S. Thompson of Boston to Mabel Cerio. This letter is framed and on display in the Studio building at Norman Bird Sanctuary). Clarke and Howe's early sketches of the transformation of the property included both a "bird room" and a "winter bird room" in the first floor plan. This lifelong ornithological passion eventually took legal form in Mabel Norman Cerio's will, the central provision of which was the establishment, continuance, upkeep, maintenance and development of [a] bird sanctuary on my farm known as "Paradise Farm"…for the propagation, preservation, and protection of birds, and where birds and bird life may be observed, studied, taught and enjoyed by lovers of nature and by the public generally so interested in a "spirit of humanity and mercy."<br>Although biographical material on George Norman does not suggest any strong interest in nature, his youngest daughter Mabel (1875-1949) appears to have had a naturalist's inclination since childhood. On the death of George Norman in 1900, ownership of SmithGardiner-Norman Farm passed to his children. Mabel, unmarried and in her early thirties, purchased the property from her siblings in 1908, around the time of the death of her brother, George H. Norman, Jr. Correspondence and clippings in the Mabel Norman Cerio (MNC) collection at Newport Historical Society provide evidence that Mabel, a lifelong member of the Audubon Society, had expressed interest in the establishment of a nature preserve or bird sanctuary early in her sole ownership of the farm.22 (See 1918 Boston-area newspaper clippings in the Mabel Norman Cerio collection: "Sanctuaries vital in conserving game birds," and "Peril of Bird Slaughter.")<br>Norman Bird Sanctuary is the proud steward of the legacy established by our founder Mabel Norman Cerio. In fact, we have expanded the property to include 300 acres of preserved lands and have ongoing educational programs that are designed to promote the protection of bird and other species. In her will, Mrs. Cerio suggested that her trustees create an advisory association to assist with the carrying out of her wishes for the Norman Bird Sanctuary. Very shortly after the probating of her estate, the trustees, authorized the formation of a group of individuals knowledgeable about wildlife habitats and wildlife, especially birds, to carry out her wishes that the property be preserved "as a bird sanctuary for the protection of animals and birds and for the enjoyment of lovers of nature and the public generally". Beginning in 1950, that group began in the role foreseen by Mrs. Cerio. As the environmental and historic importance of the Norman Bird Sanctuary grew during the following decades, so too did the environmental and educational programming offered by the organization to its members and friends and to the public at large. From its earliest days, Norman Bird Sanctuary organized biweekly bird walks, created a network of trails, managed the habitats on the property for the benefit of wildlife and organized and conducted informal educational opportunities. The organization developed successful summer camp program for children ranging in age from toddlers through high school students. Throughout the 1970s, there was a bird banding program conducted at the Sanctuary. Beginning in the 1980s and continuing through the present, trails were improved for safety but retained their nature in keeping with a farmscape and wild habitats. In addition to the tradition of the biweekly bird walks, programs are offered on a weekly basis on topics including pollinator plants, mushrooms, raptors, the engaging woodcock, owls, newer residents including coyotes and white-tailed deer, as well as longtime residents like skunk and red fox. Lastly, weekly walks are open to the public at large on a variety of topics free of charge.<br>In addition, we have hired staff and developed programs to scientifically examine the status and trends of birds and other species that frequent the property. As an example, we partner with the Cornell Lab of Ornithology as an official chapter of their NestWatch program – a citizen science nest monitoring project to track success of cavity nesting birds. We aim to provide increased nesting habitat for resident cavity nesters and increase the success of native birds over invasive birds. For the last 25 years we have conducted a bird box monitoring program on our grassland habitat. We presently install 300 boxes in advance of nesting season. This figure represents the second highest concentration of nesting boxes in the entire United States. The Eastern Bluebird is the target species for the official NestWatch program, but this is a rare bird on Aquidneck Island and even rarer in our nesting boxes, so we have shifted our focus to the Tree Swallow. The Tree Swallow is a native insectivore and the most common nester found in the boxes at the Norman Bird Sanctuary. Both this and the less common House Wren are native | BOEM has found an adverse effect from visual and cumulative impacts to the Paradise Rock Historic District, which contains the Paradise Farm. However, the Draft EIS finds no adverse effects to Paradise Farm (also known as the Smith-Gardiner-Norman Farm Historic District) as an historic property from visual or cumulative impacts. Paradise Farm is among the 350 aboveground historic properties, or NRHP-eligible viewshed resources, that would experience negligible to minor visual impacts not rising to the level of adverse effects under the criteria of NHPA Section 106 (see EIS Section 3.10.2.4). The Finding in EIS Appendix J further reiterates this: "Although the HRVEA identified 350 other above ground historic properties on mainland RI and MA within the visual APE of offshore Project components, BOEM has determined that either no effects or no adverse effects would result at these historic properties, based on the justifications provided in the HRVEA (see EDR 2022a:Attachment A)." The Smith-Gardiner-Norman Farm Historic District is specifically reviewed in the HRVEA, which is referenced in the EIS. |

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| | | birds and beneficial to the health of the ecosystem. The House Sparrow is the other species found in the boxes here, but as an invasive species, it is less desirable and management techniques are taken to limit their numbers in favor of supporting other more desirable species. The data we collect is shared with the Cornell Lab of Ornithology's NestWatch program, as well as analyzed internally to help inform future management decisions.<br>The adverse impacts to the character of Norman Bird Sanctuary as a nature preserve are difficult to quantify. We understand from the DEIS that Revolution Wind will be required to complete a series of studies to minimize and mitigate the adverse impacts to birds and other migratory species (see Revolution Wind's Avian and Bat Post-Construction Monitoring Framework). However, we maintain that these studies will not provide a mechanism to examine the specific impacts to Norman Bird Sanctuary. Accordingly, the proposed mitigation measures below are provided as a mechanism to mitigate any potential impact. | |
| BOEM-2022-0045-0086 | 16 | In Table 2.3-1 on page 2-65, the DEIS indicates a "minor adverse" impact determination on birds from the Proposed Action. However, on page 3.7-32 of Appendix E2, the DEIS also indicates that impacts "would range from temporary to long term negligible to minor adverse", and thus it seems that BOEM has selected the more conservative impact determination from the range specified without explaining its reasoning. The impact determination of "minor adverse" on birds also contradicts the impact determination of the Proposed Action in the South Fork Wind Final EIS, which was specified as "negligible to minor". Given that South Fork Wind is situated within the proposed Revolution Wind project area, it is unclear why the impact determinations would be different between the two projects. Thus, it seems that the impact determination of the Proposed Action in the Revolution Wind DEIS should amended to "negligible to minor adverse". | BOEM decided that a single impact determination be used for overall impacts rather than a range. Thus, the more conservative impact determination was chosen. |
| BOEM-2022-0045-0086 | 17 | On pages. 3.5-21 and 3.7-32 of the Appendix E2, the DEIS indicates that "conducting marine construction activities during approved in-water work windows, which would be developed in consultation with NMFS and USFWS", would be used as a mitigation measure to minimize impacts to birds and bats. However, impacts from construction activities are generally considered negligible for both birds and bats, and offshore occurrence patterns vary across bird and bat species. As such, it is unclear how a time-of-year restriction on offshore construction activities would help to reduce impacts to birds and bats. Thus, Revolution Wind respectfully requests that the DEIS be amended to remove this proposed mitigation measure. | Measure removed from Table F-2 and Section 3.7.2.6 Mitigation. |
| BOEM-2022-0045-0086 | 18 | There is little discussion of collision risk to birds from turbines under the "presence of structures" IPF sections, including Section 3.7.1.1, Table 3.7-2, and Section 3.7.2.2.2. The discussions are more focused on displacement risk than collision risk and the level of detail is not consistent with similar sections in the Vineyard Wind 1 FEIS and the Ocean Wind DEIS. The DEIS references BRI's Construction and Operation Plan (COP) Appendix AA and its collision vulnerability assessments, but the impact determination for turbines is only for long-term displacement impacts from turbines, not collision impacts. Also, in the row for "presence of structures" in Table 3.7-2, there is no mention of potential impacts from collision with structures, only collision risk during construction and long-term displacement from turbines. Revolution Wind respectfully requests that the text in Sections 3.7.1.1 and 3.7.2.2.2 include a more substantial discussion around collision risk to justify the determination of negligible to minor impact determination for the "presence of structures" Impact Producing Factor (IPF) and that Table 3.7-2 include collision risk as an impact type in the Alternative B cell. | Additional discussions regarding collision risk has been added to Table 3.7-1. Section 3.7.2.2.2 has an in-depth discussion of collision risk in terms of cumulative impacts to avian resources. |
| BOEM-2022-0045-0086 | 19 | The Avian and Bat Post-Construction Monitoring (PCM) plan referenced in Appendix F, Table F-1 on pg. F-3 and as included in Appendix G on pgs. G-2-7 does not match the PCM plan in the Avian and Bat Technical Report (Appendix AA) developed by BRI for the Revolution Wind COP. This is likely due to recent updates to the PCM plan in the COP that were not incorporated in the version referenced for the DEIS. As such, there are a couple of omissions in the DEIS PCM plan (bold text was omitted). First, on pg. G-3, "Revolution Wind has developed this Framework to outline an approach to post-construction monitoring that supports advancement of the understanding of bird and bat interactions with offshore wind farms, and other areas of uncertainty, such as the potential influence of weather conditions." Second, on pg. G- 7, "Revolution Wind would participate in an annual meeting with BOEM and USFWS to discuss the report. Data from these monitoring studies will ultimately be submitted to relevant regional databases and archives (e.g., NABat), as feasible and appropriate." Revolution Wind respectfully requests that the bolded text referenced above be included in the PCM plan in the Final EIS. | Suggested text has been added to the EIS where indicated. |
| BOEM-2022-0045-0086 | 20 | Draft EIS Appendix E2, Section 3.7.2.4, page 3.7-32 and Appendix F, Table F-2, p. F-17 includes a BOEM-proposed Bird and Bat Mitigation Measures (#2) that states "Install bird deterrent devices to minimize bird attraction to operating turbines and on the OSS, where appropriate and where Revolution Wind determines such devices can be safely deployed. The Lessor must concur with proposed locations. Revolution Wind must confirm location(s) of bird deterrent devices as part of the as-built | Clarification made in Section 3.7.2.6 and Appendix F. |

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| | | documentation submitted with the facility installation report." Consistent with industry best practice, Revolution Wind will install bird perching deterrent devices (e.g., spikes or similar) in areas where perching may create a health and safety risk for workers and where such devices can be safely deployed. Revolution Wind is not considering other methods of deterrence, such as visual, auditory, or frightening device systems at this time because they are highly susceptible to habituation by birds, do not have well established efficacy, and are impractical for deployment offshore16. Revolution Wind respectfully requests that BOEM clarify the wording of Bird and Bat Mitigation Measures #2 to specify "bird perching deterrent devices" or "anti-perching devices." | |
| BOEM-2022-0045-0086 | 21 | Draft EIS Appendix E2, Section 3.7.2.4, p. 3.7-32 and Appendix F, Table F-2, p. F-17 include a BOEM proposed Bird and Bat Mitigation Measure (#3) that states "Conduct marine construction activities during approved in-water work windows developed in consultation with the Services." Revolution Wind has proposed Time of Year (TOY) restrictions for birds and bats, listed in Table F-1 (Bird-1 and Bat-2). Neither the analysis in the Draft EIS analysis nor BOEM's Biological Assessment suggest that additional marine construction TOY restrictions specific to birds or bats are warranted for in-water construction activities; further, this measure as written does not specify species, dates, or geographies (nearshore versus offshore). Revolution Wind requests that BOEM remove or clarify the intent of this proposed mitigation measure. | Mitigation measure was removed as suggested. |
| BOEM-2022-0045-0110 | 61 | While we appreciate that Revolution Wind is sited well beyond the densest, highest concentrations of seabirds found in the near-coastal zones located to the north and the east,221 we are concerned that the DEIS and the COP fall short of properly addressing all key potential impacts to birds from the Project. The Final EIS must better address population-level, cumulative impacts to avian populations from developing Revolution Wind and other areas in the Atlantic OCS expected to be developed in the reasonably foreseeable future. In doing so, BOEM must consider impacts to a broad range of avian species which may be impacted by Revolution Wind, and not limit evaluation to federally listed species alone. | Table 3-1 in Appendix AA of the COP considers a broad group of avian species (56) and Table 3.7-1 in the EIS considers 46 species of Atlantic seabirds from different taxonomic groups that may be present or pass through the Lease Area based on OSAMP (ocean sampling) aerial and/or boat-based surveys, and cross-referenced with USFWS IPaC (information for planning and consulting) database that includes listed and non-listed bird species. Potentially occurring federally-listed species - Piping Plover (Charadrius melodus), Red Knot (Calidris canutus rufa), and Roseate Tern (Sterna dougallii) - are addressed in Section 3.1 of COP Appendix AA, in Section 3.7.1 of the EIS, and in the Biological Assessment that is available on BOEM's website. |
| BOEM-2022-0045-0110 | 62 | Recognizing that much remains unknown regarding the impacts of offshore wind to avian species in the United States, especially for the poorly studied procellariform seabirds, BOEM's evaluation of Revolution Wind in the Final EIS must incorporate a robust monitoring and adaptive management plan. This plan must include a commitment to sufficient standardized monitoring and using advanced technology as it is developed to adequately evaluate full impacts of the Project. It must also explicitly outline a strategy to employ adequate mitigation measures, based on the impacts observed during monitoring. By including requirements for adaptive management, the FEIS can account for the reasonably foreseeable impacts and commit the developer to addressing those impacts. Further, BOEM should incorporate best monitoring and management practices into a regional adaptive management plan to adequately measure and mitigate cumulative impacts to all birds from offshore wind developments expected across the Atlantic OCS for the reasonably foreseeable future. An overview of monitoring needs and recommended mitigation measures for birds (and bats) can be found in Attachment 3. | BOEM funds scientific studies and partners with the USFWS to better understand how migratory birds use the Atlantic OCS and to refine the understanding of the risks from development to migratory species. Data collected from regional projects and continued coordination with USFWS and other agencies is used to develop adaptive management protocols. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 63 | BOEM must ensure that the FEIS considers of the full range of potential impacts on bird species known to use the Project Area and its surroundings (including for foraging, resting, or migration), in particular those covered by the Migratory Bird Treaty Act (MBTA), the ESA, Rhode Island's, Connecticut's, and Massachusetts's endangered species laws, and other BOEM conservation obligations, as well as those prioritized by avian expert partners. These conservation obligations are further detailed in Attachment 3. At a minimum, the FEIS should include analysis of the following priority species for fulfilling BOEM's conservation obligations: American Oystercatcher, American Golden Plover, Hudsonian Godwit, Marbled Godwit, Buff-breasted Sandpiper, Pectoral Sandpiper, Short-billed Dowitcher, Lesser Yellowlegs, Willet, Least Tern, Black Tern, Black Skimmer, Cory's Shearwater, Manx Shearwater, and Audubon's Shearwater, which are each designated as USFWS Birds of Conservation Concern in the Continental USA222 under the Fish & Wildlife Conservation Act, 1988 amendment. Moreover, these and even more species (128 in total) are documented as using and/or flying marine waters associated with the Cox Ledge.223 Long-tailed Duck, Horned Grebe, Atlantic Puffin, Black-legged Kittiwake, Leach's Storm-petrel, and Chimney Swift, which are classified by the International Union for Conservation of Nature (IUCN) as Vulnerable. Red Knot, Semipalmated Sandpiper, and Buff-breasted Sandpiper, which are among the species classified by the Convention on Migratory Species (CMS, or Bonn Convention) as Endangered. Three Endangered Species Act (ESA) listed bird species that are present in or near the Lease Area: Piping Plover, Red Knot, and Roseate Tern. | There are approximately 177 bird species that use the Atlantic OSC for one reason or another. Potentially vulnerable populations to offshore wind development on the Atlantic OCS were identified in Willmott et al 2013 and were considered in developing the potentially vulnerable species presented in Table 3-1 of COP Appendix AA. Potentially occurring federally-listed species - Piping Plover (Charadrius melodus), Red Knot (Calidris canutus rufa), and Roseate Tern (Sterna dougallii) - are addressed in Section 3.1 of COP Appendix AA, in Section 3.7.1 of the EIS, and in the BA. |

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| BOEM-2022-0045-0110 | 64 | Further, the FEIS should include analysis of the following trans-Atlantic migrating birds that have documented routes through the Atlantic OCS WEAs, and should therefore be prioritized for analysis of impacts to nocturnal migrants (these are in addition to the American Golden-Plover, Buff-breasted Sandpiper, Chimney Swift, Pectoral Sandpiper, and Semipalmated Sandpiper, which were mentioned above):224<br>● Bicknell's Thrush<br>● Blackpoll Warbler<br>● Bobolink<br>● Connecticut Warbler<br>● Solitary Sandpiper<br>● Upland Sandpiper<br>● Whimbrel<br>● White-rumped Sandpiper<br>● Ipswich Sparrow | There are approximately 177 bird species that use the Atlantic OSC for one reason or another. Potentially vulnerable populations to offshore wind development on the Atlantic OCS were identified in Willmott et al 2013 and those identified includes nocturnal migrants like the species listed by the commentor. Although their precise migratory routes are at best crudely known, these and other nocturnal migrants are exposed offshore environment only for a short period of time during migration. Studies (e.g., Normandeau Associates, Inc. 2014) on the Atlantic offshore found that nocturnal migrants typically fly when wind speeds are below cut in speeds for the turbines. Additional language has been added in Section 3.7.2.2.2 of the EIS to describe migration during inclement weather and reduced visibility as it relates to the RSZ. |
| BOEM-2022-0045-0110 | 65 | We note below that in evaluating the range of potential impacts from Revolution Wind, the COP for the Project relied on a range of primary and transparent sources,226 but did not include data from eBird; this should be incorporated into the FEIS analysis. BOEM should consult information from the Cox Ledge eBird hotspot, as almost 130 total bird species have been recorded in the area. | The eBird database includes incidental public observations. BOEM regularly uses information from eBird to support its analyses for onshore activities, however, offshore observations have proven to be unreliable. There are cases where all observations from a pelagic trip (including those made in the harbor) are recorded at a single point in the ocean and/or every birder on the boat submits their own report thus inflating the number of observations, etc. Due to these and other "irregularities", BOEM currently relies on bird observations made during scientific ocean surveys. |
| BOEM-2022-0045-0110 | 66 | The COP does not adequately address species-specific impacts to ESA-listed species or those species vulnerable to impacts, which are protected under the MBTA. The FEIS must not rely on the COP for its evaluation of impacts and must evaluate the cumulative, species-specific impacts in a manner that is appropriate for each species' ecology. | Species-specific impacts to Endangered Species Act (ESA)-listed species are discussed in Sections 3.7.1 and 3.7.2.3.2 of the EIS and in the project Biological Assessment (BA) available on BOEM's website. The EIS incorporates the evaluation of impacts in the COP and supplements that evaluation with additional data sources. |
| BOEM-2022-0045-0110 | 67 | In particular, the COP fails to address impacts to Piping Plover from onshore activities. The species is completely excluded from both the federal evaluation and evaluation of state vulnerable species. Piping Plover and Least Tern have historically nested on Quonset Point in Rhode Island. Piping Plover were also documented nesting in this area 2020 and again in 2021.228 While the current nesting location may not fall within the construction envelope, the species' continued presence on Quonset Point (the site of the Revolution Wind cable landing), warrants an evaluation of potential impacts to this species.<br>In addition to potential onshore impacts to Piping Plover, nocturnal oceanic migration for the ESA-listed Piping Plover is not a rare event. Remote tracking studies that rely on the Motus passive very high frequency (VHF) radio tracking system reveal that Piping Plovers migrate nocturnally over open water, "directly across the mid-Atlantic Bight, from breeding areas in southern New England to stopover sites spanning from New York to North Carolina...at altitudes of 288 m (range of model uncertainty: 36-1,031m),"229 putting this ESA-listed species at high risk of collision with turbines, should their path cross through Revolution Wind. | Thank you for the information. The citation provided does not support nesting on Quonset Point; however the Biological Assessment (BA) Section 3.1.1 does acknowledge one pair that nests in a restricted area of the Quonset Airport, adjacent to the sea-to-shore transition (Loring pers. comm. 2022). Impacts to piping plovers are addressed in Section 4.1 of the BA and summarized in the EIS in Sections 3.71 and 3.7.2.2.2. The BA contemplated onshore impacts to piping plover but determined that impacts would not occur due to known species nesting range. |
| BOEM-2022-0045-0110 | 68 | Additionally, the core of the federally endangered Roseate Tern's breeding range overlaps with Revolution Wind,230 and therefore a conservative approach for this species must be required by the Final EIS. Adults and sub-adults may occur in the Project Area in the spring and summer to forage, while individuals of all ages likely cross the Project Area in the late summer and fall to reach their staging grounds on Cape Cod. Roseate Tern use of this area, and other wind development projects in the Atlantic OCS, should be a priority in pre- and post-construction monitoring so that true impacts to the population from collision and displacement can be properly measured and compensated.<br>The primary breeding islands and staging areas for Roseate Tern along the U.S. Atlantic seaboard are just to the north and south of the Revolution Wind Project area,231 so adults and sub-adults may occur in the project area during spring and autumn migration. Indeed, a recent nanotag tracking study232 indicated that eight (of 90 total, or 9%) of the tracked Roseate Terns passed through the northern portion of the Revolution Wind Lease Area. Determining Roseate Tern habitat use across all wind development projects in the Atlantic OCS should be a priority for post-construction monitoring so that any cumulative impacts to their population from collision and displacement can be properly measured and compensated. | Thank you for the comment. Impacts to roseate terns are addressed in Sections 3.1.2 and 4.1 of the Biological Assessment (BA) (BOEM 2022) and summarized in the FEIS in Sections 3.71 and 3.7.2.2.2. |

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| BOEM-2022-0045-0110 | 69 | The COP uses the Marine-life Data and Analysis Team (MDAT) and Rhode Island Ocean Special Area Management Plan (OSAMP) surveys results to evaluate the total proportion of avian populations impacted by Revolution Wind. This is inappropriate for several reasons. For one, the MDAT projections are rough estimates of relative density in the Atlantic OCS--as discussed further below, they are not intended to assess avian habitat use at the project scale and they cannot be interpreted as population proportions. The OSAMP surveys provide a higher resolution picture of relative density, but these are also inappropriate to interpret as population proportions. The MDAT predictive models, while excellent for estimating broad-scale, relative patterns of avian abundance along the Atlantic, are not of suitable resolution for reliably estimating distribution at a local scale. These models are wholly inappropriate for use in impact assessments and should only be used for broad scale planning purposes (such as determining Call Areas). | The NEPA analysis uses the best available data for assessing potential impacts to species. Marine-life Data and Analysis Team (MDAT) data was supplemented with (and is informed by) survey data, which BOEM determined is sufficient to assess impacts to avian species. |
| BOEM-2022-0045-0110 | 70 | Radio and satellite telemetry and radar monitoring methods should be employed to evaluate risks to species which are likely to use the Revolution Wind area for migration. Many species use Block Island and the southern New England coast during migration; these interactions may be fleeting and would not be adequately captured using transect survey methods. Therefore, any transect surveys are likely to underestimate the impacts to these populations. Instead,<br>Satellite telemetry technology, supplemented with pressure sensors, should be prioritized for surveying large-bodied birds, as this is the best method for gathering fine scale movement data and flight altitude. The COP has included some satellite telemetry raw data for raptors. However, this information is available for other taxa as well and should be incorporated.<br>Radio telemetry is appropriate for smaller bodied birds, including songbirds; however, the network of receiving stations in the offshore will need to be expanded significantly to evaluate the level of interaction between birds and Revolution Wind. The current array of telemetry receiving stations are not far enough offshore to track avian use of the offshore Project Area.233 Additionally, tagged Roseate Terns were limited to breeding individuals which may result in an underestimation of Roseate Terns' use of the offshore Project Area. Breeding individuals forage closer to shore, as they are tied to nesting locations. However, in April and May, breeding age terns have returned to New England, but have not yet begun egg laying, and therefore spend a great proportion of time over water and potentially further offshore. Non-breeding subadult individuals will also return to the region and are similarly unencumbered by nests or chicks.<br>We recommend that the Final EIS include both an evaluation of all relevant telemetry and radar data available for birds which may enter the Revolution Wind area (on and offshore) and expanded monitoring requirements to evaluate impacts from Revolution Wind. BOEM should also support further telemetry studies that incorporate these other life stages, time periods, and appropriate geographic scope, and incorporate these results in project analysis and future project impact evaluations. | The Avian and Bat Post-Construction Monitoring Framework is included in Appendix G and as an attachment to COP Appendix AA, which are publicly available on BOEM's website. Due to limited coverage of onshore automated telemetry receiving stations and low probability of detecting tags (Motus receivers and tags) in the offshore environment (Loring et al. 2019), there remains uncertainty related to offshore movements of ESA-listed birds in New England. Revolution Wind would install offshore Motus receiver stations and contribute funding to radio-tagging efforts to address this data gap. Movements of radio-tagged ESA-listed birds in the vicinity of the RWF would be monitored for up to three years post-construction, during the spring, summer, and fall. Motus receivers would be installed within the wind farm to determine the presence/absence of ESA-listed species. The specific number and location of offshore receiver stations would be selected to optimize study design goals, and would be determined using a design tool currently being developed through a New York State Energy Research and Development Authority (NYSERDA) funded project. If there is a need identified by USFWS, and in coordination with efforts at SFWF and RWF, existing Motus receiver stations at up to two onshore locations near the RWF would be refurbished or maintained to confirm the presence and movements of radio-tagged ESA-species in areas adjacent to RWF. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 71 | We also encourage the use of marine radar methods to document trends in avian movements within and around Revolution Wind. Despite the high value of telemetry technology to document changes in migratory routes and species distributions, the application of telemetry technology is generally limited in the number of species and sample sizes included. Marine radar can supplement telemetry data to better document the quantity and timing of birds flying through the Revolution Wind area. This is particularly valuable for understanding impacts to nocturnal migrants. We are pleased to see marine radar contemplated for monitoring nocturnal migrants flux and flight heights as well as marine bird avoidance234 and ask that BOEM and the developer provide additional details on their monitoring plans. | The Avian and Bat Post-Construction Monitoring Framework is included in Appendix G and as an attachment to COP Appendix AA, which are publicly available on BOEM's website. Due to limited coverage of onshore automated telemetry receiving stations and low probability of detecting tags (Motus receivers and tags) in the offshore environment (Loring et al. 2019), there remains uncertainty related to offshore movements of ESA-listed birds in New England. Revolution Wind would install offshore Motus receiver stations and contribute funding to radio-tagging efforts to address this data gap. Movements of radio-tagged ESA-listed birds in the vicinity of the RWF would be monitored for up to three years post-construction, during the spring, summer, and fall. Motus receivers would be installed within the wind farm to determine the presence/absence of ESA-listed species. The specific number and location of offshore receiver stations would be selected to optimize study design goals, and would be determined using a design tool currently being developed through a New York State Energy Research and Development Authority (NYSERDA) funded project. If there is a need identified by USFWS, and in coordination with efforts at SFWF and RWF, existing Motus receiver stations at up to two onshore locations near the RWF would be refurbished or maintained to confirm the presence and movements of radio-tagged ESA-species in areas adjacent to RWF". Since radar approaches to monitoring birds are actively evolving and feasibility would need to be determined, a specific system and methods would be identified closer to when the projects begin operating. RW has committed to conducting a one-to-two-year cross-project (SRWF, SFWF, and RWF) radar |

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| | | | study to collect data on macro (and potentially meso—i.e., flying between turbines) avoidance rates. These data on avoidance would support understanding of both displacement and collision vulnerability. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 72 | Given that there are no dedicated studies that document comprehensively the responses of local avian populations to offshore wind development infrastructure in United States' territorial waters, BOEM should adopt a conservative approach in the FEIS's avian impact analysis. Modeling biases and other limitations stemming from survey efforts must be addressed. | Thank you for your comment. |
| BOEM-2022-0045-0110 | 73 | As discussed above, the Revolution Wind COP bases its exposure assessment on OSAMP surveys and MDAT projections.235 Personned aerial surveys paired with vessel surveys, like those used in OSAMP, can inform offshore wind siting that minimizes avian impacts, while also measuring the realized level of impacts when comparing survey results before and after construction. However, both aerial and vessel surveys have limitations and associated biases.<br>Transect surveys are most appropriate for species that spend a great deal of time within the survey area (e.g., alcids, gannet, phalarope, ducks); they are less appropriate for assessing risk to migrants, as the surveys are generally not repeated frequently enough to catch migration events, and fail to capture impacts to species for which populations are low enough that even small levels of take can have population-level effects (e.g., IUCN-endangered Black-capped Petrel) or species for which interactions with the WEA may be relatively rare but theoretically could result in large take levels under particular conditions (e.g., nocturnal trans-Atlantic migrants encountering the WEAs during inclement weather). Additionally, smaller avian taxa are difficult to distinguish at the species level during transect surveys. Alcids are rarely attributed to species using personned or digital aerial surveys. Sterna terns and small gulls are rarely attributable to species using any survey method (i.e., aerial or vessel), and vessel surveys frighten away some marine birds. Therefore, it is important to supplement transect surveys with additional methods to assess potential changes in distribution or migratory patterns to the extent possible before and after Project construction. Aerial surveys should be supplemented with telemetry (e.g., radio and/or satellite telemetry as appropriate) and marine radar monitoring methods.<br>As much of the purpose of the surveys is to collect background information regarding spatial trends which can be compared against data collected post-construction, we recommend that BOEM work with Revolution Wind to institute digital aerial surveys pre-construction, if possible, without delaying development, and post-construction and include this requirement in the Final EIS. As marketed, digital aerial surveys enable surveys that fly at higher altitudes than personned surveys, they reduce safety risks, and they also allow surveys to be continued after wind farms have been constructed.236 These surveys should be implemented as part of a robust monitoring scheme because, while they provide important additional data about spatial trends, digital aerial survey technology is relatively new and its reliability for attributing observations to species and characterizing flight altitude has not yet been tested or published.237<br>The DEIS relies on transect surveys even though BOEM's own report indicates that the MDAT models are not suitable for predicting distribution and abundance for a rare and narrowly distributed species, even in broad scale evaluations.238 This reliance, when combined with other data deficiencies,239 likely results in an underestimation of the density of ESA-listed species within the Revolution Wind Project Area. | Marine-life Data and Analysis Team (MDAT) models are based on survey data (vessel-based and aerial surveys). Additional surveys are part of the monitoring framework provided in COP Appendix AA and include pre-construction digital aerial surveys. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 74 | The COP relies, at least indirectly, on raw enumerated data from baseline and other earlier surveys that assessed bird occurrence and numbers in the project area based on relative abundance.240 The FEIS must address biases in these methods, and present published results from associated studies that account for imperfect detection. Distance sampling is the most obvious solution to address imperfect detection in vessel and aerial transect surveys, and we recommend that BOEM and developers incorporate detection probabilities241 for better enumerating the population-level impacts for birds into future survey protocols. | Avian species that may pass through the Lease Area and surrounding area, including migrants (such as raptors and songbirds), coastal birds (such as shorebirds, waterfowl, and waders), and marine birds (such as seabirds and sea ducks) are presented in COP Appendix AA Table 3-1. These species were assessed because they were recorded offshore of Rhode Island/Massachusetts in the OSAMP aerial and/or boat-based surveys, and/or are listed as potentially present in the USFWS IPaC database. The vulnerability assessment in Section 3.2.5 and Table 3-9 of COP Appendix AA accounts for uncertainties. In addition, the analysis presented in the EIS does not rely solely on information from the COP but draws from multiple sources including, but not limited to, BOEM-funded studies, the MDAT bird models (Curtice et al. 2019; Winship et al. 2018), and OSAMP survey data. |

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| BOEM-2022-0045-0110 | 75 | Because of various survey biases,243 numerical impacts to birds from the Revolution Wind Farm project could be minimized using raw data alone. Instead, the FEIS for the Revolution Wind Farm must rely on realistic models produced from these standardized collection methods that also include parameters for estimating uncertainty. If annual and seasonal variations in avian movement were not well enough captured during the limited survey period, BOEM may need to continue survey efforts over the Revolution Wind Farm and surrounding lease areas planned for the foreseeable future to capture this temporal variation.<br>For example, the COP only provides visuals of the raw data from the OSAMP surveys for passerines, shorebirds, wading birds, coastal ducks, geese, and swans. Except for phalaropes, shorebirds and passerines do not spend a significant time in the offshore environment but could potentially experience significant interactions with turbines during migration. Therefore, survey methods are not appropriate for evaluating risk to these species' groups. Furthermore, the COP does not incorporate the available visual representations of spatial distributions for the species for which this type of evaluation might be appropriate: loons, gulls, cormorants, sea ducks, seabirds, gannets, and terns. While risk evaluations to loons, sea ducks, and gannets incorporated distribution results from satellite transmitter studies, this type of evaluation was not extended to terns, gulls, cormorants, or other seabirds. Raw tracking data was illustrated for Black-capped Petrel and Piping Plover, but predictive models based on these datasets would provide a better evaluation of risk for each species. | BOEM is considering additional pre-construction survey requirements. Visual representations of density proportions from OSAMP baseline survey data can be found in Part VI of COP Appendix AA. A detailed impacts analysis to federally listed birds from construction activities is in the USFWS BA (BOEM 2022) is available on BOEM's website. The MDAT models were used for black-capped petrel and roseate terns; however, the analysis for piping plover uses predictive risk models as discussed in the BA. |
| BOEM-2022-0045-0110 | 76 | OSAMP surveys (and eBird records, which were apparently not consulted) further indicate that songbirds were detected offshore during the spring and summer, when songbirds are nesting. Because each of these seasons also included months during which some songbirds might have been migrating, the observations could be indicative of passerine presence solely during migration. However, the data presented in the COP are binned by season, so there is no way to parse out the observations to determine the risk to resident birds. The FEIS must address this confounding effect, as the risk to songbirds will likely be very different depending on whether the birds are migrants or breeding season residents in Rhode Island. | OSAMP offshore surveys focused on marine birds; observers may have reported others species, but the presence of other species in the offshore environment is relatively rare and therefore the risk to resident birds is relatively very low. The eBird database includes incidental public observations. BOEM regularly uses information from eBird to support its analyses for onshore activities, however, offshore observations have proven to be unreliable. There are cases where all observations from a pelagic trip (including those made in the harbor) are recorded at a single point in the ocean and/or every birder on the boat submits their own report thus inflating the number of observations, etc. Due to these and other "irregularities", BOEM currently relies on bird observations made during scientific ocean surveys.. |
| BOEM-2022-0045-0110 | 77 | The COP also relied on flight heights discerned from OSAMP surveys and the Northeast Atlantic Seabird Catalog to assess collision risk. Flight height estimates from vessel surveys are generally biased low and should not be relied on to estimate average flight height.244 To the extent possible, radar, LiDAR, and pressure sensor technologies should be relied upon in the Final EIS and the limitations of each data collection method should be explicit within the Final EIS. | Thank you for your comment. In coordination with USFWS, the best available data was used and uncertainties disclosed at the time of EIS preparation. |
| BOEM-2022-0045-0110 | 78 | Additionally, the data used in this model was collected using a standardized methodology recommended for vessel surveys. For example, opportunistic observations made during chumming activities or purely recreational seabirding trips may not inflate the number of birds overall, but they do confound model results by artificially creating higher densities of seabirds along vessel survey paths. This sampling bias needs to be accounted for in the FEIS. | Thank you for your comment. OSAMP surveys were scientifically-based; these surveys were not recreational seabirding trips and chumming activities did not occur (that type of data was excluded). |
| BOEM-2022-0045-0110 | 79 | For many species, MDAT abundance model data were verified by the OSAMP baseline surveys. In cases where the latter gave different results than the MDAT abundance models,245 deference should be granted to the OSAMP baseline surveys, which adopted a finer scale approach. These higher levels of spatial resolution can help detect any changes in use that may result from displacement or habitat loss from the Revolution Wind Farm. BOEM should require the developer to continue at least this level of sampling resolution so that BOEM can accurately evaluate any potential changes in avian distribution that may result from the construction and operation of Revolution Wind.<br>We remain concerned, however, that surveys are still too temporally and spatially limited to detect changes in avian distribution from the Revolution Wind development. Both the OSAMP and MDAT data are nearly 10 years old. While the survey coverage extends beyond the Revolution Wind footprint, some species may experience displacement for up to 20 km from an offshore wind turbine array.246 Therefore, any EIS should include information of avian distribution and occurrence for a minimum of 20 km surrounding the Revolution Wind area to completely understand which species may be impacted by developing Revolution Wind. Annual and seasonal variations in avian movement are also not well captured during the limited survey period, and therefore BOEM should work with developers to continue aerial surveys over the southern New England planning areas, including a 20 km buffer, to capture this variation, beginning as soon as possible. Surveys should be repeated | The OSAMP baseline surveys (aerial and boat based) span a larger area than the Rev Wind lease and the smaller proposed project areas (see COP, Appendix AA Figure 3-2). The OSAMP surveys were among the many data sets that were used to develop the MDAT models. The MDAT models create a common map that predicts the seasonal relative abundance and distribution of 47 species of marine birds on the Atlantic OCS thus covering the so called "20 km buffer". Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |

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| | | frequently enough to cover within and between seasonal and annual variation in avian distribution, so that changes in distribution caused by offshore wind development can be discerned from other sources. | |
| BOEM-2022-0045-0110 | 80 | The FEIS should include a quantitative collision risk analysis on species that occur within a 20 km radius of the WEA and that trigger conservation obligations. These species include, but are not limited to, Roseate Tern, Piping Plover, Red Knot, Common Tern, Least Tern, American Oystercatcher, and Upland Sandpiper, including the risk posed to any other imperiled birds as they migrate through the project area. This analysis should include the most recently available scientific information. Furthermore, the FEIS cannot rely solely on pre-project assessments to make its determination of impacts from collision. We agree with the COP determination that the currently known distributions for Golden and Bald Eagles as well as for Black-capped Petrel make impacts from this project on these species unlikely.247 Nevertheless, we recognize that new information could change this assumption.<br>Based on MDAT models and OSAMP baseline surveys, the Project will not likely have consistent impacts across seasons to avian populations during operation, especially when compared to offshore call areas elsewhere that are nearer to seabird colonies and/or more proximate to notable feeding hotspots. MDAT distribution models especially have limited reliability for rare species, and more accurate or precise methods for predicting impacts have not yet been applied consistently in offshore environments of the United States. Additionally, although collision events during migration are likely to occur less frequently, these episodic events still have the potential to have population-level consequences during a short time. All current offshore lease areas and Call Areas occur within migratory pathways for trans-Atlantic migratory songbirds and shorebirds. BOEM's FEIS needs to evaluate this cumulative risk, as the likelihood of large collision events will increase as the total footprint increases for offshore wind projects. | Cumulative impacts to common tern including a collision risk assessment were analyzed for the VW EIS (cited in EIS Section 3.7.1.). There is currently not enough information available to conduct a collision risk assessment for least tern, sandpiper, or oystercatcher. Furthermore, coastal birds are considered to have minimal exposure to the Lease Area. Collision risk assessments for other species identified in this comment were conducted for this project by an intra-agency team using the best available science. |
| BOEM-2022-0045-0110 | 81 | The FEIS should explicitly outline BOEM's plan to implement collision detection and minimization measures during the operation of Revolution Wind and other planning areas. Under the ESA and MBTA, developers are responsible for any take of migratory birds and ESA-listed species. Without appropriate monitoring for collision detection, however, large collision events could have serious population-level impacts to migratory songbirds and shorebirds without any recourse for avoidance, minimization, or mitigation. This is not an acceptable contingency, and BOEM must stipulate in the FEIS how it will address collision detection. | Technology for collision detection for offshore wind turbines has not been developed at this time. As described in the Revolution Wind Avian and Bat Post-construction Monitoring Framework (attachment to COP Appendix AA), Revolution Wind, or its designated operator, would implement a reporting system to document dead or injured birds or bats found incidentally on vessels and project structures during construction, operation, and decommissioning. The location would be marked using GPS, an Incident Reporting Form would be filled out, and digital photographs taken. |
| BOEM-2022-0045-0110 | 82 | The Revolution Wind COP and DEIS do not (indeed, at present cannot) assess accurately the true collision risks to most species of seabirds. Collisions may occur within the rotor swept zone (RSZ), the WTG tower, or the WTG hub.248 The COP employs a reasonable conceptual framework when identifying relevant categories of potential impacts from the project to birds.249 Although not stated explicitly, collision risk is presumably a joint product of impacts caused by "visible structures" and "lighting," as well as possibly "[vessel] traffic[.]"250 During construction and decommissioning, potential impacts from structures and lighting are considered direct/indirect and short-term.251 However, during operations and maintenance phases, potential impacts from collision are reasonably considered to be direct and long-term.252<br>In evaluating the exposure of various bird taxa, including seabirds, to this collision risk, exposure is taken mainly as a function of currently known distributions in the OSAMP survey area.253 However, such assessment does not provide for inherent uncertainties in the ranges of flight heights, avoidance rates, and other relevant avian flight behavior used by seabirds depending on environmental conditions, foraging status, wind speed and direction, and season.254 Flight height is an essential parameter for determining the actual collision risk. The Final EIS must also consider the range of turbine specifications that could influence collision risk, including air gap, total rotor swept zone, and turbine height.<br>The FEIS must, at the very least, provide results from BOEM's own analysis of the vulnerability of 177 species of birds that could come into contact with WTGs throughout the cumulative area of the OCS where wind development areas (WDAs) are planned in the foreseeable future, then incorporate that analysis into cumulative impacts conclusions within the FEIS for this project.255 In doing so, the FEIS must be transparent in presenting the high level of uncertainty in its results, including high and low estimates for these population-level cumulative impacts. Much (but not all) of the high uncertainty in these models is a result of highly variable concentrations of seabirds throughout the year. COPs for some WDAs in the Atlantic OCS reference a study by Nisbet et al. (2013),256 acknowledging this confounding effect:<br>Petrels and shearwaters that breed in the southern hemisphere visit the northern hemisphere during the austral winter (boreal summer) in vast numbers. These species use the US Atlantic Outer Continental Shelf ("OCS") region so heavily that, in terms of sheer numbers, they easily swamp the locally breeding species and year-round residents at this time of year.257 | Collision risk modeling for ESA-listed species using different turbine specifications is included in the USFWS BA (BOEM 22) available on the BOEM website. For the other species listed in this comment, the MDAT model shows low species abundance in the Lease Area, and collision risk assessments were not conducted because there is not enough biological input information for the models. |

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| | | Additionally, “many species continue to congregate outside the breeding season in areas of high productivity, such as upwellings. Huge flocks of Sooty and Greater Shearwaters have been seen in these areas.”258 “For most development sites, the statistical variation in the data derived from surveys is likely to mask any within-site variations in bird density.”259<br>The OSAMP baseline surveys provide more information on some of the seasonal variation in occurrence of seabirds in the Revolution Wind Project Area, as compared to other WDAs.260 The FEIS for Revolution Wind also should consider variability of large concentrations of birds during even shorter periods of time for analysis when calculating risk to birds. Such concentrated flocks, if occurring within the turbine array, could produce large collision events, even if such events are relatively rare. The Final EIS should consider this variability of large concentrations of birds even in short periods of time in its analysis of seasonal abundance when calculating risk to birds. | |
| BOEM-2022-0045-0110 | 83 | Collision risks to nocturnal migrants261 have not been sufficiently accounted for in either the Revolution Wind COP or DEIS. The Robinson Willmot (2013) study262 and OSAMP study,263 for example, were not designed to assess risks for nocturnal migrants. Likewise, radar studies,264 while helpful in characterizing migration timing, do not cover the Revolution Wind project area, and typically are based on a limited number of years. The FEIS must consider migration timing, variations in flight height, and the distance from shore at which nocturnal migrants reach their maximum and minimum migration flight heights. The FEIS should contain a full analysis of these study results and not rely on a simple summary of the raw data to inform its collision risk analysis for nocturnal migrants. In general, efforts to understand these impacts should rely on a combination of radar, telemetry, survey, and acoustic monitoring, and should not be based on a single technology alone. | The Vineyard Wind 1 Final EIS (BOEM 2021a) discusses potential impacts to nocturnal migrants and addresses those impacts in its monitoring framework. Table A.8.3-1 in Appendix A of the Vineyard Wind 1 Final EIS (BOEM 2021a) is incorporated by reference in the RWF EIS (in Section 3.7.1). BOEM used the best available scientific data at the time of EIS preparation. |
| BOEM-2022-0045-0110 | 84 | When incorporating radio-telemetry methods, receiving stations need to be installed in the offshore environment in such a way that avian movement in and around the WEAs can be adequately assessed. BOEM should follow the monitoring protocols for automated radio telemetry currently in development by NYSERDA and USFWS.265 We applaud this interagency effort to develop and test robust, scientifically sound monitoring protocols. BOEM needs to support efforts to further this technology, adopt these methods into regional monitoring protocols for offshore wind development, ensure the success of this technology moving forward, and incorporate data from these efforts into the FEIS for Revolution Wind (and other impacts analyses into the future). | The Avian and Bat Post-Construction Monitoring Framework is included in Appendix G and as an attachment to COP Appendix AA, which are publicly available on BOEM's website. Due to limited coverage of onshore automated telemetry receiving stations and low probability of detecting tags (Motus receivers and tags) in the offshore environment (Loring et al. 2019), there remains uncertainty related to offshore movements of ESA-listed birds in New England. Revolution Wind would install offshore Motus receiver stations and contribute funding to radio-tagging efforts to address this data gap. Movements of radio-tagged ESA-listed birds in the vicinity of the RWF would be monitored for up to three years post-construction, during the spring, summer, and fall. Motus receivers would be installed within the wind farm to determine the presence/absence of ESA-listed species. The specific number and location of offshore receiver stations would be selected to optimize study design goals, and would be determined using a design tool currently being developed through a New York State Energy Research and Development Authority (NYSERDA) funded project. If there is a need identified by USFWS, and in coordination with efforts at SFWF and RWF, existing Motus receiver stations at up to two onshore locations near the RWF would be refurbished or maintained to confirm the presence and movements of radio-tagged ESA-species in areas adjacent to RWF. Since radar approaches to monitoring birds are actively evolving and feasibility would need to be determined, a specific system and methods would be identified closer to when the projects begin operating. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 85 | La Sorte and Fink (2017)266 document flights of several species of migratory birds that migrate over the Atlantic Ocean: American Golden-Plover, Bicknell’s Thrush, Blackpoll Warbler, Bobolink, Buff-breasted Sandpiper, Connecticut Warbler, Pectoral Sandpiper, Semipalmated Sandpiper, Solitary Sandpiper, and White-rumped Sandpiper. Two species classified by USFWS as Birds of Conservation Concern—Upland Sandpiper and Whimbrel—also cross the Atlantic Ocean during migration. We do not currently know all specifications for turbines that Revolution Wind plans to use in the Project, especially under DEIS Alternative F.267 While there is evidence to suggest that nocturnally migrating songbirds typically fly above the rotor swept zone for some current wind turbines in operation, we also know that nocturnal migrants fly lower, potentially within the rotor swept zone, during inclement weather and cross winds.268<br>Relying on the current system of automated radio telemetry receivers to minimize risk is inappropriate, as the network of | While it is unlikely that nocturnal migrants would use this space during inclement weather, the Vineyard Wind 1 Final EIS (BOEM 2021a) discusses potential impacts to nocturnal migrants and addresses those impacts in its monitoring framework. Table A.8.3-1 in Appendix A of the Vineyard Wind 1 Final EIS (BOEM 2021a) is incorporated by reference (in Section 3.7.1). The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Due to limited coverage of onshore automated telemetry receiving stations and low probability of detecting tags (Motus receivers and tags) in the offshore environment (Loring et al. 2019), there remains uncertainty related to offshore movements of ESA-listed birds in New |

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| | | receivers has not been validated in the offshore environment. Additionally, automated radio telemetry does not adequately estimate flight height, though there are efforts underway to fill this information gap. The current configuration of VHF receiving towers does not allow for detailed characterization of flight paths for this species or any protected avian species using that tracking technology, and therefore, BOEM should take a conservative approach in the FEIS when evaluating potential impacts (cumulative or otherwise) to Piping Plover, Red Knot, and other species which may fly through the Revolution Wind area and other wind development areas expected in the foreseeable future. It is essential that BOEM invests in supporting the Motus system, including supporting the construction and maintenance of a full network of VHF receiving towers throughout the Atlantic OCS. | England. Revolution Wind would install offshore Motus receiver stations and contribute funding to radio-tagging efforts to address this data gap. Movements of radio-tagged ESA-listed birds in the vicinity of the RWF would be monitored for up to three years post-construction, during the spring, summer, and fall. Motus receivers would be installed within the wind farm to determine the presence/absence of ESA-listed species. The specific number and location of offshore receiver stations would be selected to optimize study design goals, and would be determined using a design tool currently being developed through a New York State Energy Research and Development Authority (NYSERDA) funded project. If there is a need identified by USFWS, and in coordination with efforts at SFWF and RWF, existing Motus receiver stations at up to two onshore locations near the RWF would be refurbished or maintained to confirm the presence and movements of radio-tagged ESA-species in areas adjacent to RWF. Since radar approaches to monitoring birds are actively evolving and feasibility would need to be determined, a specific system and methods would be identified closer to when the projects begin operating. Marine birds, particularly loons, sea ducks, auks, and the Northern Gannet (Morus bassanus), have been documented to avoid offshore wind farms, potentially leading to displacement from habitat (Goodale and Milman 2016). However, there remains uncertainty on how birds would respond to RWF turbines that would be spaced one nautical mile apart. Based on methods used by Desholm and Kahlert (2005), Skov et al. (2018), and others, RW is considering conducting a one-to-two-year cross-project (SRWF, SFWF, and RWF) radar study to collect data on macro (and potentially meso—i.e., flying between turbines) avoidance rates. These data on avoidance would support understanding of both displacement and collision vulnerability. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 86 | The FEIS should also produce a fuller picture of migratory pathways for songbirds and shorebirds. This could be realized with the addition of satellite tracking information from Movebank and NASA's Icarus project for larger-bodied shorebirds, additional research and tagging of priority bird species using radio and satellite telemetry technology, and expansion of the radio telemetry receiver network in the offshore environment. At the least, BOEM should outline plans in the FEIS to fill these knowledge gaps to better inform future offshore wind operation and siting processes. In addition, there should be a commitment to, and process outlined for, addressing unforeseen impacts through compensatory mitigation (see section on Compensatory Mitigation for Birds). | BOEM does not anticipate incidental take that would require compensatory mitigation. The Avian and Bat Post-Construction Monitoring Framework is included in Appendix G and as an attachment to COP Appendix AA, which are publicly available on BOEM's website. Due to limited coverage of onshore automated telemetry receiving stations and low probability of detecting tags (Motus receivers and tags) in the offshore environment (Loring et al. 2019), there remains uncertainty related to offshore movements of ESA-listed birds in New England. Revolution Wind would install offshore Motus receiver stations and contribute funding to radio-tagging efforts to address this data gap. Movements of radio-tagged ESA-listed birds in the vicinity of the RWF would be monitored for up to three years post-construction, during the spring, summer, and fall. Motus receivers would be installed within the wind farm to determine the presence/absence of ESA-listed species. The specific number and location of offshore receiver stations would be selected to optimize study design goals, and would be determined using a design tool currently being developed through a New York State Energy Research and Development Authority (NYSERDA) funded project. If there is a need identified by USFWS, and in coordination with efforts at SFWF and RWF, existing Motus receiver stations at up to two onshore locations near the RWF would be refurbished or maintained to confirm the presence and movements of radio-tagged ESA-species in areas adjacent to RWF. Since radar approaches to monitoring birds are actively evolving and feasibility would need to be determined, a specific system and methods would be identified closer to when the projects begin operating. Marine birds, particularly loons, sea ducks, auks, and the Northern Gannet (Morus bassanus), have been documented to avoid offshore wind farms, potentially leading to displacement from habitat (Goodale and Milman 2016). However, there remains uncertainty on how birds would respond to the RWF turbines that would be spaced one nautical mile apart. Based |

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| | | | on methods used by Desholm and Kahlert (2005), Skov et al. (2018), and others, RW is considering conducting a one-to-two-year cross-project (SRWF, SFWF, and RWF) radar study to collect data on macro (and potentially meso—i.e., flying between turbines) avoidance rates including flux rates and flight heights of nocturnal migrants. These data on avoidance would support understanding of both displacement and collision vulnerability. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 87 | The COP asserts that collisions with the Revolution Wind Farm are not expected to affect populations of marine birds.269 Moreover, the COP claims without support that petrels, shearwaters, and storm-petrels are generally not considered vulnerable to collision because they avoid turbines and fly primarily below the rotor swept zone (RSZ). Deriving any inferences about procellariform (tubenose) seabirds based on the European experience with offshore wind is highly problematic, however, as most North American procellariform seabirds are absent in the regionally shallow waters of the Irish, North, and Baltic seas. Some shearwaters and petrels reach flight heights greater than 50 m during high winds,270 certainly placing them within the RSZ. Consequently, the FEIS must reorient its assumptions about no or little collision risk for this group of marine birds.<br>We have previously provided comments to BOEM about use of collision risk models (CRMs). Our criticism of CRMs does not mean such models should be ignored entirely when evaluating impacts of the Project. Rather, CRMs provide a mechanism for testing outcomes (e.g., observed collision rates) against the model predictions (e.g., expected collision rates), and BOEM must address the need to collect the data necessary to test these hypotheses. We reiterate our concerns with BOEM's previous application of CRMs in the following paragraphs in hopes that BOEM will provide a more detailed collision risk analysis in the FEIS for Revolution Wind.<br>The FEIS should include a transparent CRM-driven analysis for all species of conservation obligation which may occur within 20 km of the Revolution Wind footprint and for which a current CRM would be appropriate, even if the species has not been documented with observations inside the footprint of the Project. This should include a recent stochastic derivation of the Band model, such as the McGregor (2018)271 version. | Collision risk modeling for ESA-listed species using different turbine specifications is included in the BA (BOEM 2022) available on BOEM's website. BOEM has been working with the USFWS on a new collision risk model (SCRAM) to analyze risk to ESA-listed birds (https://www.boem.gov/environment/environmental-studies/transparent-modeling-collision-risk-three-federally-listed-bird species) and used SCRAM in the most recent BA. For the other species listed in this comment, the MDAT model shows low species abundance in the Lease Area and many species do not have enough biological input information for the models. In addition, BOEM used collision risk modelling to better understand the cumulative risk to several seabird species in the Atlantic: this analysis included most offshore wind project including the Rev Wind project area (see Vineyard Wind 1 FEIS, Appendix A). |
| BOEM-2022-0045-0110 | 88 | BOEM must be transparent in its CRM application. As discussed in depth in Attachment 3, CRM models are extremely sensitive to the input parameters and therefore the FEIS must provide the inputs used in its analysis for public review and transparency. Additionally, CRMs should consider any differences in daytime and nighttime flight patterns. These collision risk models are an important starting point to predict cumulative, population-level impacts and BOEM should pursue studies to not only verify CRM utility in the offshore environment, but to also move toward viable collision detection requirements for Revolution Wind and future offshore wind developments. | Collision risk modeling for ESA-listed species using different turbine specifications is included in the BA (BOEM 2022) available on BOEM's website. For the other species listed in this comment, the MDAT model shows low species abundance in the Lease Area, and collision risk assessments were not conducted because there is not enough biological input information for the models. BOEM has been working with the USFWS on a new collision risk model (SCRAM) to analyze risk to ESA-listed birds: https://www.boem.gov/environment/environmental-studies/transparent-modeling-collision-risk-three-federally-listed-bird |
| BOEM-2022-0045-0110 | 89 | The COP makes an inappropriate assumption that larger turbines reduce collision risk.272 There is no substantial evidence to suggest that larger turbines, spaced farther apart, reduces risks to birds, and it should be a goal of BOEM to understand the effects of displacement and mortality relative to turbine size and spacing. As there is no data to support the claim in the COP that larger wind turbines will minimize risks to birds,273 it would be inappropriate for BOEM to rely on this analysis in the FEIS. Size of turbines has grown substantially over the past decade, and this trend is expected to continue. In its Vineyard Wind 1 project, for example, Vineyard Wind plans to use GE's 12MW Haliade-X turbine, which has a 220-meter rotor swept zone and is estimated to reach a maximum height of 260 meters above sea level. The University of Virginia is currently developing 200-meter-long blades to power a 50 MW turbine, with a potential rotor swept zone of approximately 400 meters.<br>Given that the tower height would need to be more than 200 meters in height to accommodate rotor blades of this size, turbines could soon reach heights greater than 400 meters above sea level. Studies which suggest that fewer, larger turbines reduce avian collision risk274 are based on turbines less than 5 MW. As turbines increase in size, they are more likely to encroach on airspace occupied by nocturnal migrants275 while not necessarily avoiding airspace occupied by relatively lower flying foraging marine bird species. Conversely, certain studies find that bird deaths not only increase with turbine size, but also suggest that the number of bird deaths from collision with wind turbines is proportional to the MW produced in a wind | Collision risk modeling for ESA-listed species using different turbine specifications is included in BA (BOEM 22). For the other species listed in this comment, the MDAT model shows low species abundance in the Lease Area, and collision risk assessments were not conducted because there is not enough biological input information for the models. BOEM has been working with the FWS on a new collision risk model (SCRAM) to analyze risk to ESA-listed birds: https://www.boem.gov/environment/environmental-studies/transparent-modeling-collision-risk-three-federally-listed-bird |

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| | | farm.276 Turbulence above and below the rotor swept zone can affect flight performance. If this should make birds more susceptible to physical interactions with turbines, then larger turbines would only increase that risk. Additionally, limiting risk evaluations to the rotor swept zone neglects the risk of collision from the tower itself and turbulence around the rotor swept zone.<br>Suggestions that increased spacing (1 nm) between turbines would reduce risks to birds from both collision and displacement is unfounded, as offshore wind farms in Europe do not provide this level of spacing, and therefore, there is no operational comparisons to be made. Instead, increased spacing means fewer turbines and less energy production within the footprint of the project, so more projects (and more space) will be necessary to meet state and national energy goals. Furthermore, greater space between turbines may increase collision risk if species vulnerable to collision end up using the wind farm more frequently. Unfortunately, these all remain unknowns until such configurations are developed and operational. BOEM should support studies designed to answer these questions.<br>The FEIS should include a risk assessment, considering the full range of the potential rotor swept zone provided in the COP, to assess 1) impacts from collision and barrier effects to migrating birds, and 2) potential increased habitat loss that may need to occur to reach offshore wind energy goals. | |
| BOEM-2022-0045-0110 | 90 | The COP and DEIS must not limit the impact assessment solely to the project's immediate footprint. As noted earlier, evidence from construction and operation at other offshore wind farms suggest marine birds may be disturbed up to at least 20 km away from operating wind farms. Though flight-initiation distances are highly variable, nesting and foraging shorebirds can be disturbed from coastal anthropogenic activities more than 200 meters away. Diving marine birds may also be heavily impacted from the noises associated with pile driving. Underwater noise impacts to diving birds must be considered in the FEIS, and cannot be limited to an assessment of the Revolution Wind farm footprint.<br>Additionally, vessel traffic can disrupt wintering marine birds, and construction activities can have impacts to birds and their prey which will not end immediately after construction—some modifications to the habitat will not return to a healthy state until long after construction activities end. Given the avian distribution off Rhode Island's coast, it is likely that marine bird communities will be heavily disturbed during construction activities. | Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct drive systems like those proposed for the RWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 root mean square decibels (dBRMS), occasionally reaching as high as 128 dBRMS, in the 10-hertz (Hz) to 8-kilohertz (kHz) range. This is consistent with the noise levels observed at the BIWF (110 to 125 decibels referenced to a pressure of one micro pascal [dB re 1 µPa] sound pressure level [SPL] RMS) (Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. The EIS has been updated to reflect the effects from operational noise on diving birds within the above-referenced range. Impacts from vessel traffic on birds are discussed in Section 3.16 of the EIS. Underwater noise effects on ESA-listed species are discussed in Section 4.1.2.2 of the BA. Based on prior observations by Jansen and de Jong (2016) and ambient noise levels described above, operational underwater noise would not be audible outside the immediate vicinity of the RWF, would not exceed fish injury or behavioral thresholds, and would therefore have no measurable effect on prey availability for roseate terns. |
| BOEM-2022-0045-0110 | 91 | Construction activities from the cable laying and transition are not limited to the footprint of the cable. Noise and disruption caused by construction will likely disturb marine birds during the entirety of project build-out, and the COP fails to itemize the timeline expected from this disturbance. Especially closer to shore, this could displace sea ducks, waterbirds, and alcids from important foraging habitat. While it may not be possible to avoid such impacts entirely, the FEIS needs to be transparent in addressing these impacts and paths for mitigating these impacts. | Construction, operation, and decommissioning timelines were all considering when assessing impacts to marine birds from cable laying (see EIS Sections 3.7.2.3.1 and 3.7.2.3.2). Design features and timing restrictions will be implemented to reduce impacts to marine birds that may be impacted by these activities, as described in the EIS in Section 3.7.2.6. |
| BOEM-2022-0045-0110 | 92 | Cable laying and pile driving will likely impact birds, regardless of timing. Beach nesting birds, like Piping Plover, American Oystercatcher, Least Tern, Herring Gull, Double-crested Cormorant, and Common Tern, may be present in and around Revolution Wind from March through September. Red Knots, Semipalmated Sandpiper, and Black-bellied Plover may be affected by construction activities in spring and fall. Marine bird species, such as Northern Gannets, shearwaters, and storm-petrels, will be present within Revolution Wind during more than one season. If construction of cable routes is timed to avoid beach nesting birds, then it will likely impact wintering sea ducks. While it may not be possible to avoid impacts entirely, the FEIS should transparently address these impacts and provide a path to mitigate such impacts. | The construction of the onshore cable route is timed to avoid nesting beach birds. The offshore cable laying activities are highly localized and transitory and requires vessels to move at excruciatingly slow speeds. Birds on the water would simply move away and return after the passing of vessels. |
| BOEM-2022-0045-0110 | 93 | While Roseate Tern, Piping Plover, and Red Knot may fly through Revolution Wind offshore, the Final EIS must also consider the potential impacts of developing Revolution Wind to these ESA-listed species onshore. Piping Plover or tern chicks within 100 m of onshore construction activities will require the developer to hire a spotter to prevent the chicks from encountering harm during activities. Additionally, no construction activities may be allowed on the beach or intertidal zone within 100 m of Piping Plover chicks or nests, as this would starve breeding plovers of necessary foraging habitat. Migrating Red Knots and | The analysis in the USFWS BA (available on BOEM's website) concluded that there would be no effect to ESA-listed species from upland disturbance during onshore project construction (BOEM 2022). This is due to the lack of documented breeding habitat and staging areas within the onshore project area (or within 100 meters). |

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| | | other shorebirds rely on the mudflats along Rhode Island's coast to rest and refuel during their fall migration. Common and Roseate Terns rely on these same mudflats for staging from August-October. The FEIS must consider the impacts of building out Revolution Wind to these species, even when the activities associated with development fall outside the footprint for the Revolution Wind Farm. | |
| BOEM-2022-0045-0110 | 94 | The COP contends that:<br>Overall, displacement from the RWF is not expected to affect the populations of non-marine migratory birds (Table 4.3.6-6), because RWF is not primary habitat for these species and any avoidance behavior during migration is not likely to substantially increase energetics or reduce foraging opportunities (a detailed assessment is in Appendix AA)…Coastal birds…, waterfowl…, wading birds…, raptors…, and songbirds…, may occasionally forage in the Lease Area, visit the area sporadically, or pass through on their spring and/or fall migrations…Overall, displacement from the RWF is not expected to affect the populations of marine birds (Table 4.3.6-6).282<br>The COP implies that these impacts will be negligible to minimal, because the Wind Farm Area is generally far enough offshore as to be beyond the range of most breeding terrestrial or coastal bird species, and the small footprint of disturbance relative to the large expanse of similar habitat available within and adjacent to the Lease Area and in the broader region will allow birds to access comparable prey species outside the disturbance area associated with construction of the RWF.283 This assessment is not commensurate with the potential level of impacts which could be experienced during and following the activity. Impacts do not end immediately after construction activity. Modifications to habitat will not return to a baseline state until long after construction activities cease. Given the avian distributions portrayed in maps upon which the COP is based,284 it is likely that marine bird communities will be heavily disturbed during construction activities. At the very least, avian monitors should accompany construction vessels to document any disturbance to birds that is immediately obvious. | Thank you for your comment. A monitoring framework has been developed and is included in Appendix G and as an attachment to Appendix AA of the COP and will be implemented to determine the duration of displacement, among other monitoring metrics. |
| BOEM-2022-0045-0110 | 95 | In addition, the COP makes inappropriate assertions about risks to birds from vessel traffic and cable laying as well as the benefits to birds from habitat alterations and the reef effect.285 Terns can use upwellings and ocean turbulence as ecological cues to locate important foraging areas offshore. In addition to project construction's disruption of foraging fish breeding communities on the ocean floor, the turbine monopiles can mimic these cues, even when foraging fish are not present. According to recent research, "[t]he structures themselves may provide artificial foraging cues (or ecological trap) by which terns will ignore important upwellings in favor of investigating turbulence created by the turbine structure." | Thank you for your comment. Based on the best available science, no evidence is found to support that structures themselves may provide artificial foraging cues (or ecological trap) by which terns will ignore important upwellings in favor of investigating turbulence created by the turbine structure. Based on the lack of data on this topic, no change will be made to the analysis in the EIS. |
| BOEM-2022-0045-0110 | 96 | Cox Ledge is considered a prime destination for birders in New England who wish to see pelagic birds, like shearwaters, storm-petrels, and kittiwakes. Given that Revolution Wind surrounds the shoal known as Cox Ledge, we appreciate that the Project has been well-sited to avoid the most significant impacts to marine birds, based on the avian distribution models resulting from OSAMP surveys.287 These models are based on exemplary survey methods and suggest that the Revolution Wind area is preferred over other areas sampled within the OSAMP as it relates to predicted avian impacts.<br>Nevertheless, while this evidence suggests that the Revolution Wind is predicted to be of lower impacts to birds, relative to others within the OSAMP survey boundaries, this does not suggest impacts will be non-existent. An analysis by Winiarski and colleagues288 models avian population performance under various wind development area scenarios. There is evidence from these results to suggest that storm-petrels may be more impacted by these developments than other marine avian species and should, therefore, receive additional attention.<br>Furthermore, these projected estimates are limited to impacts from loss of habitat area. The analysis does not attempt to estimate changes to population growth and, while it does address additional impacts from displacement, these impacts are likely underestimated. The authors state:<br>Weighting of marine birds in the SCP [spatial conservation prioritization] based on their displacement sensitivity and conservation priority from Furness et al. (2013)289 increased the conservation priority ranking of nearshore waters. However, further development of displacement sensitivity weightings (Furness et al. 2013) are needed because they are currently based on relatively few OWED [offshore wind energy developments] monitoring studies in Europe that were all conducted in relatively shallow waters. Increased monitoring of European OWEDs and future monitoring of OWEDs in US waters will lead to more accurate estimates of displacement sensitivity for species or species' groups of marine birds.<br>We know that kittiwakes – a species which occurs within the OSAMP area – can be displaced up to 20 km from operating marine wind farms.290 We also know that, while birds may congregate more frequently in areas outside of Revolution Wind Project, they may continue to pass through Revolution Wind, putting them at greater risk of collision. We simply do not know the full extent of habitat loss that marine birds will experience because of Revolution Wind, nor do we know the rate at which | Thank you for your comment. A monitoring framework has been developed as an attachment to Appendix AA of the COP and will be implemented to determine the duration of displacement, among other monitoring metrics. |

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| | | birds that continue to forage in the area will be lost to collision.<br>We do, however, know that birders have been consistently successful in sighting seabirds on trips to Cox Ledge, both on dedicated birding pelagic trips as well as on fishing trips and BOEM should be transparent in its predictions of the potential impacts to birds from Revolution Wind. This will require a clearly defined path forward for monitoring the impacts from the operational project that includes installing collision detection technology and continuing the OSAMP surveys now through construction and for several years following the start of operation. | |
| BOEM-2022-0045-0110 | 97 | In addition to better accounting for potential avian impacts in the FEIS, BOEM should require developers to undertake long-term Project monitoring before, during, and after construction for endangered species like Red Knots and Piping Plover, for other species with a suspected high collision risk (such as shearwaters and petrels), for species of conservation obligation, and, at a minimum, for species of migratory birds that cross the Atlantic through the Project Area. In this case, at the least, Revolution Wind should implement robust monitoring during and post-construction and we suggest that BOEM clearly outline monitoring requirements and coordinate with other stakeholders, including the Revolution Wind developers; Rhode Island, Massachusetts, Connecticut, and New York state agencies; and the Regional Wildlife Science Collaborative, to support the development of a regional monitoring plan for birds and other wildlife.<br>Monitoring for adverse effects requires multiple modes of evaluation in a coordinated framework pre- and post-construction. Radar, vessel and aerial surveys, acoustic monitoring, satellite and/or radio telemetry are all complimentary tools that provide data necessary for evaluating impacts, although none of these tools may provide a full picture when used alone. | The Avian and Bat Post-Construction Monitoring Framework is included in Appendix G and as an attachment to COP Appendix AA, which are publicly available on BOEM's website. Due to limited coverage of onshore automated telemetry receiving stations and low probability of detecting tags (Motus receivers and tags) in the offshore environment (Loring et al. 2019), there remains uncertainty related to offshore movements of ESA-listed birds in New England. Revolution Wind would install offshore Motus receiver stations and contribute funding to radio-tagging efforts to address this data gap. Movements of radio-tagged ESA-listed birds in the vicinity of the RWF would be monitored for up to three years post-construction, during the spring, summer, and fall. Motus receivers would be installed within the wind farm to determine the presence/absence of ESA-listed species. The specific number and location of offshore receiver stations would be selected to optimize study design goals, and would be determined using a design tool currently being developed through a New York State Energy Research and Development Authority (NYSERDA) funded project. If there is a need identified by USFWS, and in coordination with efforts at SFWF and RWF, existing Motus receiver stations at up to two onshore locations near the RWF would be refurbished or maintained to confirm the presence and movements of radio-tagged ESA-species in areas adjacent to RWF. Since radar approaches to monitoring birds are actively evolving and feasibility would need to be determined, a specific system and methods would be identified closer to when the projects begin operating. Marine birds, particularly loons, sea ducks, auks, and the Northern Gannet (Morus bassanus), have been documented to avoid offshore wind farms, potentially leading to displacement from habitat (Goodale and Milman 2016). However, there remains uncertainty on how birds would respond to the RWF turbines that would be spaced one nautical mile apart. Based on methods used by Desholm and Kahlert (2005), Skov et al. (2018), and others, RW is considering conducting a one-to-two-year cross-project (SRWF, SFWF, and RWF) radar study to collect data on macro (and potentially meso—i.e., flying between turbines) avoidance rates. These data on avoidance would support understanding of both displacement and collision vulnerability. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 98 | As discussed in detail in Attachment 3 and the above section regarding collision impacts, collision monitoring is critical and, while traditional carcass searches cannot be done at offshore sites, that is not reason enough to abandon post-construction fatality monitoring—an obligation to which the onshore wind industry has committed.291 Further, there is ongoing, rapid development of imaging and bird strike technologies, some of which is actively funded by the Department of Energy. BOEM and developers should support the development and integration of strike detection technologies and Revolution Wind should plan to integrate strike detection technologies once they become verified, commercially available, and affordable at scale within the lifetime of the project's operations. The incorporation of these new monitoring technologies, hopefully standardized, should be a required element in the post-construction monitoring plan, even if it must be phased in later if not immediately upon operation. | Fatality monitoring is included in the Avian and Bat Post-Construction Monitoring Framework, which is included in Appendix G and as an attachment to COP Appendix AA, and are publicly available on BOEM's website. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 99 | The COP proposes relatively few concrete measures for monitoring collision impacts to birds in the Project, and some of these are contingent:<br>Revolution Wind is developing an Avian Post-Construction Monitoring Plan for the Project that will summarize the approach to | Fatality monitoring is included in the Avian and Bat Post-Construction Monitoring Framework, which is included in Appendix G and as an attachment to COP Appendix AA, and is publicly available on BOEM's website. Additional mitigation and monitoring |

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| | | monitoring;…and describe methods and time frames for data collection, analysis, and reporting…Where possible, monitoring conducted by Revolution Wind will build on and align with post-construction monitoring conducted by the other Orsted/Eversource offshore wind projects in the Northeast region…Revolution Wind will document any dead (or injured) birds/bats found incidentally on vessels and structures during construction, O&M, and decommissioning and provide an annual report to BOEM and United States Fish and Wildlife Service (USFWS).292<br>Revolution Wind suggests that mortality monitoring rely on carcass monitoring around the base of the offshore wind turbines. This is contrary to standard protocol for post-construction monitoring at onshore wind projects where a radius from the turbine is prescribed as the search area and includes where birds may be expelled or thrown from the actual turbine structure and blades. Offshore structures anticipated to be installed have very little available surface area on which a dead or injured bird could land. Defining the structure as a search area, if it means the turbine base or nacelle (since no injured or dead birds could be found on the blades), is inadequate. Only updated technology will detect bird strikes or mortalities in the appropriate range established by onshore post-construction mortality studies. The Final EIS must address this inadequacy in the COP and mandate an adaptive management protocol to enable adequately monitoring mortality events. | measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 100 | The FEIS and the Record of Decision (ROD) for the Project should specifically include the adoption of monitoring technologies (including collision detection technologies) that are verified and commercially available as part of the Project monitoring protocol and include monitoring frameworks for future projects permitted. BOEM should support development and funding for development and Revolution Wind should collaborate with researchers to test technology at the Project. | The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 101 | BOEM must also stipulate a requirement that industry mortality reports be made promptly available to the public and that this requirement should be incorporated into the FEIS and ROD. | BOEM requires the reporting of bird mortalities (see Biological Assessment and EIS, Table F-2). The reports may be available upon request. |
| BOEM-2022-0045-0110 | 102 | We appreciate the monitoring methods proposed by Revolution Wind, such as installing Motus receiver stations, contributing to funding for 150 Motus tags per year for up to three years, and radar monitoring.293 Additionally, we encourage BOEM to require Revolution Wind to conduct acoustic monitoring for birds and bats, pre-construction (if able without delaying construction) and post-construction avian boat surveys, and avian behavior point count surveys at individual WTGs. We hope that the FEIS will provide further specifications for how this monitoring should be carried out to collect the best available data and will require such a framework be adopted by Revolution Wind for the Project. | Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 103 | Monitoring pre- and post-construction should be designed in such a way as to be able to discern any changes to avian spatial distribution that might be a result of construction and operation of the Project. A monitoring plan should incorporate suggestions previously provided to BOEM via the Avian Considerations recommendations. | The Avian and Bat Post-Construction Monitoring Framework is included in Appendix G and as an attachment to COP Appendix AA, which are publicly available on BOEM's website. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 104 | More specifically, we recommend that efforts to track avian movement include both satellite and passive radio telemetry. Technically speaking, while the passive radio telemetry receivers for these efforts are considered part of the Motus network, the tags themselves are VHF and UHF radio transmitters. BOEM and developers should follow recommendations by USFWS Northeast Migratory Bird Office when deploying receivers and tags, using the specifications best able to capture migratory routes in the offshore environment. | Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 105 | We further suggest that avian boat surveys and tracking studies be accompanied by aerial surveys when possible as well as radar studies. Digital aerial surveys may be conducted from a higher flight altitude, and when calibrated with boat-based surveys, may provide a method for continuing aerial surveys post construction, when low-flying personned flights would no longer be possible. Radar surveys can provide a broad overview for comparison of flight paths, especially for nocturnal migrants which could not be captured during daytime survey efforts. | Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |
| BOEM-2022-0045-0110 | 106 | The DEIS fails to provide any scientific evidence to support a realistic cumulative impact assessment for birds resulting from wind farm construction and operation in the Atlantic OCS.<br>In reference to onshore activities, the cumulative impacts assessment neglects to provide for any cumulative impacts resulting from projects outside of the Project. Instead, the DEIS only assesses impacts resulting from the current Revolution Wind project per se under salient consideration, stating, e.g., “the amount of habitat loss is small relative to the similar habitat that | The cumulative impact to birds for the propose action (Alternative B - up to 100 turbines) is minor (EIS, Table 3.7-1). This is supported by the impact analysis for the potential build out of over 2000 turbines on the Atlantic OCS (see Vineyard Wind 1 EIS Vol II, Appendix A, pp A99-A105). The analysis was based on a series of analyses that includes using estimates of number birds killed per turbine at land based turbines from Loss et al 2013, using a |

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| | | will remain unimpacted in the general region."295 Indeed, the DEIS concludes that "migratory birds that use the offshore WEAs during all or parts of the year would either be exposed to new collision risk or would have long-term functional habitat loss due to behavioral avoidance and displacement from WEAs on the Atlantic OCS."296<br>Regarding noise in the offshore wind development, we simply do not know enough about the effects of noise from pile driving to diving marine birds297 to be able to assert with confidence that these activities do not result in changes to population vital rates. BOEM and the developer should support future studies which quantify these impacts on marine birds, with a special focus on alcids, loons, seaducks, and other diving marine birds.<br>Based on alternatives that would permit up to 93 WTGs,298 the DEIS infers that the Revolution Wind Project will account for less than 5% of the 2,066 turbines anticipated for the Atlantic OCS in the foreseeable future. Loss et al. (2013) estimates that the average annual mortality rate for birds from turbines onshore is 3.58 birds/MW (95% C.I.=3.05-4.68).299 The 2,066 offshore turbines currently expected would have a 12-14 MW generation capacity and produce between 24,792 MW (with 12MW turbines) and 28,924 MW (with 14MW turbines) cumulatively. If bird fatalities at offshore wind turbines are comparable to those at land-based ones, using the average mortality estimate from Loss et al. (2013), this offshore build-out could kill between 88,755 and 103,548 birds annually or an estimated 2,662,650 to 3,106,440 birds over thirty years of cumulative impacts. The Revolution Wind Project alone, with up to 93 total turbines, and under this same formula when applied to 880 MW, could kill between 80,520 and 123,552 birds over the 30-year lifetime of the project. This is not a negligible take, especially considered in the context of additional leases owned (and all projects proposed) by the operator. Until better data are available, BOEM should be conservative in their analyses of take and skew towards over-protective rather than under-protective measures. BOEM should work with the USFWS, Revolution Wind, and all developers, to ensure avoidance, minimization and mitigation measures will offset loss to the maximum extent possible.<br>These estimates only address direct mortality from collisions and do not include rates of mortality that might be driven by barrier effects and habitat loss. Barrier effects and displacement can have significant energetic costs for birds and can additionally result in increased foraging rates. Both can have consequences for individual survival and demography.<br>Cumulative impact analyses should use quantitative assessments of the cumulative effects from wind farm build out in the OCS, including population viability analyses (PVMs) which consider changes in vital rates that result from both direct and indirect impacts. These PVMs are especially warranted for ESA-listed species. BOEM should also consider revising the cumulative impact level on birds from Negligible to Moderate. | stochastic collision risk model on a dozen marine bird species, and included information from offshore wind farms in Europe. |
| BOEM-2022-0045-0110 | 107 | The FEIS should provide more certainty that the Lessee will use adaptive management practices for birds and collect "sufficiently robust" data to inform mitigation strategies to avoid and minimize impacts to birds.<br>According to USFWS Land-Based Wind Energy Guidelines (2012),300 DOI has adopted the National Research Council's 2004 definition of adaptive management, which states:<br>Adaptive management promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders.<br>The adaptive management strategies, or the mitigation (avoidance, minimization, and compensatory mitigation) of "potential adverse impacts," the specific methodologies of the frameworks for monitoring, adaptive management and mitigation should all be explicitly detailed in the FEIS.<br>The DEIS claims that "exposure of bird populations has been avoided by siting the Project offshore in an offshore Wind Energy Area designated by BOEM."301 However, this assertion is contradicted by the Project's own justifications for environmental protection measures:<br>[W]ide spacing of WTGs will allow avian species to avoid individual WTGs and minimize risk of potential collision…Revolution Wind will comply with FAA and USCG requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimizes impacts on avian species.302<br>Although deploying lighting technology to reduce collisions is an admirable action, as proposed this action is hardly a firm commitment. Should BOEM require it, this could provide an excellent opportunity to institute adaptive management—studying the efficacy of lighting technology to reduce collisions to inform best management at future wind farms. | The Avian and Bat Post-Construction Monitoring Framework is included in Appendix G and is an attachment to COP Appendix AA, which are publicly available on BOEM's website. Additional mitigation and monitoring measures, including adaptive management, may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. |

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| | | Instituting adaptive management, using lighting technology as an example, will require robust collision monitoring. Unfortunately, wholly inadequate information is provided in the DEIS that such adaptive management will in fact occur. Indeed, at this stage of development, the current level of detail is limited to vague or incomplete commitments:<br>Revolution Wind is developing an Avian Post-Construction Monitoring Plan for the Project…Post-construction monitoring will assess impacts of the Project with the purpose of filling select information gaps and supporting validation of the Project's Avian Risk Assessment…Revolution Wind will document any dead (or injured) birds found incidentally on vessels and structures during construction, O&M, and decommissioning and provide an annual report to BOEM and USFWS303<br>As we have noted in this document and in other letters to BOEM, collecting bird carcasses cannot be reliably used for estimating collisions in the offshore environment. Instead, collision monitoring will need to use technology from which we can rapidly learn the variables contributing to collision risk and adjust management actions accordingly, including informed curtailment strategies as necessary.<br>The framework for adaptive management should include operational adjustments that are reasonable and cost effective and include advances in detection and avoidance technology. For example, the adaptive management framework should consider smart curtailment if significant impacts are realized. These are practices used in adaptive management at some onshore wind facilities and in European Union offshore wind facilities. Their incorporation into the Revolution Wind FEIS will permit BOEM to require their adoption should there be significant avian fatalities from collision.<br>An adaptive management framework requires a level of coordination and commitment that goes well beyond the Project and its operators. BOEM and USFWS must commit to providing a structure that ensures this across the offshore wind landscape. | |
| BOEM-2022-0045-0110 | 108 | Given current limitations in minimization technologies for bird impacts, compensatory mitigation is another tool that should be used to offset adverse impacts of the Revolution Wind Project and high level recommendations for compensatory mitigation can be found in Attachment 3.<br>As we note above, the DEIS provides an inadequate analysis for quantifying the absolute number of birds likely to be lost in collisions with turbines, and neglects to evaluate such numerical impacts on ESA listed species and nocturnal migrants. Further, the DEIS does not consider impacts to many of the species occurring in the area that are likely to be affected, resulting in what is likely a gross underestimate for potential losses of birds. The number of birds affected is uncertain due to the lack of available technology to accurately measure impacts (e.g., collisions) at the species level, or the fate of those birds after a collision event (e.g., injury, morbidity, or mortality). We further note that, as discussed above, the agencies still have conservation obligations under frameworks, including ESA and MBTA. Based on studies of ESA listed species alone (discussed above), it seems likely that birds protected by federal laws will be killed in collisions with turbines under the currently anticipated industry build-out scenario for the Atlantic OCS. As such, compensatory mitigation should be provided for bird mortality resulting from this development, and particularly for species of conservation concern.<br>Directed mitigation can result in meaningful beneficial outcomes. For example, the Montrose restoration, a $63 million mitigation package compensated for migratory seabirds in Mexico, assisted with the recovery and delisting of Pacific Brown Pelican.304 Additional recommendations on how to effectively design appropriate levels of compensatory mitigation can be found in Attachment 3.<br>Compensatory mitigation requirements under Section 7 of the ESA were essentially ignored by the previous administration. We urge the current administration to observe compensatory mitigation requirements for species currently listed and under listing consideration for the ESA which may be impacted by offshore wind development: Piping Plover, Red Knot, Roseate Tern, and Black-capped Petrel.<br>Seabirds are long lived and have delayed maturity and low fecundity. These unique life-history traits require a substantial, long-term commitment to reach the offset needed. Given that compensatory mitigation is time-consuming from conception to successful implementation, we urge developers and agencies to commit to this and initiate action as soon as possible. | BOEM does not anticipate incidental take that would require compensatory mitigation as described in the BA (BOEM 2022) which is available on BOEM's website. The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is also publicly available on BOEM's website. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. |
| BOEM-2022-0045-0110 | 123 | Submitter provided additional attachment as follows:<br>Offshore Wind Energy Potential Impacts, Monitoring Needs and Recommended Mitigation Measures for Bats and Birds | Thank you for your submission. |

## Commercial Fishing and For-Hire Recreational Fishing

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| BOEM-2022-0045-0111 | 1 | The Department's comments, which are supportive of responsible and sustainable offshore wind development, are intended to highlight New York State's interests in the Project's development and ensure that the needs and concerns of affected New York State stakeholders, specifically commercial and for-hire recreational fishing industries, are sufficiently considered and addressed. New York's robust fishing industries are of economic significance to the State and will be influenced by how BOEM's Draft Fisheries Mitigation Guidance2 is applied to the current tranche of offshore wind projects. The waters off Southern New England contain important fishing grounds for commercial vessels landing in New York State as well as encompass long-established routes to access productive fishing grounds far afield. New York State seeks to ensure that navigational safety is prioritized and that use conflicts between mariners and offshore wind development and operations are minimized to the maximum extent possible. In the DEIS, NYSDOS was pleased to see a quantitative analysis of fisheries economic exposure of the wind farm area and cable corridors, which encompasses the entire project area and should be the standard for all offshore wind environmental reviews. BOEM's other offshore wind EISs released this year have omitted the analysis for export cable corridors. BOEM's and the National Oceanic and Atmospheric Association (NOAA) Fisheries' commendable release of draft fisheries mitigation guidance articulates the importance of developing accurate revenue exposure estimates in order to evaluate the potential for income losses to fishing industries and the need for compensation. Including the cable corridor in this analysis ensures a more complete and accurate valuation of the revenue exposure estimate to inform forthcoming compensatory mitigation measures. NYSDOS was also pleased to see BOEM refine the typically broad study area stretching from Maine to North Carolina to analyze a well-defined and appropriate Regional Fisheries Area (see DEIS Figure 3.9-2). New York State has routinely commented that the range used to evaluate the average revenue and landings is too broad to evaluate a specific fishing area and leads to a diluted assessment of the overall effect on fisheries and fishing industries that may be affected by the Project. Establishing a project-specific Regional Fisheries Area should be the standard for all offshore wind environmental reviews.<br>As BOEM prepares the Project's Final EIS, it should clearly articulate that a compensatory mitigation program:<br>1. Is needed to mitigate unavoidable adverse impacts to fishing industries; and<br>2. Must be inclusive, fair, and equitable so that demonstrated impacts can be offset regardless of where fishermen land their catch or where shoreside businesses are located | Thank you for your comment. BOEM has considered the recommendations provided in this comment and all feedback received on the DEIS and through consultations. Appendix F of the EIS has updated the comprehensive list of monitoring and mitigation being considered and evaluated. |
| BOEM-2022-0045-0089 | 1 | We are very concerned with the speed that the Ocean that we use for fishing is being changed by activities related to the installation of wind turbines. Our members are reporting changes in the area surrounding the Block Island Wind Farm's 5 turbines and, in the areas, further to the south and east where geophysical surveys are being conducted prior to actual turbine construction.<br>The proposed Revolution Wind project location and the location of the export cable includes many areas where our members routinely fish for cod, summer flounder, striped bass, tuna, sharks and many other species critically important to the economy of Rhode Island recreational fishing. We are particularly concerned that, due to unreasonable political pressure, this project will be permitted to move forward without proper consideration of ecological and fisheries impacts especially in light of the recent history of uncontrolled permitting of the South Fork Wind project on Cox Ledge in areas specifically noted by the OSAMP as Areas of Particular Concern because they are glacial moraines. We believe that the DEIS fails to identify the extent of recreational fishing, either in the form of "for-hire" or private boat fishing in the area of the turbines or along the cable route and therefore does not assess the potential impacts to recreational fishing. | As noted in the DEIS, BOEM excluded 70 miles of Cox Ledge from offshore wind energy development because of the importance of the area to for-hire recreational fishing and commercial fisheries. The description of for-hire recreational fishing in the Lease Area was based on the best available data from National Marine Fisheries Service. Data on for-hire recreational fishing along the export cable corridor were not available. |
| BOEM-2022-0045-0111 | 2 | The process for determining eligibility for compensatory mitigation claims should be transparent, data-driven, and uncoupled from states' Coastal Zone Management Act (CZMA) reviews and, in so doing, provide compensation for demonstrated impacts to communities and businesses in a fair and equitable manner. New York does not have a CZMA review of the Revolution Wind project, yet Montauk, NY was identified as deriving 64% of average annual revenue from the Regional Analysis Area (see DEIS Table 3.9-8). Clearly, it is vitally important for New York fishermen to be eligible for compensation from demonstrated impacts due to offshore wind development. Therefore, NYSDOS supports the federal government working with states and affected stakeholders to calculate the compensation amount(s) through a regional framework. | Thank you for your comment. BOEM has considered the recommendations provided in this comment and all feedback received on the DEIS and through consultations. Appendix F of the EIS has updated the comprehensive list of monitoring and mitigation being considered and evaluated. |
| BOEM-2022-0045-0072 | 2 | Another outstanding topic is the potential impact of the construction and operation of the RWF on the region's commercial and recreational fisheries. CZM has received and reviewed the draft fisheries exposure analysis dated September 14, 2022 and produced by Woods Hole Oceanographic Institution for RWF. Discussions between the proponent and state agencies on the | Thank you for the comment. |

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| | | methodology and results are ongoing. The proponent should continue to coordinate with CZM and the Massachusetts Division of Marine Fisheries regarding potential economic exposure of Massachusetts fisheries to the RWF project and proposed compensatory mitigation to offset anticipated losses to the Massachusetts fishing industry as a result of the proposed project. The FEIS should include an updated economic exposure analysis, as necessary, and proposed mitigation resulting from these discussions | |
| BOEM-2022-0045-0070 | 2 | It is our hope and expectation that final guidance for mitigating impacts on commercial and recreational fisheries related to project siting, design, navigation, access, safety measure and most importantly financial compensation will be completed before a final Environmental Impact Statement on the Project is finalized. It is also imperative that recreational fishing be considered in this category. We provided extensive comments regarding fisheries mitigation in our comment letter submitted to BOEM on August 22, 2022. A copy of that comment letter is attached. Our primary concern, which is also evident in this environmental impact statement, is the lack of enforceable measures relative to fisheries mitigation. We recommend that the language in the Project filing that reads "if adopted" be changed to "when adopted" and all measures be consistent with the final mitigation recommendations of BOEM. (Table 3.9-28. Proposed Mitigation Measures- Commercial Fisheries and For-Hire Recreational Fishing) We acknowledge and support the language in the filing that a compensation mitigation program "will mitigate "indefinite" impacts to a level where the fishing community would have to adjust somewhat to account for disruptions due to impacts, but income losses would be mitigated. (p. 3.9-77) We recognize that not all mitigation measures are within BOEM's statutory and regulatory authority but could be adopted and imposed by other governmental entities. Yet, we feel strongly that if BOEM decides to approve the Project's COP, then mitigation and monitoring must be clearly stated and identified. If such measures are not adopted, specific reasons for non-adoption must be presented and verified. | Thank you for your comment. BOEM has considered the recommendations provided in this comment and all feedback received on the DEIS and through consultations. Appendix F of the EIS includes an updated list of mitigation and monitoring measures considered and evaluated. Final mitigation measures will be outlined in the Record of Decision. |
| BOEM-2022-0045-0096 | 3 | Impacts to commercial fisheries and for-hire recreational fisheries<br><br>Included in Rhode Island CRMC's federally approved coastal management plan are enforceable policies used by the agency its review of offshore renewable energy projects, including the Revolution Wind Project. Ocean SAMP § 11.10.1(H) and (I) state the enforceable policies recognizing the importance of complex bottom habitat (i.e. glacial moraine) to the Rhode Island commercial and recreational fishing industries. See 650-RICR-20-00-11.10.1(H)-(I). The "finfish, shellfish, and crustacean species that are targeted by commercial and recreational fishermen rely on appropriate habitat at all stages of their lifecycles" and "spawning and nursery areas are especially important." Id. As stated above, large portions of the Proposed Action is sited in complex habitat, and despite the DEIS stating impacts to benthic habitat as being moderate adverse and moderate beneficial, the likely large scale death of millions of eggs, larvae and invertebrate species from WTG and IAC installation/operation will have long-term adverse impacts on the Rhode Island fishing industry. See DEIS at ES-7. Fishermen will likely be displaced from the area due to reduced catch and additional user conflicts will result. The Proposed Action does not align with the CRMC's enforceable policies regarding the protection of complex bottom habitat as it pertains to the commercial and recreational fishing industries. Minimizing the number of WTG positions in complex bottom habitat and reducing the footprint of IACs will aid in achieving this policy objective.<br><br>An inability to achieve proper cable burial depth of 4-6ft below the seabed in complex hard bottom areas will create a navigational hazard and expose fishermen and the wind developer to unnecessary conflict. As previously stated, a large portion of the Project area is sited in complex hard bottom seabed. Cable burial tools will likely face difficulty in achieving proper burial depth which may in-turn lead to an increased amount of secondary cable protection in the form of articulated concrete mattresses. These mattresses present new hangs for fishermen and will force marine users to avoid an area all together, risk losing/damaging fishing gear, or modify fishing practices to avoid new hangs and potentially reduce their ability to fish economically. For example, there are seven known cable crossings for the export cable and the export cable will cross IAC two to four times. See DEIS at 2-21. Each cable crossing could require up to 1,640feet of secondary cable protection meaning up to 18,040feet (approximately 3.45miles) of secondary cable protection could be used. See DEIS at 2-14. This is not including cable protection that may be used near WTG foundations and OSS foundations. The best option to avoid adverse impacts from secondary cable protection and avoid creating new hangs for fishermen is to ensure cable burial depth where possible, minimize the number of WTG positions in hard bottom seabed and reduce the footprint of IACs. | Thank you for the comment. All of these concerns were considered and evaluated in the EIS, including alternatives that reduce the installation footprint in complex hard bottom habitats (see Alternative C). The feasibility of cable burial and secondary cable protection is based on assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. The burial depth requirement would be evaluated and applied to any action alternative, and BOEM can develop and apply any appropriate mitigation measures as a result. If adequate avoidance could not be achieved through mitigation, then BOEM could require an update to the COP that could require additional NEPA review. |

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| BOEM-2022-0045-0089 | 3 | The Revolution Wind<br>Rhode Island DEIS also fails to address OSAMP Areas of Particular Concern including moraines and is also located closer to ports used by RI recreational fishers and includes major disturbance into Narragansett Bay because of the proposed placement of the Export Cable. | The impact analysis of the DEIS notes that the installation of the offshore export and inter-array cables could temporarily restrict vessel movement and thus transit and harvesting activities along the RWEC. |
| BOEM-2022-0045-0069 | 3 | RIDEM suggestions for BOEM on requirements for the developer:<br>• Work with the Rhode Island commercial and recreational fishing industries to minimize impacts to fishing activities and the biological resources on which they rely to the greatest extent possible and offer appropriate mitigation plans if adverse impacts cannot be avoided.<br>o Mitigation plans should be developed with substantial input from the Rhode Island Fishermen's Advisory Board (FAB) and the CRMC. | Thank you for your comment. BOEM has considered the recommendations provided in this comment and all feedback received on the DEIS and through consultations. Appendix F of the EIS includes an updated comprehensive list of monitoring and mitigation being considered and evaluated. Final mitigation measures will be outlined in the Record of Decision.<br><br>The Revolution Wind COP includes a Fisheries and Benthic Monitoring Plan which has been incorporated into the EIS as part of the proposed action. The results of the surveys and monitoring efforts outlined in this plan will be distributed to researchers through participation in regional telemetry networks such as the Ocean Tracking Network or the Mid-Atlantic Acoustic Telemetry Network (MATOS), and provide valuable long-term data on fish populations and behavior in the project area. Revolution Wind will also disseminate the annual monitoring results through a webinar or an in-person meeting which will also offer an open forum for federal, state, and academic scientists to ask questions or provide feedback on the data collection protocols. Likewise, following each year of monitoring Revolution Wind will coordinate with the Contractor(s) to host an industry workshop to disseminate the results of the monitoring activities to local fishing industry members. Although all interested stakeholders will be invited to the industry workshops, concerted efforts will be made to ensure that members of the Rhode Island Fishermen's Advisory Board (FAB) and the Massachusetts Fisheries Working group attend. |
| BOEM-2022-0045-0065 | 3 | BOEM's draft analysis recognizes the potentially major impacts to fishing, marine mammals, and navigation of the proposed project. Yet, no proposals offered by the fishing industry that would mitigate impacts from the Revolution Wind project were evaluated as alternatives in the DEIS, including clear, specific requests in RODA's comments on BOEM's project scoping process.6 These are summarized below; a full discussion is included in RODA's scoping comments (attached as Appendix I) and recent comments on the Ocean Wind DEIS (attached as Appendix III). 1. The Fisheries Communication Plan and Fisheries Monitoring Plan provided with the Construction and Operations Plan (COP) are deficient and were not timely provided to the public for comment. | Thank you for your comment. BOEM has considered the recommendations provided in this comment and all feedback received on the DEIS and through consultations. The Fisheries Research and Monitoring Plan was reviewed by state and federal agencies and revised by Revolution Wind to incorporate recommendations by those agencies. Appendix F of the EIS includes an updated comprehensive list of monitoring and mitigation being considered and evaluated. |
| BOEM-2022-0045-0098 | 4 | There has been no effective mitigation by BOEM for fishermen and their fishing boats if a previously unearthed UXO is dragged up by a fishing boat. There should be a true liability analysis done as developers are not making clear where these devices are, and not notifying fishermen early, nor are they protecting them from future injury. All must be analyzed as part of the DEIS. | Notification procedures for MEC/UXO are consistent with the Department of Defense Environmental, Safety and Occupational Health Network and Information Exchange (DENIX) for Maritime Operations. In the event of a positively identified MEC/UXO, BOEM, BSEE, and other relevant agencies are notified by the lessee. In addition, there is a Local Notice to Mariners (LNM) filed which informs the communities the location of the MEC/UXO. A copy of the LNM is sent to NOAA for nautical chart inclusion.<br><br>The identification of manmade hazards is required by 30 CFR 585.627 and 30 CFR 585.646, lease stipulations, and terms and conditions. BOEM has requirements for analyzing MEC/UXO risks that are outlined in "Supporting National Environmental Policy Act Documentation for Offshore Wind Energy Development Related to Munitions and Explosives of Concern and Unexploded Ordinances." Projects that plan for mitigation methods like relocation, removal, or detonation, must analyze the impacts. |
| BOEM-2022-0045-0089 | 4 | We believe that all disturbance inside of the COLREG line should be conducted during winter months to minimize impacts on the extensive use of this entire area by recreational fishing interests. | Thank you for your comment. Environmental Protection Measures (EPMs) committed to by the applicant are included in Table F-1 of EIS Appendix F. Additional mitigation measures are included in Tables F-2 and F-3 of EIS Appendix F. |

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| BOEM-2022-0045-0046 | 4 | While this wind farm may have impacts to larger commercial fishery catches in the near future they will unlikely impact our small scale fishers and may benefit them (especially our recreational fishing guides). Are the impacts to small scale local fisheries being prioritized over large commercial fisheries? | The EIS assesses potential impacts to both large-scale and small-scale fisheries. |
| BOEM-2022-0045-0089 | 5 | Potential short & long term impacts due to resuspension of toxic materials and turbidity increase must be assessed in detail. | The reader is referred to Section 3.21 for an analysis of impacts to water quality. |
| BOEM-2022-0045-0117 | 5 | Thank you. I have to move that a little closer so I can see. I'm reading off my sheet of paper here, because I don't want to go over my five minutes. My name is Dave Monti, M-O-N-T-I. I'm a Charter Captain and Angler from Rhode Island. For 10 years, I kept my charter boat right down the street here in Greenwich Cove. And now my charter boat's in [Indiscernible], Rhode Island. I'm a Board Member at the American Saltwater Guides Association, an active Board Member of Rhode Island Saltwater Anglers, Vice Chair of the Rhode Island Marine Fisheries Council, and a Member of the Narragansett Bay Estuary Program Steering Committee, and the Rhode Island Party & Charter Boat Association. I thank BOEM, NOAA, the Army Corps, and all the other National and State Agencies, and the Revolution Windfarm for proposing and working on this project. Without it, we would miss out on badly needed renewable energy. The fish I catch today as a Charter Captain are vastly different in type and abundance due to climate-change impacts. The fishing industry needs renewable energy to help stem the tide on negative-climate impacts. This was heard loud and clear this spring at the University of Rhode Island Graduate School of Oceanography Baird Symposium on Climate Impacts on Recreational Fishing and Boating. One after another, Anglers, Recreational Fishing Industry Leaders, and Area Charter Captains testified how they are being impacted by climate. And Scientists, including the Chief Science Officer for NOAA, explained why we Anglers are experiencing these climate impacts. We need the Revolution Windfarm to help stem the tidal climate impacts. The Revolution Windfarm has acknowledged the importance of private recreational fishing and has reached out to Recreational Anglers with Leader interviews, surveys, in-person meetings, a series of online [indiscernible] throughout the pandemic, and research, research specifically for recreational significant data for stocks like [indiscernible]. Recreational Anglers are supportive of offshore wind as long as the farms are developed responsibility with research before, during, and after construction. Revolution Windfarm is being responsibility developed with an aggressive research and monitoring plan in place that Recreational and Commercial Fishermen helped develop, the kind of research and monitoring plan that every windfarm should have. Yes, I say there will be positive impacts as I honestly believe offshore windfarms will have a major positive impact on habitat and fish. A peer-reviewed mega analysis of multiple fish-abundant studies in Europe went on to relay its greater fish abundance inside windfarms than outside. And at Block Island, recreational fishing there is good, too, perhaps a bit better than before, even though fishing pressure has increased 200 percent. Fish there now include large striped bass and bluefish, in addition to scut, black seabass, lute, and cuttle. Spear Fishermen dive on the pylons. And Rod-and-Reel Anglers use eels to target striped bass right next to the pylons. At the Block Island Windfarm, gillnets, pots, trawlers, and Recreational Fishermen all fish in the same windfarm area. And this year, we had a seven-year study completed at the Block Island Windfarm. For all areas of the windfarm, in [indiscernible] areas, as well as in two control areas, results show that there is a great fish abundance of cod and black seabass in the windfarm. And every other species, it was just about even. The reef effect of the foundations and associated scour protection will have major positive impacts for fishing in the Revolution Windfarm, just as it had in Block Island. To summarize, I reject the idea that fishing will be worse in the Revolution Farm. It will likely be better, as science tells us. I understand the negative impacts during construction. And Fishermen should be compensated. But existing science and experience tells us there will be no long-term negative impacts, but rather positive impacts. As [indiscernible] by the Revolution Windfarm Draft Environmental Impact Statement, impacts will be negligible and often temporary. I encourage BOEM and all to approve the EIS and Construction Plan and allow this project to be built to generate the energy we need, while being sensitive to the environment and helping us stem the tide on climate impacts. Once again, thank you. And I am grateful for this opportunity to come here tonight. | Thank you for your comment. The adverse and beneficial impacts of the proposed action to Commercial Fisheries and For-Hire Recreational Fishing as well as Recreation and Tourism (including recreational fishing) were evaluated in Sections 3.9 and 3.18 of the EIS, respectively. |
| BOEM-2022-0045-0114 | 6 | There is one area of analysis where an expansion of the categories would be beneficial. The current analysis approach combines "Commercial Fisheries and For- Hire Recreational Fisheries". Based on the depth of analyses compiled to date and the extensive comments provided by certain commercial fishing interests and recreational fishing advocates and charter boat captains, it is very clear that these two groups have decidedly different views of OSW. The commercial interests typically express a wide range of concerns and trepidations, while the recreational fishing interests are uniformly very positive and supportive, talcing particular note of the prospect of new productive "mini reef' environments at each WTG monopole/scour pad. In my opinion, separating the commercial and recreational fishing interests would make for a more informative analysis. | Thank you for your comment. Commercial and for-hire fisheries were analyzed collectively in an effort to streamline the assessment given the substantial overlap in IPFs and types of impacts to both categories. While opposition or support of the proposed project were not drivers for how BOEM conducted the analysis, the differences in impacts to each category, including potential beneficial impacts, were discussed throughout Section 3.9 and Appendix G. |

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| BOEM-2022-0045-0089 | 6 | In addition, a preliminary review of the Fisheries Research and Monitoring Plan dated October 2021 identifies no plan for sampling using techniques employed by recreational fishing. As RISAA has commented for many years, this Plan must be expanded to include fisheries sampling using rod and reel surveys before, during, and after construction both in the turbine area and in the area planned for the export cable. In addition, a significant effort must be made to determine the value of recreational fishing in both of these areas. This project must not be allowed to continue the fallacy established by South Fork Wind that just because there are not good data quantifying the value of recreational fishing in some areas, then recreational fishing does not exist and is worthless. The proponents of this project have a responsibility to quantify the importance and value of existing recreational fishing through observation, survey, interviews, data review and whatever other methods are available prior to drafting any Impact Study on this proposed project. It is not acceptable to just say that recreational fishing does not exist, because it does exist and it is important to the RI economy and the livelihood of thousands of Rhode Islanders and it will be impacted by the proposed project. | Thank you for your comment. The Fisheries Research and Monitoring Plan was reviewed by state and federal agencies and revised by Revolution Wind to incorporate recommendations by those agencies. For-hire recreational fishing is analyzed in the Commercial Fisheries section of the EIS. Private recreational fishing is analyzed in the Recreation and Tourism section of the EIS. |
| BOEM-2022-0045-0086 | 6 | Along with the environmental benefits of these artificial reefs, these habitats are expected to result in increased opportunities for recreational anglers in the region. The number of trips is expected to increase for private recreational anglers as well as charter and party vessels. Additional revenues are expected for charter and party vessels as a result of the Project. | The potential benefits of the proposed project to for-hire recreation fishing, including those associated with artificial reef effects, are described in Section 3.9.2 of the EIS. |
| BOEM-2022-0045-0117 | 6 | Good everything, everyone. Probably would have made more sense if I spoke before some of the guys who work with us. But my words aren't nearly as important as the Fishermen who are directly affected by this. So, I appreciate the opportunity to speak. Gordon Videll, V-I-D-E-L-L, and I'm the CEO of Sea Services North America. And essentially what we are is a consortium of working Fishermen who -- that range from Massachusetts to Virginia. And we're expanding rapidly. Our mission to increase commercial fishing safety and provide Fishermen with the opportunity to work as scout and safety vessels to Offshore Developers. And I just have to say none of this would be possible without Ørsted's absolute commitment to working with the Fishermen. And they reached out to a lot of people. And we were lucky enough to continue those conversations and build a trust. And here we are. So, now, we have eight boats being prepared for this project. And Ørsted is solely responsible for doing that. Now, eight boats may not sound like a lot. But that's eight boats for this project times five, six Crewmembers. That's real money for real families in real communities. So it couldn't be more important. We want to thank BOEM and the Staff for the years of effort that has gone into this. We appreciate it. And I think that everybody who's actually read the Plan understands their level of commitment to getting this right. And we all appreciate that. But I also want to say that no plan's perfect. But what you've done, coupled with Ørsted's commitment to the fishermen of the community, is a pretty good start. And we're very thankful for all of that. The national security and general welfare require a vast number of energy sources. And offshore wind is a significant piece of the solution. Our Fishermen Partners didn't run to that idea. But they've gotten there. And it's through education. It's hard work. And it's a trust-building exercise. And now that they're seeing the benefits, like I said, we are expanding very quickly. And they're seeing real benefits. The work they're doing here, it will be very consistent, as opposed to the problems they have with fishing. I mean, we have quota issues. We have Regulation issues. We have climate change. And we have ongoing problems staffing a lot of the posts. So we're working with the Workforce People hopefully on some of this stuff, as well. But what we've come to -- they've come to understand is the negative impacts -- and we can't say there's not going to be any disruption. We know there is. But the benefits are to the Fishermen and the communities, far outweigh the negative -- the very short-term negatives. There are many factors that we have to contend with. Like I said, the Commercial Fishermen, it's not easy work. And oftentimes, it ebb-and-flows, pun intended. But this works up letting their fishing -- gives them a career. And that couldn't be more important for these struggling fishing communities. As I said, from actively preparing eight boats for this project, we're currently working with 15 boats. And we need 45 boats with the people we're negotiating with now, like I said, from Virginia to Massachusetts. So there's an opportunity for a lot of people. And we hope the Fishermen contact us. We have a lot of outreach going and we're pretty busy. And there's an opportunity for everybody. And Ørsted is to thank for that. They're bringing Fishermen to the table. And that wasn't happening until they engaged us with a significant Framework Agreement that we've been building on. And I'll just close with this. We have to weigh our need for energy against the small disruption to the environment, Fishermen, and the effected communities. We've seen firsthand benefit of working together. And we hope everyone understands BOEM's hard work so far, and also understands the commitment that Ørsted's put forth. I'd love to share more of this story with everybody. But it's been absolutely overwhelming. And there is a commitment here that I don't think anybody would have expected. So we're looking for -- to help. And we believe that you guys have done a great job. And we hope that this goes forward as quickly as possible. | Thank you for the comment. |

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| BOEM-2022-0045-0114 | 7 | The Habitat alternatives effectively remove the center section of the Lease Area (as many as 36 WTG positions over - 30,000 acres of sea bottom). The area in question is considered to be complex fisheries habitat by NMFS. While an important consideration, elimination of this many WGT positions, each of which accounts for less than 1 acre of permanent alteration, is, in my opinion, overkill and far out of balance with the possible fisheries benefit. | Thank you for your comment. BOEM has considered these issues in the FEIS and has identified a preferred alternative in Section 2.1.7 of the EIS. |
| BOEM-2022-0045-0118 | 7 | And moving forward, at least pursue some sort of mechanism where Fishermen can benefit from upgrading their equipment, either the Developers or somebody putting forward some money to fund that, because it is an issue and it will be an issue. | Thank you for the comment. |
| BOEM-2022-0045-0059 | 8 | UXO is also a problem for fisheries, and these impacts have not been fully discussed or analyzed in the DEIS. As demonstrated by the attached Orsted Mariners Briefing, UXO is already being unearthed discovered before the FEIS/ROD for the Revolution Wind project. UXO unearthed by developer activity presents a very real safety hazard for fishing vessels and crew, as well as contamination of catch or destruction of resource.<br>Not only can UXO contain explosives; it can also contain nerve agents or burn agents such as mustard gas. For example, in 2010, a commercial fishing vessel encountered mustard gas while fishing, hospitalizing some crew and causing quarantine of the vessel and remaining crew aboard and51 the 504,000 lbs of clam harvested by the vessel to be destroyed.52 Again, in 2016, a commercial clam vessel pulled up UXO, causing second degree burns to crew and the destruction of over 700 cases of chowder.53 A commercial fishing vessel in the UK recently encountered UXO, injuring all crew members aboard,54 and US fishermen hauling aboard UXO in the past have been forced to scuttle their vessel, taking years to recover losses with payment from the government.55 Most recently, Vineyard Wind, a project with a BOEM-approved ROD, has dug up dug up a 1000 lb UXO from roughly 100 feet beneath the seabed.56 This UXO, formerly buried 100 feet below the surface so as not to interact with commercial fishing vessels operating in the area, has now been sitting on top of the ocean floor in a heavily fished area since the month of July.57 This UXO now presents a life threatening hazard to commercial fishermen working in the area, yet BOEM does not require any developer action to be taken other than noticing to the USCG and preparing UXO survey planning for BOEM related to construction. 58 BOEM requires no apparent standard procedure for UXO removal/detonation, nothing to ensure the safety of commercial fishermen operating in the area, nor any impacts analysis conducted on marine mammals regarding UXO removal/detonation. This is arbitrary and capricious. It is also a violation of the OSCLA requirement for “safety”. This is not acceptable. UXO cannot be continued to be unearthed by developers and left on commercial fishing grounds, with no lease or permit requirements to safely dispose of the UXO in a manner that both provides for safety of US commercial fishermen per OSCLA and protection of critically endangered species per the ESA. Clearly, given the information contained above in this comment, this is not currently being achieved by BOEM in the DEIS nor by the developer’s COP. Neither are there mitigation or compensation proposals related to UXO- induced injury, vessel damage, or loss of product caused by offshore wind construction activities found anywhere in BOEM’s Draft Fisheries Mitigation Guidance document. These are glaring omissions, and we request that they be included and analyzed in the Revolution Wind DEIS.<br>Revolution Wind’s own COP states that the developer plans to address UXO via one of three methods: detonation, low-order burnout, or relocation59 . Each method will have its own potential adverse impacts and require its own analysis. UXO detonation causes obvious problems for marine mammals, fish and wildlife, whereas low-order plasma burnout of the UXO will often result in sea pollution through the deposit of hazardous waste on the seabed and still carries the consequences of unintended explosion, issues being acknowledged in the UK as problematic to the nation’s offshore wind ambitions.<br>Relocation poses a safety risk for bottom tending fisheries, which cannot be ignored due to BOEM’s legislative mandate to conduct offshore wind leasing in a manner that provides for safety, and also carries the risk of accidental detonation. The Revolution Wind DEIS does not comprehensively address any of these issues, whether from a safety standard for commercial fishing vessels and crew per OSCLA, nor a biological perspective re Endangered Species Act requirements for North Atlantic right whales, nor a Clean Water Act perspective should low-order plasma burnout be selected. All UXO options- detonation, low-order burnout, relocation- must have a thorough and comprehensive analysis, with endangered North Atlantic right whales receiving their specific own section, for full compliance with the relevant laws, including NEPA, OSCLA and the Clean Water Act. | Notification procedures for MEC/UXO are consistent with the Department of Defense Environmental, Safety and Occupational Health Network and Information Exchange (DENIX) for Maritime Operations. In the event of a positively identified MEC/UXO, BOEM, BSEE, and other relevant agencies are notified by the lessee. In addition, there is a Local Notice to Mariners filed which informs the communities the location of the MEC/UXO. A copy of the LNM is sent to NOAA for nautical chart inclusion.<br><br>The identification of manmade hazards is required by 30 CFR 585.627 and 30 CFR 585.646, lease stipulations, and terms and conditions. BOEM has requirements for analyzing MEC/UXO risks that are outlined in “Supporting National Environmental Policy Act Documentation for Offshore Wind Energy Development Related to Munitions and Explosives of Concern and Unexploded Ordinances.” Projects that plan for mitigation methods like relocation, removal, or detonation, must analyze the impacts. |
| BOEM-2022-0045-0118 | 8 | The second thing is the inter-array cabling. I know that there was a comment that the 1 nautical mile limit enables the movement of vessels and fishing. I would say that if you overlay the inter-array cabling on that, it becomes more of an issue. So, to the degree possible, we suggest the Developers be required to make inter-array cabling consistent among all of the arrays, so that there are corridors where it's easy to do a dredge or a trawl, or anything else, so that there isn't cable conflict, | Burial of the cables would typically target a depth of 4 to 6 feet below the seafloor to the maximum extent practicable. Cable protection in the form of rock berms, rock bags, and/or mattresses would be installed on the IAC and OSS-link cable where burial cannot occur, where sufficient burial depth cannot be achieved because of seafloor conditions, or to avoid risk of interaction with external hazards as determined necessary by the cable burial |

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| | | because, if you look at the inter-array cabling on this, there are a couple instances where you'll see it's not very consistent, and then it's sort of problematic for one, if you're doing any kind of length in trawl, or any sort of fishing line on the bottom. | risk assessment, and where the cables cross existing submarine assets. The COP estimates up to 10% of the route for each IAC would require cable protection and the lessee will provide the location of all cables and associated cable protection to NOAA's Office of Coast Survey after installation for inclusion on nautical charts. |
| BOEM-2022-0045-0114 | 9 | The Commercial/Recreational Fishing Assessment (Section 3.9) spans some 78 pages of dense text in the DEIS proper. The writeup is very thorough but forces the reader to search for specific data and perspective on the 83,798 acre Revolution Wind lease area. For example, on page 3.9-14, the reader learns that "As shown in Figures G-1 through G-13 in Appendix G, the commercial fishing revenue for most FMP fisheries was a low level of intensity within the Lease Area and along the RWEC compared to adjacent areas ... ". The point is driven home by Table 3.9-9 which indicates that the average annual revenue generated by FPV in the entire Lease Area was $1,059,000 or less than $13 per acre (2008-2019 data). The leading species on a revenue basis was American lobster. This fixed gear fishery should not be affected in any significant way by WTG operation. The next two biggest revenue species are sea scallops anp monkfish. As previously noted, the Project which will generate electric power worth ~ $270 million per year, thus it can obviously cover potential fishing revenue losses, even under a conservative scenario where the entire lease area FPV catch ($1,059,000) is foregone during construction. Examined another way, the Projects' more than 1,500,000 tons per year of avoided CO2 emissions would have a value on the order of $75 million per year based on EPA's $50 per ton valuation (social cost of carbon). Notwithstanding these numbers, BOEM rates the Proposed Action impact on fisheries as "Minor to major adverse" (Table ES-2). Oddly, the No Action alternative is rated as Moderate to Major for commercial fisheries. What is the logic for these ratings? | Definitions of impact levels applied in the EIS are provided in section 3.3 of the EIS. The impact conclusions in Table ES-2 of the DEIS have been clarified and include impact determinations for the proposed action in comparison to both the existing baseline as well as in the context of cumulative activities. Appendix E (Planned Activities Scenario) describes the methodology used for assessing impacts from planned activities in the EIS. The geographic analysis area (GAA) is not used as a basis for analyzing the effects of the Proposed Action, which represent a subset of these broader effects and expressed over a smaller area. Thus, while Project-related impacts to fisheries are restricted to a relatively smaller geographic area, the GAA for Project impacts in the context of cumulative activities is necessarily large due to the range of the fisheries potentially affected by the action.<br><br>The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations. Under all of the alternatives, the overall impact to commercial fisheries and for-hire recreational fishing from any alternative would be moderate adverse as (a) mitigation would reduce adverse impacts substantially during the life of the proposed Project; (b) the affected activity or community would have to adjust somewhat to account for disruptions due to notable and measurable adverse impacts of the Project; or (c) once the impacting agent is gone, the affected activity or community, including traditional cultural practices, is expected to return to a condition with no measurable impacts, when remedial or mitigating action is taken. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in an overall long-term major adverse impact because some commercial and for-hire recreational fisheries and fishing operations would experience substantial disruptions indefinitely even if remedial action is taken. This impact level is primarily driven by climate change, fisheries management activities, and the presence of offshore structures from cumulative offshore wind development within the GAA. |
| BOEM-2022-0045-0059 | 9 | Based on BOEM's previous lack of accurate assessment of commercial fishing impacts, which we detail in our comments on BOEM's Draft Fisheries Mitigation Guidance (BOEM-2022-0033-0003)61 which we incorporate into this comment by reference, we do not have confidence that BOEM has conducted an accurate and comprehensive commercial fishing impacts analysis. Therefore, we request that BOEM make public all its models and numbers for calculating fisheries impacts so that they can be replicated by an industry economist and compared with other economic fisheries studies we have provided BOEM in the past. We request that this information be provided prior to the finalization of the Revolution Wind EIS. | Appendix G of the EIS provides an overview of the commercial fisheries data used in Section 3.9. It also provides a description of the methodologies and assumptions used to describe the dependency of fishermen on the Lease Area and to generate fishery exposure estimates with further information available at the links and reports provided within the literature cited. |
| BOEM-2022-0045-0118 | 9 | My main comment would be the future. As was pointed out by two commenters, uncertainty sort of rules the day here. We don't know where we will be from a fishing standpoint, from a stock standpoint five years from now, 10 years from now. It's uncertain. So it's not to suggest that this shouldn't be build. But what I would suggest is that BOEM commit to follow-up, either in the EIR or in the COP, to say that, five years from now, a Developer needs to, as I said, put their money where their mouth was. They've said they won't have an impact on fishing. Fine; understood. And that means somebody needs to take that into account in the EIR. What we're saying is the burden shouldn't be five years from now on the Fishermen to come back and say, you did have an impact. The burden should be on the Developer five years from now to take some studies, go to NOAA, find the stats, and come back to BOEM and say, look, we aren't having an impact, because it's not fair to take their word for it now and then require Fisherman five years from now, 10 years from now, to be the ones to come forward and say, you actually did have an impact on us. So if you're going to take the Developer's word for it now, what we're suggesting is there needs to be a built-in review period at some point in the future consistently, so that you're monitoring that and not just taking their word for it. | Thank you for the comment. Post-construction monitoring measures are required for several resource areas (e.g., benthic habitat), but are not currently required for commercial fisheries revenue and landings. Analyses of projected economic exposure are provided in the EIS Section 3.9. |

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| BOEM-2022-0045-0114 | 10 | My puzzlement continues when I read that the overall cumulative impact to commercial fisheries (and for hire recreational fishing) would be "major adverse". Some insights are provided beginning on page 3.9-40. On page 3.9-44, BOEM explains that a very small fraction of vessels (0.9%) generated over 50% of their annual revenue from one or more lease areas, thus ascribing a moderate to major score on this basis. Given the ability of vessels to fish other areas, this seems like the tail wagging the dog. The real issue faced by commercial fishermen is migrating/thinning stocks based on ocean warming, increasing acidification and in some instances overfishing and the ensuing management measures. If changes in ocean conditions are to be limited, clean OSW must be an important part of the solution. Granted, no one project will make a significant difference in a global problem, but a 1.5 million ton per year CO2 reduction from a single OSW project is a very positive and productive move. Multiply this by the OSW projects on the books, and those that will follow, and the US is making a serious contribution towards dealing with global climate change. I really think BOEM needs to rework this "logic" and put potential fisheries impacts from the Project in a far more balanced perspective. | Thank you for the comment. The "major" impact level is primarily driven by climate change, fisheries management activities, and the presence of offshore structures. The majority of offshore structures in the GAA for commercial fisheries would be attributable to the offshore wind industry. The potential reductions in GHG emissions from offshore wind is also considered in the EIS. |
| BOEM-2022-0045-0118 | 10 | I hear the word "impact". The placement of the five turbines in Rhode Island, the Fishermen in Sector 13 now fish 13 miles further out to sea because of that, verified by their BMS box. Also, the five turbines have now attracted invasive species. We have to protect the environment that's there now. I'm always amazed that the Environmentalists don't really speak up to the environment as it is today and what it will be in the future. | Thank you for the comment. Potential introduction of invasive species were considered in the EIS analysis. The potential impacts from the project were evaluated in the context of current conditions (i.e., existing baseline) as well as in the context of future conditions (i.e., cumulative impact assessment). |
| BOEM-2022-0045-0071 | 11 | The DEIS describes commercial and recreational fisheries within the lease area and the export cable corridor. Some fisheries will be impacted by activities within both the lease area and the export cable corridor, while other fisheries will be primarily impacted by one or the other. It is important to consider the differences in impacts due to the different activities which will occur in the lease area and the cable corridor and the different fisheries that operate in those areas. Different mitigation measures may also be relevant for the two areas. For these reasons, we support the approach of analyzing the lease area and export cable corridor separately in terms of their impacts on fisheries, as well as considering their combined impacts. This approach should be carried forward in future analyses of other wind projects. | Thank you for your comment. |
| BOEM-2022-0045-0100 | 12 | Fisheries Analysis: The fisheries data used in the analysis at large are incomplete, outdated, and do not reflect all of the metrics we suggested BOEM evaluate during our review of the PDEIS. The analysis does not consider impacts to fisheries not fully captured by Vessel Trip Report (VTR) data, including highly migratory species, lobsters, and conch, and does not discuss the number of vessels and trips affected by each alternative. Further, some of the data used to analyze project areas reflect outdated shapefiles on our website from 2021 including the Revolution Wind project area that is smaller than that identified in the EIS (see attached technical comments). Thus, the project-specific and cumulative impact analysis should be updated in the Final EIS, as necessary, based on the most accurate project areas. | Thank you for the comment. The data in the regional tables in the Affected Environment (Tables 3.9-1 through 3.9-8) have not been updated because these data are used to make regional comparisons in the revenue-at-risk estimates presented in the impact analysis for the action alternatives. For the Lease Area tables in the Affected Environment (Tables 3.9-9 through 3.9-12) the Final EIS includes the 2008-2019 data, but the data for these tables for 2020-2021 was downloaded from the NMFS GARFO website and included in Appendix G for reference. For the for-hire recreational fishing tables in the Affected Environment, the data was updated to 2008-2019 in the Final EIS for consistency with the commercial fisheries tables. In addition, a map showing the distribution of highly migratory species recreational fishing effort for 2002–2019 has been added. A note describing the limitations of the VTR data has been added to tables where applicable. Vessel trip and vessel number data was added to the impact analysis for each action alternative in the Final EIS. |
| BOEM-2022-0045-0071 | 12 | We appreciate that Section 3.9 lists not only the average annual ex-vessel value for many important fisheries in this region, but also includes the peak annual revenue over a 10-year time period. Fisheries revenues can fluctuate for a variety of reasons; therefore, an average value may not always accurately describe the economic value of the fishery. | Thank you for your comment. |
| BOEM-2022-0045-0059 | 13 | The DEIS concludes that impacts to commercial fisheries from cable placement and maintenance is long term, but only negligible to minor adverse. This is because BOEM expects that all cables will be buried and remain buried.74 Not only has the opposite been proven to be true in Europe, as we highly detailed in our Vineyard Wind SEIS comments on pages 38-43 and which we incorporate here by reference,75 but BOEM continues to view cable impacts in a vacuum. Significant numbers of cables already exist on the US Atlantic OCS. We have attached a NOAA cable chart of Southern New England/NY Bight as part of this comment. None of these existing cables contain the high electric voltages planned for offshore wind cables and therefore present less of a hazard. However, the cables from Revolution Wind and all other East Coast offshore wind projects will create cumulative impacts on top of these pre-existing cables, necessitate many cable crossings and associated cable mattresses/rock armoring, and related cable failures and maintenance. The East Coast is soon to become a spiderweb of hazardous, high voltage cables containing many overlaps with existing cables and each other, resulting in lost fishing grounds for mobile bottom tending gear. The Revolution Wind COP estimates one third of a mile of cable protection-including rock | A coastwide cumulative analysis of existing and proposed cables is beyond the scope of the Revolution Wind EIS. BOEM has included a boulder relocation mitigation measure in the FEIS which seeks to minimize the number of potential seafloor obstructions that may interact with bottom trawl commercial fisheries (see proposed mitigation measures in the EIS, Appendix F, Table F-2 and Table F-3). |

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| | | berm, rock bags, concrete mattresses- will be required for each cable crossing.76 Considering the number of cable crossings that will be occurring throughout the region, this carries considerable potential for interruption with commercial fishing operations. We request that BOEM conduct a coastwide cumulative cable analysis and include this analysis as part of the Revolution Wind DEIS.<br>Maintenance of existing cables damaged by rock armoring will also become an issue for commercial fishing operations around armored cable areas. Orsted, the developer applying for Revolution Wind approval, has already run into significant problems with its armored cables in the UK and Europe. Last year, 10 of Orsted's UK and European offshore wind farms required cable repair because the subsea cables had been eroded by scour protection placed by the developer.77 The more cable crossings, the more armoring necessary, the more probability of cable erosion and failure, and the more maintenance required, resulting in exclusion zones for commercial vessels while repairs are completed.<br>Additionally, the DEIS does not analyze impacts to commercial fishing from boulder relocation during cable laying activities. This is a glaring omission. The DEIS only analyzes boulder relocation impacts to other affected resources. Boulders present a threat to commercial fishing gear and commercial fishing operations. Boulder relocation from currently rocky bottom into potentially smooth bottom utilized by mobile bottom tending gear vessels represents a loss of fishable area. The cumulative impact of the Proposed Action together with other planned and approved projects presents the potential for significant changes to ocean bottom currently fished by commercial vessels. For the South Fork Wind Farm alone, a project containing only 15 turbines, Orsted expects to relocate 900 boulders.78 For a project such as Revolution Wind, which is proposing 100 turbines, will the number be exponentially higher?<br>We request that BOEM include estimates of number of boulders expected to be relocated for the Revolution Wind project, including cable routes, in the DEIS. These numbers are important for analysis purposes and a Cumulative Impact cables analysis. We also request that BOEM consider the enormity of the boulder plow equipment, available for viewing here: https://www.youtube.com/watch?v=8p7NV3fnYa8, and include the plowing of potentially hundreds or thousands of boulders in the project area (depending on the numbers estimated) in its impacts analysis to benthic habitats and EFH. | |
| BOEM-2022-0045-0071 | 13 | We did not find estimates of impacts to private recreational anglers in the DEIS, only for-hire recreational fishing. The FEIS should estimate impacts to this user group. | The potential impacts of the proposed project to private recreational anglers are described in the recreation and tourism analysis in Section 3.18. |
| BOEM-2022-0045-0069 | 15 | The developer has considered a variety of offshore fishing data sources: vessel trip reports (VTRs), vessel monitoring systems, and Marine Recreational Information Program data. Each data source has merits and limitations, as none of these data reporting systems were designed to assess the spatial distribution and value of offshore catch. A variety of studies are currently underway to generate additional data sharing systems and assessment tools.<br>• Other sources of data and improved methods should be incorporated into impact assessment as they become available. For example, vessel monitoring system (VMS), automatic identification system (AIS), and electronic monitoring data are becoming more prevalent and may present opportunities to improve upon existing methods. These data may offer higher spatial and temporal resolutions, and address challenges associated with self-reporting, when compared to VTRs.<br>• Additional methods are particularly needed to understand potential changes to recreational fishing activities. | The analysis of impacts to commercial and for-hire recreational fishing in the EIS is based on the best information available at the time. |
| BOEM-2022-0045-0071 | 17 | We have been tracking communications from the Southern New England developers related to unexploded ordnance (UXO) uncovered during site preparation activities. Exposed UXO presents a significant risk to mariners, especially those towing mobile gear that could bring UXO to the surface. While UXO is a known ongoing risk that mariners are already aware of, offshore wind construction activities are uncovering several devices. We recommend that the terms and conditions specify that developers are responsible for the disposal of UXO unearthed due to construction activities. Clear, timely, and repeated communication about UXO locations prior to removal is essential, beyond the weekly email mariner updates. | Notification procedures for MEC/UXO are consistent with the Department of Defense Environmental, Safety and Occupational Health Network and Information Exchange (DENIX) for Maritime Operations. In the event of a positively identified MEC/UXO, BOEM, BSEE, and other relevant agencies are notified by the lessee. In addition, there is a Local Notice to Mariners (LNM) filed which informs the communities the location of the MEC/UXO. A copy of the LNM is sent to NOAA for nautical chart inclusion.<br><br>The identification of manmade hazards is required by 30 CFR 585.627 and 30 CFR 585.646, lease stipulations, and terms and conditions. BOEM has requirements for analyzing MEC/UXO risks that are outlined in "Supporting National Environmental Policy Act Documentation for Offshore Wind Energy Development Related to Munitions and Explosives of Concern and Unexploded Ordinances." Projects that plan for mitigation methods like relocation, removal, or detonation, must analyze the impacts. |

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| BOEM-2022-0045-0071 | 18 | When boulders are relocated with grabs (as opposed to pushed out of the way with plows), they will be placed elsewhere within the lease area. We recommend developing a clear strategy for boulder relocation that is protective of habitats in the area, potentially relocating them to soft bottom directly adjacent to existing hard bottom areas. Mobile gear fishing activity should be considered when planning specific placement options; relocation areas with similar habitat impacts might have higher or lower potential for conflict with trawling and dredging activities. We also recommend using grabs to relocate boulders whenever possible, vs. relying on plowing. The COP assumes that a boulder plow could be used in all areas of higher boulder concentrations, conservatively estimated at up to 80% of the entire interarray cable network. Plowing will have a much larger impact on benthic habitats as compared to grabs. Recreational fishermen often set gear on boulder habitats. We recommend that habitat maps post boulder relocation be made available to the recreational and commercial fishing communities and others. | Thank you for the comment. BOEM has included a boulder relocation mitigation measure in the FEIS which seeks to minimize the number of potential seafloor obstructions that may interact with bottom trawl commercial fisheries (see mitigation measures in the EIS, Appendix F). |
| BOEM-2022-0045-0086 | 27 | Revolution Wind would like to respectfully clarify that much of the area described does not cover the boundaries of Revolution Wind, which is mostly contained within two National Oceanic and Atmospheric Administration (NOAA) Statistical Areas, 537 and 539. It would be beneficial to the Project as well as to the public to include a further description as to why other areas were included in this Regional Fishing Area with respect to Revolution Wind. | As described in Section 3.9.1 of the DEIS, the Regional Fisheries Area provides a reference area for assessing the relative importance of the Lease Area and RWEC corridor to regional fisheries of importance to commercial fishing fleets based in Rhode Island, Massachusetts, and New York ports. |
| BOEM-2022-0045-0086 | 29 | Similar corrections should be made in Section 3.9.2, Impacts on Commercial Fisheries and For-Hire Recreational Fishing. In Table 3.9-24 and Section 3.9.1.2, a major adverse finding was made for the No Action Alternative on the basis that fisheries management regulations designated to protect North Atlantic Right Whale (NARW) would adversely impact commercial fisheries. The same finding was carried through to the build alternatives for the same reason. The major adverse finding is not a result of any of the build alternatives. | The impact determination of major adverse is based on the impacts of the build alternatives when combined with the impacts of present and other reasonably foreseeable activities. The No Action alternative includes consideration of future offshore wind projects within the geographic analysis area as part of the cumulative impacts assessment. BOEM maintains that the cumulative offshore wind projects in the geographic analysis area, along with fisheries management regulations to protect North Atlantic right whales, could potentially have major adverse impacts to commercial fisheries. |
| BOEM-2022-0045-0100 | 42 | Please update project-specific analysis and discussion to correct for outdated shapefiles of the Revolution Wind project data acquired from references NMFS 2021b and NMFS 2021c. This issue affects Tables 3.9-9, -19, -20, -21, and -22 and associated narrative discussions on pages 3.9-14 and 3.9-20. These sources include landings and revenue data for the Revolution Wind and other project areas posted on the NMFS GARFO website and accessed August 7, 2021. The wind energy areas available at those times have since changed. In addition, the shapefile used to generate our socioeconomic impact report and data for Revolution Wind lease area is smaller and inconsistent with the shape identified in the DEIS (see image). Although we have not evaluated the difference between the areas, resulting analysis will underestimate fishery impacts for any analysis using that data due to the evaluation of a smaller area than the area proposed. Therefore, the information used based on reports on our website should be updated based on the full lease area. The data provided by a specific data request in January 2022 (referenced as NMFS 2022) is not affected by this issue. | Table 3.9-9 used data from the specified data request in January 2022, and therefore used the correct shapefiles of the Revolution Wind project. No data revisions are necessary. For all the Lease Area tables in the Affected Environment (Tables 3.9-9 through 3.9-12) the Final EIS includes the 2008-2019 data, but the data for these tables for 2020-2021 was downloaded from the NMFS GARFO website and included in Appendix G for reference. The for-hire recreational fishing tables was updated in the Final EIS using 2008-2019 data from the NMFS GARFO website. |
| BOEM-2022-0045-0100 | 43 | For tables and narrative descriptions of regional analysis using federal VTR data (Tables 3.9-1 through 16,Table 3.9-19 through 22, Table 3.9-25 through 27, Figure 3.9-6), please note in each instance that federal VTR data likely substantially underestimate landings and revenue for state-managed fisheries (conch, menhaden, etc.) and lobster, particularly for Maine lobster vessels, due to historical and existing reporting requirements. Therefore, any regional estimates of landings and revenue will be underestimated due to limited data on such fishing activity. Please see the data limitations listed in Appendix A of BOEM's Draft Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf available at: https://www.boem.gov/sites/default/files/documents/renewable-energy/Appendix%20A%2006232022_0.pdf and our data limitations at https://media.fisheries.noaa.gov/2022-02/Socioeconomic-InfoNeeds-OSW-GARFO.pdf. | Thank you for the comment. Additional text has been added. |
| BOEM-2022-0045-0100 | 45 | In all tables, please clarify how revenue were adjusted for inflation to ensure consistency with data provided by NMFS and used in other tables. Use of different inflation methods can result in different estimates. Totals for each table would also help validate some percentage conclusions listed in the text, but not in the tables themselves (e.g., Table 3.9-10 indicates skates represented 30% of total landings from the lease area, but no totals are provided and the other columns do not show this information). | Text has been added to table notes where appropriate in Section 3.9 indicating the revenues are adjusted to 2019 dollars using the GDP Implicit Price Deflator. |
| BOEM-2022-0045-0100 | 46 | Social impacts to fisheries are not analyzed here or in the cultural impacts section. In the Affected Environment section for fisheries, insert a discussion of and applicable references to social and well-being impacts of fishing industry participants. Fisheries are part of social-ecological systems that take into account inter-relationships between ecological functions and | A reference to the Community Profiles for Northeast U.S. Marine Fisheries prepared by Colburn et al. (2010) has been added to the affected environment, and a qualitative discussion of potential socioeconomic impacts on commercial fisheries has been included |

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| | | human communities that depend on ecosystem services for their well-being. As previously commented, the DEIS has limitations in understanding full impacts without considering social impacts that go beyond ex-vessel landings.<br>Similar to assessing the economic impacts based on historic catch and VMS data, discussion of and research on social wellbeing in the region should be discussed where available to consider the full impacts of the alternatives. The brief discussions on cultural importance and identity can be supported by numerous studies on traditional values and historical significance of fishing areas in the region. Examples of available social research include: 1) Job satisfaction and well-being studies, including safety considerations, have been done in the region for decades -see Pollnac et al. (2014) and it's citations, Smith and Clay (2010), 2) Silva et al. 2021, Cutler et al. 2022 and Henry and Olson (2014) provides an overview of commercial fishing crew demographics and changes over time. 3) Resilience and vulnerability data can be found at Jepson and Colburn (2013). A study was also done on commercial and recreational fishing industry's adaptive capacity in NY and NJ (Seara et al. 2012). Well-being topics relevant to offshore wind are listed below based on Van Holt et al. (2016) and Smith et al. 2020 and should be considered in BOEM's impact assessment with description of relevant research in the region. Where data is not available this should also be noted. Well-being objectives to consider include: Impacts to income and employment, infrastructure investment, community economic impacts, equitable distribution of fisheries benefits, maintaining fishing opportunities for small-scale operators, reducing conflict in the fishery, improving safety at sea, promoting food security, and maintaining cultural importance of fishing to the community. | in the Presence of Structures IPF. In addition, gentrification pressure indicators for communities with fishing ports have been added to Table 3.12-1 in Section 3.12. |
| BOEM-2022-0045-0100 | 47 | Please verify whether statistical area 612 or 613 is included in the evaluation of the Regional Fisheries Area and associated analysis. This text suggests 612 is included, but not 613, while Figure 3.9-2 suggests that statistical area 613 is included, but not 612. Please correct figures, descriptions, and associated analysis to ensure the right data are used to describe fishery operations within the Regional Fisheries Area. This was raised during our cooperating agency comments in May. | Text has been corrected. |
| BOEM-2022-0045-0100 | 48 | Please consider using a broader range of historical data to reflect interannual variation in fishing operations and resource availability. The analysis uses the fishing footprints for 3 years only (2016-2018) as shown in Figures G-1 through G-13 in Appendix G. Additional data available on the Northeast Ocean Data Portal (www.northeastoceandata.org) show similar patterns in more historic data, indicating some fisheries experienced the highest concentrations of fishing effort within the proposed project area and lower fishing effort concentrations outside of the area. Using a shorter timer series is not consistent with BOEM's compensation guidance which is based on our socioeconomic impact guidance highlighted in a previous comment that recommends at least 10 years of data should be used in analyses to avoid under representing fishing in the area and accounting for interannual variability in fishery operations. | Thank you for the comment. The revenue intensity figures for commercial fisheries in Appendix G of the DEIS were based on the data available at the time the DEIS was prepared. As discussed in the DEIS, the data were generally limited to the years 2016 through 2018. |
| BOEM-2022-0045-0100 | 49 | Please identify how ports were determined to have commercial fishing activity or not in Figure 3.9-1. Are these ports that have landings from within the lease area? The RFA? Greater Atlantic Region? Note that port dependence is not only from landings but fishing businesses and infrastructure- some vessels may land in one or multiple ports, but depend on businesses and infrastructure in others. A more thorough analysis of port usage that includes both commercial, recreational fishing, and wind ports should be conducted separately and included in the EIS as commented on previous projects. | Thank you for the comment. As described in the DEIS, the data presented in Section 3.9 of the DEIS focus on those FMP fisheries, species, gear types, and ports that are relevant to commercial fishing activity in the Lease Area and along the RWEC. |
| BOEM-2022-0045-0100 | 50 | Please note that project-specific standardized reports available on our website only include 2019 data, but more recent data through 2020 are available upon request. More updated data through 2020 should be utilized in the FEIS per our socioeconomic impact recommendations found at: https://media.fisheries.noaa.gov/2022-02/Socioeconomic-InfoNeeds-OSW-GARFO.pdf | Thank you for the comment. The data in the regional tables in the Affected Environment (Tables 3.9-1 through 3.9-8) have not been updated because these data are used to make regional comparisons in the revenue-at-risk estimates presented in the impact analysis for the action alternatives. For the Lease Area tables in the Affected Environment (Tables 3.9-9 through 3.9-12) the Final EIS includes the 2008-2019 data, but the data for these tables for 2020-2021 was downloaded from the NMFS GARFO website and included in Appendix G for reference. For the for-hire recreational fishing tables in the Affected Environment, the data was updated to 2008-2019 in the Final EIS for consistency with the commercial fisheries tables. |
| BOEM-2022-0045-0100 | 51 | In Table 3.9-1, clarify whether Surfclam, Ocean Quahog data is included separately or under the "Other FMPs" row, as indicated by the asterisk footnote and in the text above. This contradictory messaging should be rectified. | Text has been corrected in all appropriate tables. |
| BOEM-2022-0045-0100 | 52 | In Table 3.9-2, ensure the table reflects the order from high to low of pounds landed per the notes below the table. The current table is not organized in this way. It is unclear why some tables are ordered in this way, while others are ordered alphabetically. We recommend the FEIS order tabular data consistently by value or alphabetically to minimize confusion. | Data in tables have been reorganized alphabetically in the Final EIS. |

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| BOEM-2022-0045-0100 | 53 | In Table 3.8-4, please use the Engagement and Reliance scores for "Point Pleasant Beach, NJ" not "Point Pleasant, NJ" Point Pleasant beach is the geographic location where catch is landed and therefore the scores are reported here on the Social Indicators data tool. Commercial Fishing Engagement= high; Commercial Fishing Reliance= Medium | Engagement and Reliance scores for Point Pleasant Beach have replaced those for Point Pleasant. |
| BOEM-2022-0045-0100 | 54 | Please delete the text regarding reductions from the call areas or move it to a background discussion in Section 1 instead. As we noted previously, it suggests such reductions were part of the proposed action and increases confusion relative to the evaluation of no action impacts. Additionally, citing Smythe et al. 2016 here is misleading as this report was on the RI Ocean SAMP state process, which did not evaluate the MA/RI WEAs. | Thank you for the comment. This discussion is located in the Description of the Affected Environment (Section 3.9.1) for commercial fisheries and not under the description of the Proposed Action. |
| BOEM-2022-0045-0100 | 55 | Please provide the total number of vessels that use the lease area (e.g., transit). The VMS analysis currently discusses fishing vessels under 5 knots who are presumed to be actively fishing. In order to better characterize use within the lease area and impacts, all uses should be characterized for mitigation purposes (e.g., changes in transit and fuel costs). Further, the data provided in January 2022 also contains a count of the number of vessels and trips that occurred in each area analyzed for this project, including areas listed in each alternative. | Thank you for the comment. Figure 3.9-6 showing VMS bearings for all vessels (transiting and fishing combined) in the Lease Area has been added. |
| BOEM-2022-0045-0100 | 56 | Revise the text above Table 3.9-14 to reference landings instead of revenue. | Text has been corrected. |
| BOEM-2022-0045-0100 | 57 | Please insert a discussion and analysis of state permitted fishery landings and revenue data along the export cable corridor and the lease area, as appropriate, given the admission federal VTR data presented previously in this section does not include such data. The same applies for highly migratory species, as landings/revenues for these species are recorded in vessel logbooks issued by the Southeast Regional Office and Science Center, separate from those referenced in this section issued by the Greater Atlantic Regional Fisheries Office. These data are necessary to fully describe the potential impacts of this project relative to the no action alternative. Otherwise, insert a justification why such data are not included in the DEIS and note in the text that such data underestimate landings and revenue. | Text and tables summarizing landings and revenues relevant to the Revolution Wind Project from vessels that do not hold federal fishing permits have been added to Section 3.9 and Appendix G. A note describing the limitations of the VTR data has been added to the text and tables and where applicable. |
| BOEM-2022-0045-0100 | 58 | Please correct footnote 19 to indicate that all federally permitted party/charter vessels must submit a VTR for every fishing trip. The regulatory reference is correct, but the application is incorrect. Groundfish vessels, for example, must submit VTRs. | Footnote text has been revised. |
| BOEM-2022-0045-0100 | 59 | Under Light, revise the impact conclusions to long-term to be consistent with impact definitions in Table 3.3-4. Lighting for construction and operations/maintenance activities could continue for several years as other projects are built and become operational. This is beyond the "several months" listed for short-term impacts in Table 3.3-4. | Text has been revised. |
| BOEM-2022-0045-0100 | 61 | Under Presence of Structures, please note that predator-prey relations may be impacted, which could benefit some species (black sea bass, striped bass), but harm others (lobster, cod juveniles). | These effects are described in EIS Section 3.13 Finfish and EFH. |
| BOEM-2022-0045-0100 | 62 | Please identify the FMP or species-specific cumulative revenue impacts from all wind projects combined. This would provide a sense of which fisheries would be more impacted than others. Presenting only total revenue impacts from all FMPs combined does not provide fishery-based impacts, which could have different implications on domestic and international markets and particular communities if particular fisheries are important to specific communities (i.e., the squid fishery and Rhode Island vessels). | Thank you for the comment. Please refer to Table 3.9-26 in the FEIS, which shows annual commercial fishing revenue exposed to offshore wind energy development by Fishery Management Plan under the No Action Alternative. While this data does not include Revolution Wind it does include all other current, ongoing, and future offshore wind projects, including projects in the New York Bight. |
| BOEM-2022-0045-0100 | 63 | Please describe the methodology used to generate Table 3.9-22. There is insufficient description to replicate this table to assess the accuracy of the data presented and our efforts to replicate methods were unsuccessful. For example, how was revenue exposure extrapolated across projects outlined in Appendix E? Was the average annual revenue exposure for each FMP from each project summed based on when each project was expected to be constructed using project-specific or lease area data from NMFS 2021b? If not, please describe how revenue exposure was calculated. Also, please clarify whether non-federally managed species revenue is included in this table, as the footnote denoted with an asterisk (*) does not clearly describe applicable species (e.g., is Atlantic menhaden from state-permitted vessels included instead of relying only on bycatch of Atlantic menhaden by federal vessels described in federal VTRs). Further, was there any consideration for future species status, as discussed during BOEM's fishery compensation technical working group? Because this table is used as a proxy for cumulative impacts for wind projects other than the proposed action, it is important that this table accurately depicts the potential impacts. | The description of the methodology has been enhanced within Section 3.9.2 and a more detailed description of the methodology is provided in the Commercial Fisheries and For-Hire Recreational Fisheries section of Appendix G. |
| BOEM-2022-0045-0100 | 64 | Under Regulated Fishing Effort, please note that while the survey mitigation strategy could potentially reduce impacts to NMFS survey efforts over the long term and the indirect impacts of increased uncertainty on management and fishing | Thank you for the comment. The description of the impacts of the survey mitigation strategy has been moved to Section 3.9.2.6. In addition, please note that the description of |

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| | | communities, it would not affect the overall impact categorization for NMFS surveys. Further, there are no dedicated resources in place nor implementation plans yet developed for any potential survey mitigation measures. Therefore, it is speculative to suggest that such efforts would also reduce effects on commercial and for-hire fishing operations at this time. We recommend removing the impact conclusions from this discussion. | potential impacts to commercial and for-hire recreational fisheries resulting from changes to NMFS survey efforts has been moved to the Presence of Structures IPF. The impact of Project construction and O&M on NMFS survey efforts has been changed to major adverse. In turn, these impacts could have a major adverse impact on commercial fisheries and for-hire recreational fishing. |
| BOEM-2022-0045-0100 | 65 | The DEIS in its current state as well as the mitigation measures, oversimplifies fishing behavior changes and resulting vessel traffic, gear interactions and other space-use conflicts. The DEIS conclusions are based on assumptions that fisheries will be able to quickly adapt to fishing within a project area or adjust to new fishing grounds. The region has a long history of traditional fishing practices and fishermen of different gear types have established social relationships to avoid space-use conflicts. Research has found a decrease in local knowledge passed down through generations of fishing (Farr et al. 2018) and should be considered when determining the ability to adapt to new uses such as offshore wind development in the region. The quality of knowledge will determine the ability of fishermen to adapt, avoid space-use conflicts and find alternative fishing grounds. See other relevant research: Stoll JS, Fuller E, Crona BI (2017) Uneven adaptive capacity among fishers in a sea of change. PLoS One 12https://doi.org/10.1371/journal.pone.0178266 15 Stoll, Beiti, and Wilson. 2016. How Access to Maine's Fisheries Has Changed over a Quarter Century: The Cumulative Effects of Licensing on Resilience. Global Environmental Change 37:79-91 DOI:10.1016/j.gloenvcha.2016.01.005 16Holland and Sutinen. 2000. Location Choice in New England Trawl Fisheries: Old Habits Die Hard. Land Economics Vol. 76, No. 1 (Feb., 2000), pp. 133-149 https://doi.org/10.2307/3147262. Decisions made at sea have been found to be dependent upon social factors in addition to economics (Kraan et al. 2020), including business structure (family owned vs. corporations). Corporations might have different protocols in operating within wind areas. Research in the Northeast (Murray et al. 2010. Cumulative effects, creeping enclosure, and the marine commons of New Jersey. International Journal of the Commons 4(1) DOI:10.18352/ijc.148) has shown that the cumulative restrictions on space over time on fishermen can cause loss of flexibility, change the employment structure (owner vs. employer) and increase corporatization of the fishery. All of these social factors should be included in the EIS and considered when analyzing the impacts of offshore wind development of the project alternatives. | Thank you for the comment. It is BOEM's position that the impact analysis in the EIS is based on the best available information. |
| BOEM-2022-0045-0100 | 66 | Under Port Utilization and other relevant IPFs, please note that increased utilization of ports by wind project vessels could also lead to higher costs for support services and other downstream impacts if vessels change ports. For example, O'Farrel et al., 2019 discusses three behavior types that could be affected by disturbances in the system; 1. Fishermen with low mobility and less explorative behavior who are risk averse and carry out short trips; 2. Fishermen with high mobility and more explorative behavior are more risk tolerant and conduct longer trips, and; 3. Fishermen have explorative and risk tolerant behavior but also have higher variability in trip duration and revenue. This could also be applied relevant to port utilization. Papaioannou et al. 2021 note that vessel shifts to different ports could result in economic loss to ports and communities, especially small ports, due to changes in fishery landings. As found in the literature, established fishing communities are forced to adapt to new social, economic, and environmental conditions and as a result many fishing communities in the Northeast have been supplemented with technology-based industries and tourism, and are heavily impacted by coastal development, gentrification and the emergence of retirement communities (Claesson, Robertson and Hall-Arber, 2006). Increased tourism and recreational boating & fishing infrastructure as a result of gentrification has also resulted in space use conflicts both onshore and offshore between commercial and recreational fishing (Jepson and Colburn 2013, Thompson 2012, Hall Arber et al. 2001) that could be exacerbated by the proposed action and other projects. Offshore wind development can be another industry providing pressure to these communities, so recognizing those communities that are vulnerable is important. See NMFS Gentrification summaries: https://storymaps.arcgis.com/stories/56781eb366f1485e8ffd7c96b16f133f. Without modelling the human components of socio-ecological systems, impacts will not be effectively recognized and mitigated. | Text has been added. |
| BOEM-2022-0045-0100 | 68 | Please revise the impact conclusions to reflect a range of impacts (i.e., minor to major) consistent with the previous discussions. Further, references to additional information later in this section that would support this conclusion should be included, or this discussion should be removed from this part of the section. The text immediately below Table 3.9-23 seems sufficient to discuss the general influence of potential mitigation measures in this introductory section. The introduction does not include sufficient supporting information to justify conclusions, rather such information is contained later in the document. Therefore, we recommend that the document reserve conclusions regarding impact levels until later in the document when supporting information is presented in greater detail. | Thank you for the comment. The structure of this chapter follows BOEM guidance for NEPA EIS documents. |

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| BOEM-2022-0045-0100 | 69 | In Table 3.9-24, acknowledge that impacts to commercial and for-hire fishing activities will be higher or lower for each impact-producing factor even if it would not change the ultimate impact category. For example, the discussion of accidental releases indicates impacts under Alternatives C-F would be lower than that of the proposed action due to fewer turbines built under these alternatives even though the impact conclusions would remain the same as the proposed action. That should be repeated for each impact-producing factor such as light and anchoring. | For most impact-producing factors (IPFs), Table 3.9-24 in the DEIS acknowledges that impacts to commercial and for-hire recreational fishing would be lower under Alternatives C-F. The exception is anchoring. As noted in the DEIS the anchoring impact on navigation and vessel traffic under Alternatives C-F would be similar to the Proposed Action. Therefore, the impact of anchoring to commercial fisheries and for-hire recreational fishing in the GAA would be similar to that of the Proposed Action. |
| BOEM-2022-0045-0100 | 70 | In Table 3.9-24 under Climate Change, please copy the Alternative A text indicating minor to major beneficial impacts to fishery operations for those targeting species beneficially impacted by climate change to the discussion of Alternatives B-F. This more accurately reflects a range of both beneficial and adverse impacts from climate change to different species and fisheries. The table's impact conclusions are not substantiated by any real discussion in the following section and should be further supported. | Text has been added. |
| BOEM-2022-0045-0100 | 71 | In Table 3.9-24, under Light, please note that light effects are long-term during operations and maintenance given that such effects would last for years through decommissioning. | Text has been revised. |
| BOEM-2022-0045-0100 | 73 | In Table 3.9-24, under Port Utilization, please revise impacts to long term, including for construction, to be consistent with Table 3.3-4 given that port activities associated with wind development projects will occur over decades. | Construction impacts from the Project that do not extend beyond the construction period are considered short term. |
| BOEM-2022-0045-0100 | 74 | In Table 3.9-24, under Presence of Structures, please revise impact conclusions under Alternative B from "temporary minor" to "long-term moderate" at the end of the third and seventh paragraphs to be consistent with impact definitions in Table 3.3-2. If mitigation in the form of gear conflict prevention and claim procedure is a remedial or mitigation measure, then impacts cannot be listed as "minor" based on Table 3.3-2, which indicates minor impacts do not need remedial/mitigation measures and would not return affected entities to a condition with no measurable impacts given current policies would not fully cover opportunity costs for lost fishing activities while gear is repaired. Further the presence of structures disrupts the normal and routine functions of the fishing industry even with mitigation measures, which is inconsistent with "minor" impacts in Table 3.3-2. | Thank you for the comment. BOEM disagrees that a remedial or mitigation measure precludes a "minor" impact level. As a clarification of terms, Environmental Protection Measures (EPMs) are identified in the COP and listed in EIS Appendix F, Table F-1, and are a component of the Proposed Action, and shall be implemented by the applicant. Therefore, EPMs are included in the Chapter 3 analysis of direct and indirect impacts and cumulative impacts. Mitigation measures as identified in EIS Appendix F, Table F-2 and Table F-3, are proposed additional measures that may be applied by BOEM as a requirement for COP approval and are not considered components of the Proposed Action. The Mitigation section within each resource area of Chapter 3 addresses the potential reduction of the impact determination after the proposed additional mitigation measures are applied. |
| BOEM-2022-0045-0100 | 75 | In Table 3.9-24, under Regulated Fishing Effort, please note our earlier comment that the survey mitigation strategy would not affect the overall impact categorization for NMFS surveys given the current lack of dedicated resources and implementation plans, which is not expected to affect impacts to regulated fishing effort for commercial or for-hire fisheries. Also, please revise the conclusions under Alternative B to match those discussed under Alternative A. While this table concludes that ongoing management actions for the lobster and Jonah crab fisheries would result in major adverse impacts, there are no conclusions reached for other fisheries. Therefore, it is inaccurate to conclude that regulated fishing effort for all other fisheries would similarly have a major impact on those fisheries. In fact, prior discussion in Section 3.9.1 suggested that regulated fishing effort would have long-term positive impacts on fisheries by achieving maximum sustainable yield. This should be reflected in this table. | Thank you for the comment. The description of the impacts of the survey mitigation strategy has been moved to Section 3.9.2.6. In addition, please note that the description of potential impacts to commercial and for-hire recreational fisheries resulting from changes to NMFS survey efforts has been moved to the Presence of Structures IPF. The DEIS notes that regulated fishing effort would have a major impact on some fisheries; it does not state that all fisheries would be affected at that level. |
| BOEM-2022-0045-0100 | 77 | In Table 3.9-24, under Vessel Traffic, please revise impact conclusions from "short term minor" to "long-term moderate" throughout to be consistent with impact definitions in Tables 3.3-2 and 3.3-4. Construction activities will occur for at least a year for the proposed project and likely all other projects. This suggests impacts from construction will be long-term per Table 3.3-4 as it will exceed several months. Further, because vessel traffic from the proposed and other wind projects will disrupt normal fishing operations, this should be characterized as "moderate" impacts per the definitions in Table 3.3-2. There is no information to support that a communications plan alone would mitigate impacts from vessel traffic within or outside of ports given the lack of detail provided on the number of vessel trips that may be required or from which ports they would be entering/exiting for the proposed action or other projects. It is not sufficient to just state that it is expected that impacts would be low; such claims should be supported by information justifying that conclusion. Finally, it is inaccurate to conclude that vessel traffic impacts for at least Alternative D would be the same as the proposed action. Alternative D was specifically intended to facilitate transit in various directions. Therefore, at least Alternative D would result in lower vessel traffic impacts than the proposed action. This should be noted in this discussion. | Construction impacts from the Project that do not extend beyond the construction period are considered short term. Impact rating changed from minor to moderate. Text regarding Alternative D has been added. |

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| BOEM-2022-0045-0100 | 78 | Please integrate the above comments on Table 3.9-24 for each impact-producing factor. For example, under Light, please note that such impacts will be long term given they will persist over the life of the project and under Noise, indicate that some species could die due to noise exposure and that noise that disrupts spawning behavior could result in ongoing recruitment impacts for certain fisheries like cod and squid that could, in turn, negatively impact fisheries. In addition, for New Cable Emplacement/Maintenance, please note that surface preparation may relocate boulders and other obstructions that could cause gear damage/loss (e.g., this could go in the discussion on page 3.9-67). | Text has been revised. |
| BOEM-2022-0045-0100 | 79 | In the discussion of Table 3.9-27, please clarify the methods used to calculate the percentages listed, as it is not clear from the table column headings. Did this calculation take revenue in a particular port from vessels fishing within the lease area or export cable corridor and divide it by the total landings from ME-NC within each port? If so, the calculations appear to correctly reflect the impacts to port. If not, please clarify how the data were analyzed. It would be inaccurate to take port-specific landings from within the lease/export cable corridor and divide by the total landings from ME-NC for all ports. | Text has been revised. |
| BOEM-2022-0045-0100 | 80 | Please revise impact conclusions in the second to last paragraph to "minor to major adverse" and the "minor" conclusion in the last paragraph to "moderate" to accurately reflect the discussion in this section and impact definitions in Table 3.3-2. It is more accurate to reflect the full range of impacts than to discount the potential major impacts of vessels heavily dependent upon an area for a substantial portion of annual fishing revenue because not many vessels are dependent upon this area (i.e., average impacts). Further, despite the gear conflict claim procedure, the impact conclusion should be "moderate" to be consistent with Table 3.3-2, which indicates moderate impacts would return the affected activity to a condition with no measurable impacts when mitigating action is taken. | Thank you for the comment. BOEM disagrees that a remedial or mitigation measure precludes a "minor" impact level. As a clarification of terms, Environmental Protection Measures (EPMs) are identified in the COP and listed in EIS Appendix F, Table F-1, and are a component of the Proposed Action, and shall be implemented by the applicant. Therefore, EPMs are included in the Chapter 3 analysis of direct and indirect impacts and cumulative impacts. Mitigation measures as identified in EIS Appendix F, Table F-2 and Table F-3, are proposed additional measures that may be applied by BOEM as a requirement for COP approval and are not considered components of the Proposed Action. The Mitigation section within each resource area of Chapter 3 addresses the potential reduction of the impact determination after the proposed additional mitigation measures are applied. |
| BOEM-2022-0045-0100 | 81 | Under Regulated fishing effort, please revise the impact conclusions to NMFS ongoing scientific research to "major" consistent with previous NMFS comments, including those mentioned above. | Thank you for the comment. The description of the impacts of the survey mitigation strategy has been moved to Section 3.9.2.6. In addition, please note that the description of potential impacts to commercial and for-hire recreational fisheries resulting from changes to NMFS survey efforts has been moved to the Presence of Structures IPF. The impact of Project construction and O&M on NMFS survey efforts has been changed to major adverse. In turn, these impacts could have a major adverse impact on commercial fisheries and for-hire recreational fishing. |
| BOEM-2022-0045-0100 | 82 | Under Vessel Traffic, please revise impact conclusions to "moderate" consistent with the impact definitions in Table 3.3-2, as noted above. Vessels will have to adjust somewhat to increased vessel traffic. Further, because a communication plan is necessary and that is listed as a mitigation measure, impacts should be classified as "moderate." This is consistent with conclusions on page 3.9-68. | Thank you for the comment. Impact rating changed from minor to moderate. BOEM disagrees that a remedial or mitigation measure precludes a "minor" impact level. As a clarification of terms, Environmental Protection Measures (EPMs) are identified in the COP and listed in EIS Appendix F, Table F-1, and are a component of the Proposed Action, and shall be implemented by the applicant. Therefore, EPMs are included in the Chapter 3 analysis of direct and indirect impacts and cumulative impacts. Mitigation measures as identified in EIS Appendix F, Table F-2 and Table F-3, are proposed additional measures that may be applied by BOEM as a requirement for COP approval and are not considered components of the Proposed Action. The Mitigation section within each resource area of Chapter 3 addresses the potential reduction of the impact determination after the proposed additional mitigation measures are applied. |
| BOEM-2022-0045-0100 | 83 | In addition to port revenue exposure as a percentage of total fishing revenue from the Regional Fishing Area, please include an estimate of the shoreside support service impacts that may result due to vessel revenue exposure. This will help estimate impacts if vessels are no longer able to fish within the project area or move to a different port. | The EIS assesses potential impacts to shoreside support services, but a quantitative estimate of these impacts is not possible with the data available. A quantitative analysis of portside support services and community dependence is beyond the scope of an EIS for an individual offshore wind project. BOEM may consider conducting a cumulative analysis for all of the offshore wind projects as part of a separate effort. |
| BOEM-2022-0045-0100 | 84 | Under Port Utilization, please revise impact conclusion to "moderate" to be consistent with Table 3.3-2 given that ongoing port activities in affected fishing ports would require vessels to adapt their behavior and reduce access to port services. This is more consistent with the "moderate" impact definition than "minor." | Text has been revised to further clarify impacts to commercial fishing and for-hire recreational fishing as a result of changes in port utilization. |

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| BOEM-2022-0045-0100 | 85 | Ensure that this section accurately reflects the scope of regional impacts to fishery operations, noting that cumulative impacts will be higher than those of the proposed action even if the impact definitions will remain the same in some limited circumstances. Existing leases cover 2.5 million acres from Maine to North Carolina and fishery operations occur in all lease areas and vessels operate out of ports that will also support wind projects. Thus, there are measurable impacts from many of the impact producing factors that are over and above those of the proposed action, and most impacts should be listed as "moderate" to be consistent with impact definitions in Table 3.3-2. For example, while anchoring may be localized and temporary, vessels from multiple areas will have to adapt to such anchoring, which is consistent with at least "moderate" impacts per Table. 3.3-2. Similarly, the need for cable armoring and associated mitigation measures for gear damage/loss would result in "moderate" impacts. | Impact rating for the Anchoring IPF has been changed from negligible-to-minor to negligible-to-moderate for the No Action Alternative. BOEM disagrees that a remedial or mitigation measure precludes a "minor" impact level. As a clarification of terms, Environmental Protection Measures (EPMs) are identified in the COP and listed in EIS Appendix F, Table F-1, and are a component of the Proposed Action, and shall be implemented by the applicant. Therefore, EPMs are included in the Chapter 3 analysis of direct and indirect impacts and cumulative impacts. Mitigation measures as identified in EIS Appendix F, Table F-2 and Table F-3, are proposed additional measures that may be applied by BOEM as a requirement for COP approval and are not considered components of the Proposed Action. The Mitigation section within each resource area of Chapter 3 addresses the potential reduction of the impact determination after the proposed additional mitigation measures are applied. |
| BOEM-2022-0045-0100 | 86 | Under Climate Change, please insert text from Table 3.9-27 that some fisheries for species positively affected by climate change (squid) may benefit from climate change; the impacts are not exclusively adverse. | Text has been added. |
| BOEM-2022-0045-0100 | 87 | Please provide justification to support the conclusions that the long-term major adverse impacts to fishing operations are driven by climate change and regulated fishing effort. As noted before, there are positive fishery impacts due to climate change benefitting some species and that the only fishery which it was noted could experience major impacts from fishery regulations was the lobster/Jonah crab fishery due to North Atlantic right whale restrictions. Because limited detail is available for most of the mitigation measures for non-approved projects, consider revising characterization of mitigation measures to reduce impacts from "would" to "could." This is consistent with text on page 3.9-75. | Text has been revised. |
| BOEM-2022-0045-0100 | 88 | Please provide a summary of the number of vessels and trips that would be affected under each alternative and evaluate which fisheries would be impacted by the removal of turbines under each alternative. Data on vessels impacted by each alternative were made available as part of the project's data request in January 2022. Such data indicate the number of entities that would be affected by each alternative and the scale of such impacts between alternatives. This is another important metric that could more effectively assess impacts to fishing operations and associated communities than proportion of regional revenues. Comparison with fishing footprint information (as used in figures in Appendix G) can identify where certain fisheries operate relative to the alternative configurations. This will identify which fisheries and communities may be affected most. This is similar to our comment 32 for Section 3.9 during the cooperating agency review. | Vessel trip and vessel number data was added to the impact analysis for each action alternative in the Final EIS to the extent possible. |
| BOEM-2022-0045-0100 | 89 | Please clarify if these are developer-proposed mitigation measures or those that BOEM may require as part of the approval of the COP. It is unclear if the developer has proposed these and whether/if they will be required by BOEM. | The mitigation measures in Section 3.9.2.6 are not developer-proposed EPMs. Developer-proposed EPMs are included in the analysis. The mitigation measures in Section 3.9.2.6 originate in Appendix F and include measures proposed by BOEM and other cooperating agencies to the Project. |
| BOEM-2022-0045-0100 | 90 | In Table 3.9-28 under compensation for lost fishing income and the following narrative text, please revise the text suggesting this measure "would" reduce impacts from major to moderate to "could" reduce such impact. There is insufficient information available to support that claim at this time. BOEM's mitigation guidance is not finalized and no details of a proposed mitigation plan are available for this project. Therefore, it is not possible to determine the scale of impact reduction that would be realized from this measure. If compensation does not fully compensate for losses, which is possible under the draft guidance, an affected entity could still have measurable impacts even after partial compensation. If that occurs, impacts would still be classified as "major" under the definitions in Table 3.3-2. Given the uncertainty in final mitigation measures, we recommend retaining the impact range as "negligible to major." | The impact rating has not been changed, but if BOEM receives additional information for a compensatory mitigation plan the rating will be reassessed. |

## Cultural Resources

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| BOEM-2022-0045-0110 | 9 | Successful compliance with Section 106 involves identifying state, tribal, and private interests involved in historic preservation within the development areas. Relevant State or Tribal Historic Preservation officers (SHPO or THPO respectively) must be involved in the 106 process, along with any private preservation groups with appropriate legal or economic interests. BOEM must identify which historic properties are listed, or are eligible for listing, on the National Register of Historic Places that could be affected by the project. BOEM must assess the project's impact on these properties to determine if any adverse effects "diminish the characteristics qualifying a property for inclusion in the national register."38 Collaborative efforts between BOEM, SHPO, THPO, and any private preservation groups can result in agreed upon measures to minimize or mitigate known adverse effects. These collaborations should continue throughout project development in case any unknown cultural or archaeological resources are discovered during development.<br>According to the DEIS, federal recognized tribes in the GAA include: Mashpee Wampanoag Tribe, Shinnecock Indian Nation, Mashantucket Pequot Tribal Nation, Wampanoag Tribe of Gay Head (Aquinnah), Mohegan Tribe of Indians of Connecticut, Narragansett Indian Tribe, Delaware Tribe of Indians, and Delaware Nation, and BOEM has met with these tribes on various issues.39 Additionally, while the NHPA does not require it, consultation with all state recognized tribes who may have resources that could be potentially affected by the Project would help ensure environmental justice goals of the Administration are advanced.<br>Robust consultation with states and tribes under Section 106 is paramount to ensuring the Project appropriately considers impacts on historic state and tribal resources. | Thank you for the comment. BOEM has engaged in, currently engages in, and will continue to engage in consultation with federally recognized Tribal Nations, including THPOs, SHPOs, and private interests involved in historic preservation within the development areas. |
| BOEM-2022-0045-0064 | 1 | The following comments are directed to Appendix J in the DEIS - Finding of Adverse Effect for Historic Properties and Draft Memorandum of Agreement. In summary, Appendix J severely minimizes the adverse effect of the Project on Norman Bird Sanctuary and, as a result, proposes disproportionate mitigation measures to offset these adverse impacts. While Norman Bird Sanctuary fully supports the need to advance clean power to address climate change, we equally support mitigation to offset adverse impacts caused by clean power projects. For the reasons that follow, we respectfully request that the findings in Appendix J be modified and that the proposed mitigation measures identified by Norman Bird Sanctuary be included.<br>As described more fully below, this Project would have cumulative adverse impacts to Norman Bird Sanctuary with respect to: 1) the visual impact of the Project's turbines and the resulting diminishment of the integrity of our significant historic features and contributing features, and 2) the turbine's impact to avian and other migratory species that may impact the character of the setting as a bird sanctuary and an historic farm that supports avian species.<br>To begin, we strongly agree with BOEM's overriding conclusion that the Project will adversely affect Norman Bird Sanctuary and other historic properties under the protections of Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. § 306108) and the associated regulations at 36 CFR Part 800. The Project will have an adverse effect on numerous historic properties as it will alter the characteristics of historic properties "in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association." 36 CFR 800.5(a)(1).<br>The regulations at 36 CFR 800.5(a)(2) include numerous examples of potential adverse effects on historic properties including: 1) the introduction of visual elements that diminish the integrity of the property, and 2) changes of the character of the historic property. As described more fully below, this Project would have cumulative adverse impacts to Norman Bird Sanctuary with respect to: 1) the visual impact of the Project's turbines and the resulting diminishment of the integrity of our significant historic features and contributing features, and 2) the turbine's impact to avian and other migratory species that may impact the character of the setting as a bird sanctuary and an historic farm that supports avian species.<br>1. Adverse Visual Impacts<br>As specified in Appendix J, the following approach was used in analyzing the visual impact of the Project:<br>As the HRVEA notes, the primary 'potential effect resulting from the introduction of wind turbines into the visual setting for any historic or architecturally significant property is dependent on a number of factors, including distance, visual dominance, orientation of views, viewer context and activity, and the types and density of modern features in the existing view (such as buildings/residences, overhead electrical transmission lines, cellular towers, billboards, highways, and silos)' (EDR 2022a:102). Potential visual effects were assessed by considering a number of factors for each above-ground historic property, including:<br>• Maritime setting | Impacts associated with visual resources and visual values related to users and uses (e.g., for recreation) of this area (KOPs AI05, AI06, and AI07) can be found in Appendix G Tables G-40 through G-48). |

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| | | • Contribution of views of the sea to the above-ground historic property's significance<br>• The location and orientation of the above-ground historic property relative to the shoreline/sea.<br>With respect to determining whether a property had a significant maritime setting and the relationship of the view of the sea to the historic property, the factors used for this Project included the views of marine waters, the unobstructed views of the sea, whether the view contributes to the historic significance of a the property, the distance and direction of view related to the intended historic purpose, the total acreage of the historic property, the total acreage of visibility within the property, and the portion of the above-ground historic property (percent of acreage) from which the Project would be potentially visible.<br>Appendix J includes "Draft Historic Property Treatment Plan for the Revolution Wind Farm - Nine Historic Properties - Town of Middletown, Newport County, Rhode Island". This draft Historic Property Treatment Plan (HPTP) includes the following discussion relating to Norman Bird Sanctuary's maritime visual setting:<br>3.5.3 NRHP Criteria and the Maritime Visual Setting<br>The Paradise Rocks Historic District is an NRHP-eligible resource, possibly under Criterion A and C. The district contains a typical landscape within coastal New England and Middletown that was utilized for agriculture by Europeans for over 200 years. In addition, the few houses within the district are typical examples of nineteenth century residences within Middletown, Rhode Island, embodying the distinctive characteristics of the type, period, or methods of construction. The homes are also in keeping with the vernacular building tradition of coastal New England.<br>One of the resources within the District, the Smith-Gardiner-Norman Farm (also known as Paradise Farm), was listed in the NRHP under Criterion A and C for its significance in the history of Middletown's settlement and agriculture. According to the NRHP Inventory Nomination Form (Connors, 2007), the Paradise Farm is "a well-preserved example of Rhode Island's eighteenth and nineteenth century island farms, typical of its region in its form and in its history of use and ownership until the early twentieth century." Contributing structures included a farmhouse, a two-car garage, carriage shed, barn, stone walls, agricultural fields, orchard, family garden, sheep pen, Gardiner Family Burial Plot (1786-1872), gravesite (date unknown), Hanging Rock, and quarry. The period of significance for the Farm spans from 1750 to 1949. While the early period's significance included the history surrounding the historic farmstead, the later period's significance included the pattern of development in the history of the island towns and the use of agricultural areas in island towns as country retreats for wealthy families. The Smith-Gardiner-Norman Farm may also be NRHP eligible under Criterion D, as it may yield evidence about the lifeways of coastal Native Americans as well as successive owners, tenants, and slaves (Connors, 2007).<br>While this analysis includes a proper attribution of the NRHP listing of Smith-Gardiner-Norman Farm (hereinafter Norman Bird Sanctuary or Paradise Farm), it is entirely devoid of any discussion of the maritime setting, the extensive views of ocean from numerous areas within the property, the significant acreage of the site, or the historical significance of the relationship between the historic resources and the views of the ocean. In contrast, other districts and properties in Appendix J describes: "extensive and magnificent ocean views contribute to the integrity of setting, feeling, and association" and the "district as a whole derives historic significance from its seaside location and maritime visual setting, as the location specifically relied on its coastal setting and maritime view in order to attract homeowners." Moreover, it is unclear why Norman Bird Sanctuary as a listed NRHP property is not treated separately rather than being part of the unlisted Paradise Rocks Historic District. From our review of Appendix J, the net result was a lack of analysis of the maritime setting of Norman Bird Sanctuary and the extensive acreage and percent of the property that will be affected by the Project.<br>Norman Bird Sanctuary was listed as part of the Paradise Rocks District in Table 3 Above Ground Historic Properties Adversely Affected by the Project, in Order of Nearest Distance to Project WTGs. While it was listed as historic under 4.1.3.2 Historic Buildings and Structures, it is unclear why Norman Bird Sanctuary was not listed in 4.1.3.6 as part of the Agricultural Properties. Of these agricultural properties, four properties in Rhode Island were determined to "possess important settings and critical views of the Project (see EDR 2022a: Attachment A) and have been determined by BOEM to be subject to adverse effects from the offshore elements of the Project." Norman Bird Sanctuary clearly meet the common attributes of this historic property type – they are described "in the HRVEA (EDR 2022a:50) as follows: • Farmhouses; • Barns and associated ancillary buildings; • Large, open fields; • Fieldstone walls dividing property or grazing space; and • Locally sourced building materials." Lastly, Norman Bird Sanctuary should have been included in 4.1.3.7 as part of the recreational properties listed in the visual APE (Appendix B) as Hanging Rock as a tourist destination meets the standard of the "role these properties served in their original functions as places for the resort tourism economy of the late-nineteenth century to flourish" (EDR 2022a:50)." | |

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| | | This lack of analysis is critical in that it minimizes the adverse impact of the Project with respect to the visual implications to Norman Bird Sanctuary. This failure to properly assess the adverse visual impact is important to the credibility of the findings of Appendix J and is directly related to the adequacy of the mitigation proposed by Revolution Wind. Norman Bird Sanctuary understands that Revolution Wind has provided this draft HPTP with proposed mitigation to BOEM for inclusion in the DEIS so that parties may provide meaningful input on the resolution of adverse effects and help the development of implementing mitigation at the historic properties. For these reasons, Norman Bird Sanctuary is providing BOAM and Revolution Wind with the following information to better describe the adverse effects as well as mitigation proposals that adequately address these adverse effects.<br><br>Norman Bird Sanctuary's listing as a historic property includes thirteen (13) contributing resources and these resources "include those related to Smith-Gardiner-Norman Farm from the construction of the farmhouse ca 1750 to the death of owner Mabel Norman Cerio in 1949." These thirteen resources are listed in order of distance from the Project's turbines and have views of the ocean unless noted (not visible – NV or limited visibility - LV) as follows: 1) Hanging Rock, 2) Agricultural fields (40 acres), 3) Stone walls, 4) Sheep Pen, 5) Quarry-LV 6) Gravesite–NV, 7) Farmhouse, 8) Two car garage-LV, 9) Carriage Shed-LV, 10) Family Garden, 11) Orchard, 12) Barn-LV, 13) Gardiner Family Burial Plot- NV.<br><br>Approximately 17,000 visitors come to visit Norman Bird Sanctuary each year to see our historic buildings, walk our historic agricultural fields edged by colonial stone walls, hike our seven miles of trails, and enjoy the scenic viewshed of the surrounding coastline. The viewshed from Paradise Farm and our ridge trails is well documented in the Norman Bird Sanctuary Cultural Landscape Report (see NBS website and comment photos and videos). The viewshed from the culturally significant overlook from Hanging Rock is described as follows in this report:<br><br>Hanging Rock (NRHP- 19th century, contributing) Hanging Rock or "Berkeley's Seat", sits approximately 10' above sea level, and is composed of Coal-Age conglomerate and sandstone. It is noted for its iconic south facing profile jutting out over Paradise Valley with a view to second beach and the Atlantic Ocean. Hanging Rock's iconic image has been captured by many known and unknown artists through the ages but its heyday was in the late 1800's when "luminist" artists such as John LaFarge, John F. Kensett, James A. Suydam, Thomas Worthington Whittredge painted extensively in Paradise Valley.<br><br>While Appendix J's description of the view of the maritime setting does not include a description of the view from Hanging Rock, Revolution Wind Farm's "Visual Impact Assessment" does include two pictures taken from Hanging Rock. In section 3.2.2.5 AI07: Hanging Rock, the existing view from Hanging Rock is described as follows: "The overlook represents a singular available elevated location along this part of Aquidneck Island" and "Rating panel members indicated that the scene is dominated by the man-made pond dike and platform in the foreground, as along with the parking area and adjacent dunes. As noted by one panel member, these elements in the foreground tend to draw attention away from the open view of the water."<br><br>It is difficult to understand how the rating panel reviewers of the existing view from Hanging Rock could conclude that the view is dominated by man-made objects unless they were simply shown the two existing condition pictures. Visitors to Norman Bird Sanctuary specifically come hike our trails to witness the spectacular views from Hanging Rock. Visitors similarly come to hike Red Fox Trail (on the south-western corner of the historic 130 acres) for the spectacular views of the ocean, Paradise Valley, and Hanging Rock as a geological landmark (see comment photos and videos). The language of the DEIS includes the following language: "views toward the Project from inland locations were generally blocked by buildings/structures and vegetation. Exceptions occur at topographic highpoints, such as Hanging Rock at Norman Bird Sanctuary and the inland portions of Brenton Point State Park." While this language recognizes the unobstructed views from Hanging Rock, the review panel members appear to minimize the existing views and the impact of the Project.<br><br>In section 3.2.2.5, the visual impact assessment includes the following findings of the Project:<br><br>Proposed Project<br><br>Regional visibility of the RWF in this area is largely restricted to the shoreline along Second Beach, and unobstructed views across the open water of Nelson and Gardiner Ponds along the southeastern shore of Aquidneck Island (two additional KOPs are located nearby including Second Beach and Sachuest Point which provide additional information on regional visibility). Additional areas of potential Project visibility are present northeast of Gardiner Pond along Hanging Rock Road, as well as east of the pond along Third Beach Road, where views would be available across low-lying coastal wetland areas. | |

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| | | With the proposed RWF in place, from this KOP the nacelles and rotors of numerous WTGs will be visible in the background along the horizon. The nearest WTG would be 16.3 miles (26.2 km) south-southeast of this KOP. Rating panel members noted that the density of the RWF turbines across the horizon become a dominant focal point of the view. One reviewer indicated that the turbines were particularly noticeable under the backlit lighting conditions illustrated in this view.<br>Rating panel members had varying reactions to the RWF's impact, with VIA scores ranging from 9.3 to 12.7 (average score = 10.9). These scores indicate an average reduction of 1.4 points in comparison to the existing view, with individual rating panel members indicating reductions that ranged from 0.6 to 2.4. With the RWF in place, the KOP score remains within the Partial Retention class (see Table 3.2-12). Considering the compatibility, scale contrast, and spatial dominance factors that influenced the visual impact rating at this KOP, panel member ratings demonstrated that the WTGs were generally compatible with, landform, and vegetation, and somewhat compatible with water resources, land use, and user activity (see Table 3.2-13). Scale contrast was rated as minimal for vegetation and land use, but moderate for water resources, landform, and user activity. Considering spatial dominance, panel ratings suggest that the WTGs are subordinate to vegetation and land use, and co-dominant to water resources, landform, and user activity.<br>Based on the compatibility, scale contrast, and spatial dominance impacts of the RWF it is anticipated that Project visibility from this KOP will be consistent with VTL 5 because it "is not large but contrasts with the surrounding landscape elements so strongly that it is a major focus of visual attention, drawing viewer attention immediately and tending to hold that attention. In addition to strong contrasts in form, line, color, and texture, bright light sources such as lighting and reflections and moving objects associated with the study subject may contribute substantially to drawing viewer attention. The visual prominence of the study subject interferes noticeably with views of nearby landscape/seascape elements." (Sullivan et al., 2013).<br>The overlooks from Hanging Rock Trail and Red Fox Trail are primary destinations for the thousands of Norman Bird Sanctuary members and visitors that hike our seven miles of trails. While pictures from these overlooks simply do not do justice to seeing the views in person, we have included pictures and videos from both vantage points as part of our comments on this Project to demonstrate the magnificence of the existing views from both overlooks (see comment photos and videos). Suffice it to say, the rating analysis performed for this Project simply does not reflect the quality of the existing views or the adverse impact caused by the Project.<br>In addition to the views from Hanging Rock Trail and Red Fox Trail, the views from other contributing resources are also especially worthy of note. The views from the agricultural fields and associated stone walls are critical parts of Norman Bird Sanctuary's trail system. This includes the fields adjacent to the Paradise Farmhouse as well as fields that head out toward Hanging Rocks Road as well as fields across Hanging Rocks Road (see comment photos and videos). Of the 130 acres of the historic listing, 40 acres are agricultural fields. These fields are kept as grasslands for birds and provide sweeping views of the ocean. These views are enjoyed by members and visitors who walk the trails, view wildlife, and birdwatch as well as by people who rent Paradise Farmhouse or associated buildings for overnight stays, weddings, artist and corporate retreats, and various meetings. These views from the open fields are critical reasons that people come visit or rent our buildings.<br>In addition to the fields and stone walls, the Farmhouse, the family garden and the orchard are also listed as contributing resources. Similar to the fields and stone walls, these three contributing features also afford excellent views of the ocean. Weddings with an ocean view are performed in Mabel's Garden – named after the founder of the Sanctuary. The view from the primary bedroom of the Paradise Farmhouse is surely a major attraction of our rental success (see comment photos and videos including a video of Paradise Farmhouse). As listed above, the remaining contributing resources have no or limited views of the ocean. The failure to properly conduct an analysis in Appendix J of the maritime setting, views to the sea, and orientation of the historic resources on the Norman Bird Sanctuary property must be cured. A thorough analysis of the property and its historic resources must be completed to properly assess the adverse impact of the Project.<br>It is also important to note that Norman Bird Sanctuary has invested substantial funds since it was founded in 1949 to protect the historic property, buildings, contributing resources, as well as the viewshed. While a full accounting is beyond the scope of these comments, the major capital investments include a $2,200,000 renovation of Paradise Farmhouse (https://www.newportri.com/story/news/local/2014/01/17/what-mabel-wouldhave/12747091007/). This investment allows Norman Bird Sanctuary to rent the Farmhouse and allow for the public enjoyment of the historic house as well as the stunning views of the ocean. In addition, a $3,500,000 acquisition and deed restriction added the 23-acre Third Beach property (https://www.environmentcouncilri.org/content/third-beach-land-acquisition-project). This property expanded the Norman Bird Sanctuary to own additional habitat for birds and other species along Third Beach, in dune habitat, in cattail marsh | |

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| | | habitat, and in additional upland habitat. This expansion also allowed for the creation of our Coastal Education Center where students can experience the protection of these habitats and view species such as piping plovers. In addition, the $1,150,000 acquisition of a 14.5-acre parcel and the 34.7-acre deed restriction of the Gray Craig property was completed in partnership with Rhode Island, the Town of Middletown and the City of Newport. This acquisition also added an additional trail with ocean views. | |
| BOEM-2022-0045-0064 | 3 | 3. Proposed Modification to the Draft Historic Property Treatment Plan<br>Appendix J includes a "Draft Historic Property Treatment Plan for the Revolution Wind Farm - Nine Historic Properties - Town of Middletown, Newport County, Rhode Island". This draft Historic Property Treatment Plan (HPTP) includes the following proposals to address the adverse impacts of the Project:<br>Development of a Coastal/Shoreline Resiliency and Climate Adaptation Plan for Historic Properties<br>1) Revolution Wind will provide funding to develop a coastal/shoreline resiliency and climate adaptation plan for the eight historic properties identified in Attachment 21 to provide the Town and historic property owners with specific measures that can be taken to<br>protect their historic properties from flooding, coastal erosion, and other climate related threats as described in Attachment 21 .<br>2) Revolution Wind will develop the project consistent with Town of Middletown Planning Regulations; Current Climate Adaptation, Resiliency, and related guidance; the SOI Standards for Treatment of Historic Properties (36 CFR 68); the SOI Guidance on the<br>Identification of Historic Properties (36 CFR 800.4); and the SOI Professional Qualifications Standards (36 CFR Part 61), as applicable.<br>3) Revolution Wind will submit an RFP, proposals by qualified consultants in response to the RFP, photographs and documentation of existing conditions, draft updated historic property inventory if required, final updated historic property inventory if required,<br>draft Coastal/Shoreline Resiliency and Climate Adaptation Plan, and final Coastal/Shoreline Resiliency and Climate Adaptation Plan to the interested consulting patties for review.<br>Historic Context for Summer Cottage/Resort Development<br>1) Revolution Wind will provide funding to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries as described in<br>Attachment 21.<br>2) Revolution Wind will develop the project consistent with the Secretary of the Interior's Professional Qualifications Standards (36 CFR Part 61), as applicable, RIHPHC guidance, and MHC guidance.<br>3) Revolution Wind will submit an RFP, proposals by qualified consultants in response to the RFP, preliminary draft report, and final report to the interested consulting parties for review.<br>For the reasons provided in the two sections above, Norman Bird Sanctuary maintains that the adverse impact analysis does not property address the Project's impact to Norman Bird Sanctuary. Accordingly, the following proposed additions to the draft Historic Property Treatment Plan (HPTP) are recommended to be included:<br>A. Historic, Cultural, and Viewshed Mitigation<br>Paradise Valley Historic Context, Website, Mobile Application, and Interpretive Signage<br>1) Revolution Wind will provide funding to develop a regional context/history of Paradise Valley to provide details on the historic, artistic, and environmental heritage of Paradise Valley. In addition, this project will include a "Paradise Valley" website, mobile application and related interpretive signage.<br>Paradise Valley National Register of Historic Places Nomination<br>1) Revolution Wind will provide funding to recognize and document the historic and cultural significance in Middletown by completing NRHP Nomination for the entire Paradise Valley as described in Attachment __.<br>Paradise Valley Pedestrian Safety and Access Plan<br>1) Revolution Wind will provide funding to complete a study of pedestrian access, safety improvements, and alternative options to improve pedestrian safety and access throughout Paradise Valley.<br>Support On-Going Maintenance and Aesthetic Improvements to the Third Beach Road and Hanging Rocks Road Stone Walls<br>1) Revolution Wind will provide funding for the implementation of resiliency measures, ongoing maintenance, and/or | The Draft EIS has found adverse effects from visual impacts within the Paradise Rocks Historic District and, in application to that property's mitigation, BOEM will take into consideration your recommendations for mitigation of adverse effects when finalizing the draft MOA and its attached HPTPs (see EIS Appendix J). Please note that Appendix J addresses only impacts to historic properties as defined under NHPA Section 106. Please see EIS Appendix F for environmental protection measures and mitigation and monitoring on other resources, including avian resources. |

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| | | aesthetic improvements to the historic stone walls along Third Beach Road and Hanging Rocks Road stone walls to ensure the long-term preservation of this historic resource as described in Attachment __.<br>B. Mitigation of Property as a Nature Preserve<br>Avian Research Project<br>1) Revolution Wind will fund the development of multi-year habitat and usage survey of migration flyways for avian, bat, and related wildlife species using an array of sites along the East Coast. This will establish a current day baseline of population numbers and density with which the impact of the period in which initial construction begins through five years of operations. The Norman Bird Sanctuary will serve as one of several study sites along the East Coast at which Revolution Wind will fund banding surveys, GPS tracking, and other population monitoring projects to accurately track the impact of the Project.<br>Development of Interpretive Materials<br>1) Revolution Wind will fund the development of GIS story maps and comparable demonstrations to interpret the native avian species and migratory patterns to be used as an interpretive exhibit on the Norman Bird Sanctuary property and website<br>Support On-Going Improvements to the Third Beach Coastal Trail<br>1) Revolution Wind will provide funding for the ongoing improvement to the Norman Bird Sanctuary's Coastal Trail to provide support for bird viewing platforms and other trail improvements to ensure preservation of natural resources as described in Attachment __.<br>For the above reasons, Norman Bird Sanctuary respectfully maintains that proper recognition of the adverse impacts will be included in Appendix J and appropriate mitigation measures are included in draft Historic Property Treatment Plan. | |
| BOEM-2022-0045-0064 | 5 | B. Mitigation of Property as a Nature Preserve<br>Avian Research Project<br>1) Revolution Wind will fund the development of multi-year habitat and usage survey of migration flyways for avian, bat, and related wildlife species using an array of sites along the East Coast. This will establish a current day baseline of population numbers and density with which the impact of the period in which initial construction begins through five years of operations. The Norman Bird Sanctuary will serve as one of several study sites along the East Coast at which Revolution Wind will fund banding surveys, GPS tracking, and other population monitoring projects to accurately track the impact of the Project.<br>Development of Interpretive Materials<br>1) Revolution Wind will fund the development of GIS story maps and comparable demonstrations to interpret the native avian species and migratory patterns to be used as an interpretive exhibit on the Norman Bird Sanctuary property and website<br>Support On-Going Improvements to the Third Beach Coastal Trail<br>1) Revolution Wind will provide funding for the ongoing improvement to the Norman Bird Sanctuary's Coastal Trail to provide support for bird viewing platforms and other trail improvements to ensure preservation of natural resources as described in Attachment __.<br>For the above reasons, Norman Bird Sanctuary respectfully maintains that proper recognition of the adverse impacts will be included in Appendix J and appropriate mitigation measures are included in draft Historic Property Treatment Plan. | The proposed Project's impacts to birds are analyzed in Section 3.7 of the EIS. BOEM, USFWS, and the applicant are developing the required bird and bat monitoring plan (elements included as mitigation measures in EIS Appendix F, Table F-2 and Table F-3), which will include many of the elements in the drafted Revolution Wind Avian and Bat Post-Construction Monitoring Framework (see COP Appendix AA). |
| BOEM-2022-0045-0064 | 4 | See attachment 1 to letter BOEM-2022-0045-0064 which includes text, maps, photos, and video links for Norman Bird Sanctuary. | Thank you for the added information accompanying your comment. |
| BOEM-2022-0045-0080 | 1 | Because BOEM bifurcated the deadline for submitting comments on the National Historic Preservation Act (NHPA) process—including the Section 106 Finding of Affect, Draft Memorandum of Agreement, Area of Potential Effects Delineation Memorandum, CHRVEA, HRVEA offshore, HRVEA onshore, MARA, TARA, and NHL Supplementation—the Block Island Parties and Newport Parties reserve the right to supplement their comments on the DEIS with comments submitted on all NHPA issues. For purposes of these comments, our review of the NHPA documents shows that the DEIS, which relies on them, is seriously flawed, and that Revolution Wind's mitigation proposals for resolving adverse effects to our clients' historic properties are absurd.<br>As a threshold matter, BOEM undermines consultation and the legitimacy of its environmental permitting responsibilities by refusing to respond to our simple question: Why did BOEM classify reports associated with the preparation of the DEIS and relevant documents incorporated by reference relative to the NHPA, other than to state that BOEM will respond later in writing? Unfortunately, BOEM's refusal to respond demonstrates a pattern and practice of failing to comply with federal historic preservation laws across its portfolio of offshore wind energy developments.<br>BOEM's failure to address our comments, questions, and concerns—other than "We'll get back to you"—makes it difficult for | With respect to the timing of the Draft EIS public comment period and the differing dates for technical document review by consulting parties under NHPA Section 106, BOEM believes that it was appropriate to give the consulting parties additional time to review the documents that it distributed on August 1, 2022, because supplemental information on NHLs was provided during the review period for the Section 106–related documents and reports. This extended review period allowed the consulting parties at least 30 calendar days to review the supplemental information, which was shared with consulting parties on October 1, 2022. With this extension, the consulting parties had a 90-calendar-day review period for the Section 106–related documents from August 1 to October 31, 2022. BOEM elected not to extend the 45-day public comment period on the Draft EIS. BOEM is planning to include the final versions of the Finding and MOA, with input from consulting parties, in the Final EIS. Also, to the extent that the consulting parties' comments on any of the Section 106 consultation–related documents warrant changes to the analysis in the |

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| | | consulting parties to comment meaningfully on the DEIS insofar it is unclear what documents they may share with their constituencies to seek their reactions and concerns. See Attachment A.1<br>In addition, we note BOEM's failure generally to notify historic property owners, other than nongovernmental organizations, about Revolution Wind and the ongoing permitting review, even though they have a demonstrated interest in the Project. Finally, BOEM's so-called "public hearings" for Revolution were organized with inadequate notice or little to no advertising and should have occurred within the Town of New Shoreham and City of Newport, two communities with National Historic Landmarks expected to bear the brunt of Revolution Wind's adverse effects.<br>As oceanfront communities, the Block Island and Newport Parties are at the forefront of climate change response and impacts. They are committed to supporting responsibly permitted renewable energy projects. At the same time, they seek to protect their communities' historic and cultural character, their tourism economies, and their uninterrupted ocean views for generations to come and to ensure offshore wind is developed responsibly and in accordance with the law. The Block Island and Newport Parties should not be forced to bear externalities created by multi-billion dollar corporations—like Ørsted—that stand to make billions of dollars in revenue at a community's expense and without any direct or tangible benefit.<br>Our clients' goal in consultation with BOEM is to ensure that BOEM's permitting process follows the law, and that BOEM selects an alternative that preserves the integrity of the Project's surrounding area to the greatest extent possible, including all ocean-facing historic properties. Our clients insist that BOEM comply with the requirements of the National Environmental Policy Act (NEPA) and Section 106 and 110(f) of the National Historic Preservation Act (NHPA) so that Revolution Wind and nearby windfarms are developed responsibly.<br>Our comments address several deficiencies: (1) the DEIS is inadequate because it fails to take a "hard look" at impacts to historic and cultural resources by undervaluing their significance and downplaying adverse impacts to Block Island and Newport; (2) the DEIS fails to consider adequately the cumulative effects of Revolution Wind, South Fork Wind, Sunrise Wind, and other reasonably foreseeable wind farms; and (3) BOEM has inappropriately classified key technical reports and other documents associated with the environmental review process and therefore is thwarting public understanding of the Project's true impacts. If BOEM or any other cooperating agency, such as the U.S. Army Corps of Engineers, relies on the DEIS in its current form, any decision the agency makes will be arbitrary, capricious, and contrary to law.<br>Footnote 1: Letter from William J. Cook to Sarah Stokely and Scott Phillips dated May 2, 2022 (Comments on Revolution Wind Technical Reports). | main body of the Final EIS or any of the other appendices, BOEM will consider the consulting parties' comments in those contexts.<br>BOEM had also received previous consulting party requests for clarification regarding public availability of documentation provided during this NHPA Section 106 consultation and about BOEM's NHPA Section 304 process for the Project. The following reiterates BOEM's November 3, 2022, responses to the same or similar comments received on the Draft EIS from the same parties.<br>BOEM has consulted with the ACHP and coordinated with the NPS about a plan on how to handle sensitive information potentially subject to Section 304 of the NHPA. BOEM has not yet formally initiated the Section 304 consultation pursuant to 36 CFR 800.11I for the Section 106 consultation on the Project. The NPS has informed us that the Section 304 regulations of the NHPA do not specify when or if an agency is required to initiate consultation with the Secretary of the Interior within the course of an ongoing Section 106 consultation. In addition, the NPS advised BOEM that it is acceptable for a federal agency to wait to disclose project findings to the public until identification of historic properties, including sites of religious and cultural significance to Tribal Nations, and until potential effects to these properties have concluded and consensus evaluations of NRHP eligibility have been completed. From the beginning of the Section 106 consultation for the Project, BOEM has planned to distribute these reports that contain sensitive information to the consulting parties and to post publicly available summaries or redacted versions of Section 106–related documents to BOEM's website. The consulting parties have received all the available information and documentation associated with this Section 106 consultation, including sensitive information that could be subject to Section 304.<br>The basis for making confidential all of the revised technical reports (reports associated with the preparation of the Draft EIS) as opposed to redacting sensitive portions and making the documents public is as follows. The documents could contain sensitive information that could be subject to Section 304 of the NHPA. We have publicly available summaries of the revised technical reports—the MARA, TARA, and offshore HRVEA—posted to BOEM's website for the Project at https//:www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan). These summaries were posted shortly after the Project's Draft EIS was made publicly available. The CHRVEA is available on BOEM's website for this Project under the visual simulations tab (https//:www.boem.gov/renewable-energy/state-activities/revolution-wind). The Draft EIS contains the Finding and the draft MOA with certain sensitive information redacted. The Finding in the Draft EIS includes information regarding how BOEM has delineated its APE for the Project. All consulting parties received unredacted copies of the MARA, TARA, HRVEA, memorandum on the updated HRVEA (offshore), CHRVEA, and memorandum on BOEM's APE delineation.<br>The basis for making confidential the Finding and draft Memorandum of Agreement and redacting sensitive portions of the documents for the public is as follows. As noted above, the DEIS (Appendix J) contains the Finding of Effect and the draft MOA with certain sensitive information redacted (i.e., on the character and location of archaeological and tribal historic properties). BOEM made these documents available to the public when the Draft EIS was published. The consulting parties received unredacted versions of the Finding and the draft MOA in early August 2022, which contain all the redacted information in the public versions of these documents.<br>BOEM would like to note that we indicated in a September 27, 2022, Section 106 consulting parties meeting that BOEM would respond to the questions raised about Section 304 in writing to all consulting parties. BOEM then sent a written response to the consulting parties on November 3, 2022. BOEM disagrees with the assertion of other |

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| | | | consulting parties that the Section 106 consultation cannot proceed until the NPS is consulted with and redactions are applied to reports that contain sensitive information. As explained above, the regulations implementing Section 304 do not specify when an agency must begin consulting with the NPS. In summary, all consulting parties have received all available information and documentation associated with this Section 106 consultation, including sensitive information that could be subject to Section 304, and BOEM's website contains either redacted versions of consultation-related documents or non-technical summaries of reports that contain sensitive information. The basis for making confidential the summary and recordings of the prior two Section 106 meetings (as opposed to redacting sensitive portions and making the summary and recordings public) is as follows. The Section 106 meeting summaries and recordings contain sensitive information that could be subject to Section 304 of the NHPA. BOEM plans to produce redacted versions of the meeting summaries once we initiate Section 304 consultation with the NPS and the ACHP. The Section 106 meeting summaries and recordings were shared with all consulting parties on August 1, 2022.<br>BOEM has made information about the project public as appropriate. For the notification of the owners of historic properties, in the NOI for the Project, BOEM identified its intent to inform its Section 106 consultation by seeking public comment and input regarding the identification of historic properties and potential effects to historic properties from activities associated with approval of the COP. The NEPA scoping, hearings, and review have specifically included presentation of the NHPA Section 106 process and information. The NEPA process and document posting are also used to provide public involvement, input, and review opportunities in accordance with NHPA Section 106 regulations (36 CFR 800.2(d)(3)). This includes involvement on the resolution of adverse effects on historic properties, such as through mitigation of adverse effects as provided for in the MOA. This includes assessment of effects to NHLs under NHPA Section 110(f) in conjunction with the Section 106 process. BOEM has found that the Project would have adverse effects to historic properties, including NHLs, with visual effects specifically extending to historic properties in Newport and New Shoreham, Rhode Island. These effects were found in the Finding and in the CHRVEA analyses to include cumulative adverse effects related to other reasonably foreseeable future offshore wind farm developments. Impacts on recreation and tourism are addressed in EIS Section 3.18.<br>BOEM will continue consulting on the avoidance, minimization, and mitigation of adverse effects to historic properties under the integrated NEPA and NHPA Section 106 processes. BOEM has engaged in, currently engages in, and will continue to engage in consultation with Tribal Nations, SHPOs, and consulting parties involved in historic preservation within the development areas. Through consultation, BOEM will work to adapt and finalize the resolution of adverse effects in revision of the MOA and its attached HPTPs (see EIS Appendix J).<br>Throughout the NHPA Section 106 consultation, BOEM has added additional consulting parties with demonstrated interest in the undertaking that have requested to participate, including federally recognized Tribal Nations, state or historical tribal governments, local governments, nongovernment organizations, and property owners. BOEM further welcomed recommendations from invited consulting parties on any organizations, local governments, or members of the public they believed BOEM should include in the consultation process as per 36 CFR 800.3(f). BOEM will continue to consider, and add as appropriate, additional consulting parties who request to participate as the NHPA Section 106 process proceeds under NEPA and the NHPA. BOEM with the assistance of Revolution Wind, LLC posted notifications to the public and for property owners in local newspapers; in public spaces (libraries and post offices); and with public agencies, municipalities, and |

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| | | | historical commissions to notify about BOEM's Finding on historic properties and for further invitation to the Section 106 consultation. BOEM additionally sent letters inviting property owners and property administrators such as local governments to consult under Section 106 in early 2023, regarding adversely affected historic properties.<br>In addition, BOEM advertised public hearings with the release of the Draft EIS on the BOEM website for the Project as well as other media, such as local newspapers. Remote access was provided through virtual meetings, and in-person hearings were provided in local locations in Rhode Island and Massachusetts near the Project. |
| BOEM-2022-0045-0080 | 2 | I. The DEIS is inadequate because it fails to take a "hard look" at impacts to cultural and historic resources in the Project Area. BOEM has failed to uphold its obligations to properly inform the public in the DEIS and through public meetings about the effects of Revolution Wind as NEPA requires. NEPA is designed to ensure that the public and decision-makers are provided with the information they need to make a considered decision about the best path forward. The statute is also designed to ensure that federal agencies have carefully and fully contemplated the environmental effects of a proposed action.2<br>In addition to considering impacts on the natural environment, NEPA requires federal agencies to consider impacts on historic and cultural resources.3 By focusing the permitting agency's attention on the environmental consequences of its proposed action, NEPA "ensures that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast."4 In other words, NEPA requires that federal agencies take a "hard look" at the environmental consequences of a proposed action.5<br>In addition to assessing all impacts to the natural environment, BOEM must fully assess and consider all direct, indirect, and cumulative impacts on cultural and historic resources. But the DEIS falls short of NEPA mandates that require consideration of all adverse effects because BOEM has failed to integrate properly its NEPA and NHPA reviews, preferring instead to integrate in name only, but not in substance.6<br>BOEM has not taken a hard look at Revolution Wind, but rather has placed its thumb on the scale in favor of granting approval by considering only alternatives that could best be described as nonstarters. The Block Island and Newport Parties are longstanding stewards of some of the nation's most significant historic and cultural resources, yet BOEM refuses to consider the unique history of their communities or consider adequately the Project's specific impacts.<br>Footnote 2: 40 C.F.R. § 1502.1; N.C. Wildlife Fed'n v. N.C. Dep't of Transp., 677 F.3d 596, 601 (4th Cir. 2012) (quoting Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989)).<br>Footnote 3: 40 C.F.R. §1508.27(b)(3); 40 C.F.R. § 1508.27(b)(8).<br>Footnote 4: Robertson, 490 U.S. at 349.<br>Footnote 5: Citizens Against Burlington v. Busey, 938 F.2d 190 (D.C. Cir. 1991), cert. denied, 502 U.S. 994 (1992).<br>Footnote 6: See NEPA and NHPA: A Handbook for Integrating NEPA and Section 106<br>Synopsis, Advisory Council Hist. Preservation, https://www.achp.gov/digital-library-section-106-landing/nepa-andnhpa-handbook-integrating-nepa-and-section-106. | The EIS document preparation provides for a hard look at the impacts of the Project. The EIS Introduction, at Section 1.5 and 1.6, provides the methodology for the assessment of environmental impacts used for this federal action in accordance with NEPA requirements and other regulatory frameworks. Chapter 2 of the EIS provides information on how alternatives were scoped; this included providing scoping meetings for public involvement. Chapter 3 of the EIS identifies the affected environment (including as it relates to cultural resources and historic properties), provides the basis for IPFs for affected resources, and analyzes impacts. BOEM is addressing all of the regulatory requirements of the NHPA Section 106 process, including NEPA substitution, as it proceeds through the NEPA analyses. BOEM informed the public and all NHPA Section 106 consulting parties that would use the NEPA process to substitute for the steps in the Section 106 process when it releases the NOI for the Project. BOEM has engaged in, currently engages in, and will continue to engage in consultation with Tribal Nations, SHPOs, ACHP, and consulting parties involved in historic preservation within the development areas. This has included and will continue to include parties at Block Island and Newport, Rhode Island, regarding cultural resources identification, assessment of effects, and resolution of adverse effects on historic properties. |
| BOEM-2022-0045-0080 | 9 | Each of our clients' historic properties were purpose-built to take advantage of pristine, uninterrupted ocean views—an inseparable part of their context. The development of their properties also demonstrates broad patterns of history, particularly in terms of the evolution, preservation, and maintenance of ongoing summer resort communities. Furthermore, their historic properties maintain connections to living communities who have come to Block Island and Newport since their development for multiple generations. Yet BOEM has ignored how Block Island's and Newport's historic properties and their associated ocean landscape could be eligible for listing in the National Register as a historic landscape or even as a traditional cultural property. | Historic properties, including historic landscapes or TCPs, are those listed on the NRHP or eligible for listing on the NRHP and are defined as historic districts, sites, buildings, structures, or objects. The identification and evaluation of historic properties under the EIS and for the purposes of NHPA Section 106 review include historic districts, sites, buildings, structures, and objects in the APE for the Project. The APE extends to historic properties at Block Island and Newport, Rhode Island (see EIS Section 3.10).<br>BOEM is applying the EIS documentation, and supporting documentation as referenced in the EIS, in BOEM's reasonable and good faith efforts to identify historic properties, in accordance with 36 CFR 800.4. These efforts include BOEM taking into account past planning, research and studies, the magnitude and nature of the Project undertaking and the degree of federal involvement, the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties within the APE. BOEM has produced the Finding (see EIS Appendix J) for BOEM's determination of adverse effects pursuant to the undertaking. BOEM is applying the criteria of adverse effect from 36 CFR 800.5 et seq. and applying the special requirements for minimizing harm to NHLs at 36 CFR |

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| | | | 800.10 and for Section 110(f) compliance. BOEM remains in consultation with consulting parties on the identified historic properties, the assessment of effects, and in planning for the resolution of adverse effects under NHPA Section 106. |
| BOEM-2022-0045-0080 | 10 | In addition, BOEM must give more serious consideration to construction impacts in its final analysis of impacts to historic properties. Proposed construction is expected to cause significant adverse effects to historic properties within the Project Area and Area of Potential Effects, something the DEIS does not address with any substance. Prolonged, constant, and bright lights will be required to construct the WTGs, and this lighting will cause major impacts to Block Island's and Newport's views for a significant period. The DEIS does not discuss fully how Revolution Wind will address potential lighting impacts, including during the construction phase, other than effectively dismiss them. However, our clients are especially concerned about lighting impacts to the dark night sky both during and after construction and urge BOEM to take a hard look at these impacts and mandate ADLS. In addition, BOEM should also consider visual impacts of lighting at each proposed turbine's base, reflections caused by weather conditions, and reflections on the ocean's surface, as well as ways to minimize or mitigate those impacts.9<br>Footnote 9: The DEIS notes that lighting has the potential to adversely affect tourism visitation rates, employment and economic activity in service industries that support tourism. DEIS at 3.11-29. See also DEIS at 3.12-14. | As described in EIS Chapter 2 under the Proposed Action Alternative, all structures would have appropriate markings and lighting in accordance with USCG and International Association of Marine Aids to Navigation and Lighthouse Authorities guidelines. This includes where navigational lighting would be placed near the base, midway WTG towers, and on the WTG nacelles. Weather or atmospheric conditions are considered, as is distance to historic properties, which would ameliorate the effects of lighting impacts such as in surface reflection. The EIS also considers that existing ambient lighting would reduce the impacts of Project lighting at some locations and, therefore in contrast, be greater where darker skies prevail; see for example the Light subsection at Section 3.20.2.2. Construction lighting as well as navigation lighting were taken into account in the analysis of impacts on cultural resources in EIS Section 3.10. Lighting is specifically analyzed as an IPF for cultural resources, and lighting was found to contribute to adverse effects on historic properties, where reaching moderate to major impact levels in the analyses. These impacts would continue through the life of Project, with construction and decommissioning introducing temporary effects during their active periods and O&M causing long-term impacts from lighting. ADLS is a planned element of the Project that would reduce the effects of lighting. Avoidance, minimization, and mitigation of adverse effects to historic properties, including from the visual impacts of lighting and other Project elements, are addressed by the MOA and its attached HPTPs (see EIS Appendix J). Also in EIS Appendix J, the Finding (see its Section 5.1.2.1) also specifically considers adverse effects from construction and installation lighting, and discusses this in context of consideration of Project alternatives considered, cross-referencing to the EIS |
| BOEM-2022-0045-0080 | 3 | II. The DEIS is incomplete because it fails to assess adequately Revolution Wind's cumulative impacts to the Town of New Shoreham and City of Newport.<br>Multiple wind farms are in development off the coasts of Rhode Island and adjacent states. These offshore wind projects will have both separate and cumulative adverse visual impacts upon historic properties, sites, and districts listed or eligible for listing in the National Register of Historic Places.<br>This Project, and how it is evaluated and permitted, will set a precedent for upcoming projects in the area and along the entire Atlantic Coast; therefore, it is essential to apply consistent criteria to this project and subsequent future sites. Due to the historic integrity of historic properties within the Project Area and Area of Potential Effects, BOEM must establish and implement best practices. Based on the omissions described above, the DEIS should be amended to reflect—and the Final EIS should include—a complete cumulative assessment of all impacts to historic and cultural properties and include additional cumulative visual simulations for the Town of New Shoreham's and City of Newport's historic properties, including those reasonably foreseeable effects that Revolution Wind, South Fork Wind, Sunrise Wind, and other planned projects will generate.<br>Moreover, the DEIS fails to incorporate best practices and minimum guidelines that would apply to all offshore wind developments near the Town of New Shoreham and City of Newport. In specifically requiring cumulative impacts analyses, NEPA recognizes the significant effect that reasonably foreseeable projects can have on the surrounding landscape beyond the scope of a single development. However, BOEM's analysis and methodology for assessing cumulative impacts in the DEIS are confusing and unclear. Revolution Wind, and how it is evaluated and permitted, influences permitting for all future projects in the area. Consulting parties and the public have a right to understand BOEM's conclusions and how it arrived at them. Currently, no reasonable person can interpret them.<br>According to the Cumulative Historic Resources Visual Effects Analysis, there will be at least an additional 958 additional WTGs up to 873 feet high present in the Area of Potential Effects for Revolution Wind, with thousands more expected throughout the East Coast. 10 It is concerning, then, to see the lack of minimum guidelines and best practice standards established for offshore wind projects in the United States, especially as they relate to adverse visual impacts upon National Historic | The EIS analyzes the cumulative impacts of the Project in relation to other reasonably foreseeable future offshore wind projects. These analyses specifically include cumulative analysis of adverse effects from cumulative visual impacts to aboveground historic properties (also referred to as NRHP-eligible viewshed resources), inclusive of these historic properties as they occur at the City of Newport and the Town of New Shoreham, Rhode Island. Visual simulations that depict the buildout of the Project and other reasonably foreseeable future wind farm projects that would be visible from KOPs at New Shoreham and at Newport are provided with the CHRVEA, which the EIS cites in EIS Appendix B. BOEM's 2020 Guidelines for Providing Archaeological and Historical Property Information Pursuant to 30 CFR Part 585 and BOEM's (Sullivan et al.) 2021 Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States (cited in EIS Appendix B) were followed in the compilation of the HRVEA and CHRVEA that the EIS references. As further noted at EIS Section 3.1, BOEM's 2019 study National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf (cited in EIS Appendix B) developed reference tables that evaluate potential impacts associated with ongoing and future offshore wind and non–offshore wind activities. The content of these tables has been re-evaluated in Appendix E1 to determine the relevance of each IPF to each resource analyzed in the EIS. Updates have been made to the presentation of cumulative impacts in the Final EIS to improve readability and more clearly delineate impacts from the action against current and future baseline conditions.<br>Practices planned to assist in avoiding, minimizing, or mitigating impacts to historic properties, including those at New Shoreham and Newport, include the use of ADLS and |

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| | | Landmarks and historic properties, sites, and districts listed or eligible for listing in the National Register of Historic Places. It is essential to apply consistent criteria to this project and subsequent future sites. Due to the high cultural and historic sensitivity of the Town of New Shoreham's and City of Newport's numerous ocean-facing historic properties, best practice criteria must be applied. Minimum standards should include:<br>• Requiring the least impactful nighttime lighting, such as ADLS;<br>• Requiring all windfarms in a specific region to use the same non-reflective paint color, determined to be most effective in minimizing the visual impacts, per specific atmospheric/geographical conditions of the lease sites;<br>• Establishing minimum set-back standards from land, with specific considerations for historic landmarks and areas with tourism-driven economies;<br>• For communities with historical significance, BOEM should help ensure that local stakeholders receive fair and direct access to any state and federal agencies or resources, which may provide critical regulatory guidance on how best to avoid, minimize, and mitigate the local impacts of offshore windfarms. This support would be provided independent of the Section 106 process, and would, for example, identify and encourage dialogue between communities with their State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP); and<br>• Requiring—to the extent to which harm to historic and cultural resources cannot be avoided or minimized—appropriate project mitigation measures to offset the impacts to communities, such as community benefit agreements, offshore wind mitigation trust funds, or other economic development arrangements, as are standard in the offshore wind industry globally.<br>At this critical juncture in the development of the U.S. offshore wind industry, stakeholders are open minded, if not supportive, of a successful industry that shares benefits with local communities who will bear the brunt of adverse impacts and certain risk of loss to their economies.<br>Footnote 10: Cumulative Historic Resources Effects Analysis – Revolution Wind Farm and Revolution Export Cable Project, 31-38 (August 2022). | general application of paint colors (no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey) that conform to BOEM's 2021 Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development (cited in EIS Appendix B). BOEM has engaged in, currently engages in, and will continue to engage in consultation with federally recognized Tribal Nations, SHPOs, and consulting parties and the public on historic preservation within the development areas. BOEM continues to consult on mitigation of adverse effects to historic properties with all required and interested parties, as reflected under EIS Appendix J. BOEM will consider mitigation "trust funds" as proposed in consultation on potential mitigation measures. |
| BOEM-2022-0045-0080 | 4 | III. BOEM has violated the letter and spirit of NEPA and the NHPA by refusing to subject its permitting review to public scrutiny. To the extent that the DEIS relies on information developed through the Section 106 process, BOEM has violated Section 304 of the NHPA by refusing to make public certain reports that would assist the public in determining impacts to the community. Section 304 allows federal agencies to keep confidential certain types of sensitive information about historic properties such that disclosure would result in a significant invasion of privacy, cause damage to the historic property, or impede the use of a traditional religious site by practitioners.11 Determining which material to keep confidential must be made in coordination with the Secretary of the Department of the Interior through the National Park Service. The policy behind the confidentiality rule is designed to balance the policy of transparency of environmental permitting laws against historic preservation needs where public disclosure could lead to harm. No consulting party has requested confidentiality in this matter. Despite this fact, BOEM has apparently made the historic resource reports confidential in their entirety.<br>To our knowledge, BOEM has not coordinated its decision with the National Park Service or the Advisory Council on Historic Preservation to keep confidential nearly every document concerning historic property, visual, and cumulative effects assessments as Section 304 requires. Instead, BOEM and Ørsted have prevented the public from having access to the identification of historic properties, adverse effects, visual simulations, and the proposed resolution of adverse effects. For example, BOEM has done so by removing or not posting on its project websites the following documents:12 Marine Archaeological Resources Assessment, Terrestrial Archaeological Resources Assessment, Memorandum on the Updated Historic Resources Visual Effects Analysis, Offshore Historic Resources Visual Effects Analysis, Onshore Historic Resources Visual Effects Analysis, Cumulative Historic Visual Effects Analysis, the memorandum on BOEM's Area of Potential Effect Delineation, BOEM's proposed Memorandum of Agreement to resolve adverse effects, and Ørsted's proposed mitigation measures to offset adverse effects. Nor has BOEM made public all consultation meeting transcripts, presentations, or meeting summaries. Instead, BOEM has kept the public from having access to this information and purported to limit what consulting parties can share, claiming some unspecified need for confidentiality. As elected officials with an affirmative duty to keep their community informed, our clients find these vague requirements particularly troubling.<br>Moreover, BOEM has refused to respond to legitimate questions concerning the basis for its nondisclosure, thus creating confusion among consulting parties, especially local governments who need public input to assist with consultation. Therefore, BOEM must make public all documents associated with the Revolution Wind and all other offshore wind consultations, with appropriate redactions as necessary in coordination with the National Park Service and Advisory Council on Historic Preservation and restart the period for public comment. We also request that BOEM hold in-person public meetings on Block | BOEM received previous consulting party requests for clarification regarding documentation provided in this NHPA Section 106 consultation that is publicly available and clarification regarding BOEM's NHPA Section 304 process for the Project. The following reiterates BOEM's November 3, 2022, responses to the same or similar comments received on the Draft EIS from the same parties.<br>BOEM has consulted with the ACHP and coordinated with the NPS about a plan on how to handle sensitive information potentially subject to Section 304 of the NHPA. BOEM has not yet formally initiated the Section 304 consultation pursuant to 36 CFR 800.11(c) for the Section 106 consultation on the Project. The NPS has informed us that the Section 304 regulations of the NHPA do not specify when or if an agency is required to initiate consultation with the Secretary of the Interior within the course of an ongoing Section 106 consultation. In addition, the NPS advised BOEM that it is acceptable for a federal agency to wait to disclose project findings to the public until identification of historic properties, including sites of religious and cultural significance to tribes, and until potential effects to these properties have concluded and consensus evaluations of NRHP eligibility have been completed. From the beginning of the Section 106 consultation for the Project, BOEM has planned to distribute these reports that contain sensitive information to the consulting parties and to post publicly available summaries or redacted versions of Section 106–related documents to BOEM's website. The consulting parties have received all the available information and documentation associated with this Section 106 consultation, including sensitive information that could be subject to Section 304.<br>The basis for making confidential all of the revised technical reports (reports associated with the preparation of the Draft EIS) as opposed to redacting sensitive portions and making the documents public is as follows. The documents could contain sensitive information that could be subject to Section 304 of the NHPA. We have publicly available summaries of the revised technical reports—the MARA, TARA, and offshore HRVEA—posted to BOEM's website for the Project (https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan). These |

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| | | Island and in the City of Newport during this period of time.<br>***<br>For the reasons discussed above, BOEM should revise the DEIS so that it fully identifies historic properties within the Area of Potential Effects, adequately assesses adverse effects including cumulative effects, and resolves adverse effects appropriately for all of these properties. In addition, because BOEM has refused to allow the public to review information related to Revolution Wind, it must reissue the DEIS and its associated appendices and allow the public a reasonable opportunity to comment.<br>Footnote 11: 54 U.S.C. § 307103; 36 C.F.R. § 800.11(c).<br>Footnote 12: https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan | summaries were posted shortly after the Project's Draft EIS was made publicly available. The CHRVEA is available on BOEM's website for this Project under the visual simulations tab (https://www.boem.gov/renewable-energy/state-activities/revolution-wind). The Draft EIS contains the Finding and the draft MOA with certain sensitive information redacted. The Finding in the Draft EIS includes information regarding how BOEM has delineated its APE for the Project. All consulting parties received unredacted copies of the MARA, TARA, HRVEA, memorandum on the updated HRVEA (offshore), CHRVEA, and memorandum on BOEM's APE delineation.<br>The basis for making confidential the Finding and draft Memorandum of Agreement and redacting sensitive portions of the documents for the public is as follows. As noted above, the DEIS (Appendix J) contains the Finding of Effect and the draft MOA with certain sensitive information redacted (i.e., on the character and location of archaeological and tribal historic properties). BOEM made these documents available to the public when the Draft EIS was published. The consulting parties received unredacted versions of the Finding and the draft MOA in early August 2022, which contain all the redacted information in the public versions of these documents.<br>BOEM would like to note that we indicated in a September 27, 2022, Section 106 consulting parties meeting that BOEM would respond to the questions raised about Section 304 in writing to all consulting parties. BOEM then sent a written response to the consulting parties on November 3, 2022. BOEM disagrees with the assertion of other consulting parties that the Section 106 consultation cannot proceed until the NPS is consulted with and redactions are applied to reports that contain sensitive information. As explained above, the regulations implementing Section 304 do not specify when an agency must begin consulting with the NPS. In summary, all consulting parties have received all available information and documentation associated with this Section 106 consultation, including sensitive information that could be subject to Section 304, and BOEM's website contains either redacted versions of consultation-related documents or non-technical summaries of reports that contain sensitive information. The basis for making confidential the summary and recordings of the prior two Section 106 meetings (as opposed to redacting sensitive portions and making the summary and recordings public) is as follows. The Section 106 meeting summaries and recordings contain sensitive information that could be subject to Section 304 of the NHPA. BOEM plans to produce redacted versions of the meeting summaries once we initiate Section 304 consultation with the NPS and the ACHP. The Section 106 meeting summaries and recordings were shared with all consulting parties on August 1, 2022. |
| BOEM-2022-0045-0080 | 5 | Attachment A, comment 1:<br>We write on behalf of our clients, the Town of New Shoreham, RI, and Southeast Lighthouse Foundation (the "Block Island Parties"), which are joined by the City of Newport, RI; Newport Restoration Foundation, Preservation Society of Newport County, and Salve Regina University (the "Newport Parties"). Our clients request that BOEM conduct additional visualizations so that consulting parties and the public have an accurate and realistic understanding of Revolution Wind's visual effects. BOEM's confusing technical reports, specifically the Historic Resources Visual Effects Assessments (HRVEAs) and Cumulative HRVEA (CHRVEA), cannot reasonably be considered complete without substantial revisions. BOEM must also make public all technical reports. BOEM has offered no legitimate reason exists to justify their nondisclosure.<br>As a general matter, we concur with BOEM's identification of historic properties. We agree with BOEM's conclusion that the maritime nature of our clients' historic properties and seaward views contribute to the maintenance of their integrity and continued listing or eligibility for listing in the National Register of Historic Places. We agree with BOEM's observation that wind turbines will unquestionably change the ocean landscape integral to historic properties in numerous ways. As BOEM explained:<br>The introduction of the wind turbines would likely constitute a change in the physical environment of an above-ground [historic] property. This is particularly true for those properties for which open views of the ocean are integral, such as | The visualizations prepared for the Project (i.e., in the VIA, HRVEA, and CHRVEA referenced in the Draft EIS) present a broad range of lighting and atmospheric conditions appropriate to assess the potential visual effects to historic properties located within the visual APE. BOEM finds the documentation acceptable and sufficient to enable any reviewing party to understand the basis of BOEM's determinations and findings on the undertaking under NHPA Section 106 (per 36 CFR 800.11(a)). The HRVEA and supporting VIA visualizations are not found by BOEM to underrepresent the size or number of WTGs. Numerous visualizations are provided in the VIA, HRVEA, and CHRVEA for a range of high-contrast conditions from various KOPs. It is neither feasible nor required to simulate all potential viewing conditions for BOEM to determine whether individual historic properties would be adversely affected and to accurately characterize the nature of any such adverse effects. The visualizations presented in the HRVEA include five KOPs in the City of Newport and a sixth on Sachuest Point. The KOPs were selected to provide a range of vantages and elevations (e.g., bluffs, coastlines, landscape features) with unobstructed views toward the Project and, therefore, represent views with the greatest scope of change from existing |

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| | | lighthouses and recreation areas. . . . [E]ven those properties which would likely experience reduced visual effects resulting from existing modern elements, partially obstructed visibility by landscape features (vegetation and topography) or other buildings would be potentially affected by the Project due to its unprecedented size and scale.1<br>Indeed, Revolution Wind's "unprecedented size and scale" will harm the integrity of our clients' historic properties in significant ways as well as the broader community of historic properties for which our clients advocate, all of which depend contextually on an ocean landscape and unimpeded vistas of that landscape. In addition, the "number and density" of offshore wind farm turbines create a "visual mass" that will have a presence of "large-scale modern infrastructure" on the ocean's horizon.2<br>BOEM is correct to acknowledge Revolution Wind's disruptive visual intrusion on Block Island's, Newport's, and other communities' ocean-facing landscapes. However, if BOEM intends to move forward with using these technical reports, it must amend them to include comprehensive visualizations from additional properties that it has identified as part of the so-called "Preliminary Area of Potential Effects"—and not just more visual depictions, but accurate, useful ones. Offshore wind energy projects have dramatic visual effects on the landscapes where they are placed, and the public has a right to understand what these projects will look like. As researchers at Argonne National Laboratory Visual Resource Analysis Laboratory observed:<br>The seascape visual impacts associated with offshore wind facilities are without precedent; the facilities are very large, with enormously tall structures having colors and geometry that contrast strongly with natural seascapes. The synchronized sweeping movement of the massive+543:544 blades during the day and synchronized flashing of the lighting at night contribute to the facilities' visibility over very long distances. These impacts are extremely difficult to mitigate, and the only truly effective means of reducing the impacts in a seascape is to site the facilities away from sensitive visual resource areas and viewing locations. Because distance is so important to reducing or avoiding impacts, an accurate understanding of the relationship between distance and visibility of utility-scale offshore wind facilities in real settings is critical to the optimal siting of new facilities.3<br>BOEM's current visual simulations are inadequate to show the actual impact of the wind turbines and associated infrastructure, in violation of BOEM's own guidelines: each "Key Observation Point" has only one viewpoint simulated.4 BOEM appears to have cherry-picked these observation points to minimize the appearance of adverse visual effects. And BOEM appears to have cherry picked timing of its visual simulations: 23 of the base photos were taken in the summer; 11 in the fall, 5 in the winter, and zero in the spring. According to BOEM's hypothetical New York study, summer tends to have the lowest average visibility, followed by spring, winter, and fall with the highest visibility.5 For purposes of Revolution Wind, BOEM should have taken baseline photographs from historic properties during common weather conditions and periods of maximum meteorological visibility under multiple lighting conditions for each representative property. But BOEM skipped these steps, contrary to its own practices.6 In addition, simulations commonly under-represent turbine number and size, simulation frames are too narrow to adequately represent human vision, and simulations under-estimate how many turbines are visible from a single landscape position.7<br>Moreover, BOEM does not have the present capability to evaluate the accuracy of existing visual simulations against the post-development reality of what Revolution Wind—and other industrial scale offshore wind energy development projects—will look like, which undermines their reliability for present purposes.<br>Furthermore, there are too few vantage points to properly assess impacts, no simulations depicting construction, sunrise, or sunset for these missing vantage points at times when the turbines will be most visible, and no consideration of what Revolution Wind and other wind farms will look like at night and during construction, when cumulative lighting impacts are expected to be significant and continue for years (possibly until 2030). Simulations included in the HRVEA and CHRVEA are too limited in both number and scope, and they fail to consider visuals of the turbines systematically during all seasons at multiple times of day. Thus, BOEM cannot reasonably rely on its current visuals as realistic or accurate.<br>Strikingly, there are no simulations from Newport's numerous National Historic Landmarks (NHLs); likewise, BOEM's simulations for Block Island properties are wholly inadequate, including limited views from the Southeast Lighthouse NHL.<br>8 BOEM cannot shirk its burden to determine adverse effects and expect consulting parties to guess what Revolution's visual effects will look like. BOEM has a legal duty to focus on NHLs as part of its duty to use all possible planning to minimize harm, as required by Section 110(f) of the National Historic Preservation Act ("NHPA"), yet BOEM has effectively ignored them.<br>BOEM must amend its visualizations and simulations to assess accurately adverse impacts and to determine appropriate avoidance, minimization, or mitigation measures from useful vantage points and additional conditions. Observation points should include all historic districts, as well as all properties listed or eligible for listing in the National Register, and all National | conditions. The visualizations presented in the HRVEA were created methodically to accurately characterize views of the Project from representative viewpoints throughout the APE. Consistent with BOEM's guidance and extensive analyses of visual effects conducted over the previous decade on offshore wind facilities, the VIA and HRVEA contain extensive field photography and visualizations to accurately depict how the Project would appear from vantages throughout the APE. The Project visualizations have been prepared by qualified consultants, and reviewed by BOEM's visual and Section 106 subject matter experts, to best support robust and accurate characterization of Project visibility. BOEM is uniquely experienced in preparing and evaluating visual studies for offshore wind facilities, and has consistently moved to incorporate best practices from ongoing research. BOEM's guidance and requirements are applied sufficiently in the HRVEA, CHRVEA, and VIA for the Project. BOEM's review and consultation on the Project remain ongoing, and BOEM welcomes continued input that will improve its NHPA Section 106 and other regulatory reviews and consultation. Please note that simulations and visualizations are only one supporting aspect of BOEM's analyses for adverse effects to historic properties, including NHLs and TCPs important to Tribal Nations, and not the entire basis of the assessment of effects. The VIA and HRVEAs for the Project provides detail on the fuller contexts of the visual impacts analyses.<br>The VIA, HRVEA, and CHRVEA specifically provide Project simulations from and directly at NHL viewpoints at Newport Cliff Walk and Block Island Southeast Lighthouse and from TCP viewpoints at Massachusetts offshore islands. The NHL supplemental documentation adds visual simulations and information for all 12 NHL locations in the APE, providing further simulations and visualizations specific to these historic properties. |

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| | | Historic Landmarks located within the Area of Potential Effects, including additional points in Newport County as well along Block Island's Atlantic coast. Revolution Wind will irreparably alter the setting of these places important to our clients, along with myriad other historic properties, including traditional cultural properties that are significant to tribes.<br>Footnote 1: CHRVEA at 5.<br>Footnote 2: CHRVEA at 20.<br>Footnote 3: Robert G. Sullivan, Leslie B. Kirchler, Jackson Cothren, Snow L. Winters, Offshore Wind Turbine Visibility and Visual Impact Threshold Distances, 15 ENVIRONMENTAL PRACTICE 1 at 33-49 (March 2013) (emphasis added).<br>Footnote 4: According to BOEM's INFORMATION GUIDELINES FOR A RENEWABLE ENERGY CONSTRUCTION AND OPERATIONS PLAN (COP) (May 27, 2020, Attachment A, Best Management Practices, at 28, Revolution Wind visualizations fall far short of best practices. According to BOEM, best practices require:<br>• Lessees and grantees for wind projects should address key design elements, including visual uniformity, use of tubular towers, and proportion and color of turbines.<br>• Lessees and grantees for wind projects should use appropriate viewshed mapping, photographic and virtual simulations, computer simulation, and field inventory techniques to determine, with reasonable accuracy, the visibility of the proposed project. Simulations should illustrate sensitive and scenic viewpoints.<br>• Lessees and grantees must comply with FAA and USCG requirements for lighting in accordance with BOEM's "Draft Proposed Guidelines for Providing Information on Lighting and Marking of Structures Supporting Renewable Energy Development," dated October 2019, available at https://www.boem.gov/guidance, and should minimize visual impacts through appropriate application.<br>• Lessees and grantees should seek public input in evaluating the visual site design elements of proposed wind energy facilities.<br>• Within FAA guidelines, directional aviation lights that minimize visibility from shore should be used.<br>Footnote 5: BOEM, Renewable Energy Viewshed Analysis and Visualization Simulation for the New York Outer Continental Shelf: Compendium Report (2015) ("Compendium Report").<br>Footnote 6: BOEM's Compendium Report provides: "Baseline photographs were taken at each KOP in each of the four seasons during common weather conditions and periods of maximum meteorological visibility. . . . Photographs were taken systematically to ensure that four different lighting conditions were recorded (including mornings, mid-day, afternoon, and nighttime)." Note 5, supra.<br>Footnote 7: Robert C. Corry, A Case Study on Visual Impact Assessment for Wind Energy Development, 29 JOURNAL OF THE INT'L ASS'N FOR IMPACT ASSESSMENT 303 (2011).<br>Footnote 8: Because of their NHL status and concentrated number of historic properties facing the ocean, it is nconceivable that BOEM would not have made Bellevue Avenue Historic District, Ochre Point-Cliffs Historic District, and the Ocean Drive Historic District the primary focus of its Newport analysis. BOEM's choice to ignore these NHLs, but then cite Kay Street-Catherine Street-Old Beach Road as a representative example of "Historic Homes and Structures" undermines BOEM's credibility since it is not entirely clear whether Revolution Wind would be visible from there. | |
| BOEM-2022-0045-0080 | 6 | Attachment A, comment 2:<br>Moreover, it is not clear how BOEM has defined or justifies "impact classes" to determine whether Revolution Wind will cause adverse effects. Grouping properties into ranges, such as "less than 12 miles," "12-24 miles," "24-30" miles, and "greater than 30 miles" to decide which properties will experience adverse effects without showing the public what turbines will look like renders the categories useless. Consulting parties have a right to understand the methodology BOEM relied on to create these classes and need to see a complete inventory of visualizations. Without these, it is impossible to verify whether BOEM is correct about how offshore wind turbines are perceived and the extent to which they alter the maritime setting.<br>Likewise, our clients are concerned about lighting impacts to the dark night sky both during and after construction, which will require continuous lighting for years. BOEM's technical reports do not discuss how Revolution Wind will adequately address potential lighting impacts, thus rendering it impossible for anyone to understand the nature and extent of this adverse environmental effect. Four nighttime simulations simply are not sufficient. In addition, BOEM should more carefully consider visual impacts of lighting—at the top of each turbine and at each proposed turbine's base—as well as the potential added impact of the reflection of those lights on the ocean's surface, which will magnify lighting effects. Contrary to BOEM's contention at the most recent consulting party meeting, it is hard to understand how water ripples in the ocean would eliminate this threat. | The EIS analyzes the cumulative impacts of the Project in relation to other reasonably foreseeable future offshore wind projects. These analyses specifically include cumulative analysis of adverse effects from cumulative visual impacts to aboveground historic properties (also referred to as NRHP-eligible viewshed resources), inclusive of these historic properties as they occur at the City of Newport and the Town of New Shoreham, Rhode Island. Visual simulations that depict the buildout of the Project and other reasonably foreseeable future wind farm projects that would be visible from KOPs at New Shoreham and at Newport are provided with the CHRVEA, which the EIS references in EIS Appendix B. BOEM's 2020 Guidelines for Providing Archaeological and Historical Property Information Pursuant to 30 CFR Part 585 and BOEM's 2021 Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States (cited in EIS Appendix B) were followed in the compilation of the HRVEA and CHRVEA that the EIS references. As further noted at EIS Section 3.1, BOEM's 2019 study National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North |

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| | | Next, it is not clear how BOEM arrived at its 6.4 to 95.7% figure9 for determining how much more cumulative impacts Revolution Wind would add to adverse visual effects considered in BOEM's analysis; whether BOEM's calculations considered nighttime aviation hazard lighting and lighting during construction; and/or whether and to what extent use of aircraft detection lighting systems might change its accuracy. Additionally, BOEM has not considered the possibility of developers employing larger turbines in line with current industry trends, or what would happen if development leases were extended beyond their current lease periods—relevant factors that would render the CHRVEA meaningless.<br>For all these reasons, the CHRVEA's methodology concerning visual impacts is fundamentally flawed. The Block Island Parties and Newport Parties request that BOEM revise the technical reports to include visualizations for all NHLs, include visualizations from these sites at all times of day and during all seasons, reevaluate CHRVEA's conclusions based on the aviation hazard lighting, construction lighting, and light reflection on the ocean's surface, and evaluate the potential impacts of taller turbines to be deployed in offshore wind developments.<br>Footnote 9: CHRVEA at i. | Atlantic Outer Continental Shelf (cited in EIS Appendix B) developed reference tables that evaluate potential impacts associated with ongoing and future offshore wind and non–offshore wind activities. The content of these tables has been re-evaluated in Appendix E1 to determine the relevance of each IPF to each resource analyzed in the EIS. Updates have been made to the presentation of cumulative impacts in the Final EIS to improve readability and more clearly delineate impacts from the action against current and future baseline conditions.<br>Practices planned to assist in avoiding, minimizing, or mitigating impacts to historic properties, including those at New Shoreham and Newport, include the use of ADLS and general application of paint colors (no lighter than RAL 9010 Pure White and no darker than RAL 7035 Light Grey) that conform to BOEM's 2021 Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development. BOEM has engaged in, currently engages in, and will continue to engage in consultation with federally recognized tribes, SHPOs, and consulting parties and the public on historic preservation within the development areas. BOEM continues to consult on mitigation of adverse effects to historic properties with all required and interested parties, as reflected under EIS Appendix J. BOEM will consider mitigation "trust funds" as proposed in consultation on potential mitigation measures.<br>The CHRVEA includes numerous visualizations of cumulative buildout scenarios that depict how WTGs would appear within the APE. Distance thresholds applied in the VIA, HRVEA, and CHRVEA are consistent with previous studies of offshore wind that document diminished visual contrast due to atmospheric perspective, as cited variously in these technical reports. The distance zones, as applied in the VIA, HRVEA, and CHRVEA, are a useful and a sound means of characterizing which WTGs contribute to adverse visual effects to individual historic properties and for evaluating cumulative visual effects where they occur. However, as presented in the VIA, HRVEA, and CHRVEA, distance thresholds are not the sole method of assessment of effects that were utilized. Visualizations make up one tool used to illustrate the distribution of planned WTGs in relation to aboveground historic properties in the visual APE and distance thresholds one comparative assessment that was applied.<br>Regarding lighting impacts, the number of light sources potentially visible from each historic property was analyzed as part of the HRVEA and CHRVEA. Earth's curvature will substantially limit the possibility of reflections and shimmer from light sources based on the distances separating WTGs and the OSSs from historic properties in the visual APE for the Project. As indicated in EIS Appendix J, avoidance, minimization, and mitigation measures for historic properties are drafted in both the MOA and the HPTPs attached to it. Under the MOA, adverse effects from the Project to historic properties, including NHLs, would be avoided, minimized, or mitigated in accordance with the NHPA Section 106 regulations (36 CFR 800) and in compliance with Section 110(f). Measures committed to by the Lessee to effectively reduce nighttime lighting would include the use of an ADLS that would drastically reduce the amount of time in which the higher red lights are lit at night. With ADLS, flashing red lights would not be perpetual during nighttime/dark conditions.<br>The range of potential effects and numbers of historic properties have been changed in the revised HRVEA and CHRVEA, released to NHPA Section 106 consulting parties in August 2022 and reflected in EIS analysis released to the public in September 2022. The percentage(s) of cumulative effects described in the CHRVEA were adjusted with these revisions. In response to the comment, the revised CHRVEA, in August 2022, presented further information on the percentage contribution estimated for the Project's cumulative effects. As stated in the CHRVEA, the cumulative effects include daytime visibility and nighttime lighting for Project offshore wind components, including construction. The use of |

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| | | | ADLS would not change the accuracy or precision of the percentage(s); however, it would assist in minimizing adverse effects overall. Per the revised CHRVEA, the Project would contribute proportionally between nearly 10% and nearly 90% of the cumulative adverse effect, owing to the location and intensity of the foreseeable buildout attributed to other offshore wind energy development activities relative to the location of the historic property. This is based on full buildout of the Project (to up to 100 WTGs and two OSSs) and all other reasonably foreseeable offshore wind projects currently planned in the adjacent lease areas (modeled at 955 WTG and three OSSs). The proportion of visible WTG elements added by the Project ranges from 9.6% at the nearest TCP, where all modeled WTGs and OSS would potentially be visible, to 87.2% at the historic U.S. Weather Bureau Station at Block Island, where the Project WTGs would be visible in greater numbers than the combination of all other future wind farms planned in adjacent OCS lease areas (41 Project WTGs would potentially be visible there versus six WTGs from other planned projects).<br>The PDE in the Lessee's COP under BOEM review includes a maximum turbine size of 12 MW. However, BOEM's EIS contemplates an alternative (Alternative F) that would allow for use of greater-capacity WTGs so long as they fit within the physical parameters of the PDE presented in the COP (i.e., as long as the size and physical footprint of the WTGs are no greater than the range submitted in the COP). This alternative is considered in BOEM's Finding under NHPA Section 106 in EIS Appendix J and in EIS Section 3.10. Any changes outside of BOEM's assessed PDE or alternative parameters, including changes to the life of Project (which is specified in the lease), would require submission of a revised COP, which would not meet the purpose and need and be functionally equivalent to selection of the no action alternative under NEPA.<br>BOEM has provided supplemental visualizations of the Project in a document by Revolution Wind, LLC, Revolution Wind Farm National Historic Landmarks, which BOEM has made available to the public on its Project website here: https://www.boem.gov/renewable-energy/state-activities/revolution-wind#tabs-4221. |
| BOEM-2022-0045-0080 | 7 | Attachment A, comment 3:<br>Finally, we request that BOEM immediately make all technical reports public. Congress passed NEPA and the NHPA to help ensure that the public could understand the effects of government undertakings. Keeping reports confidential undermines this public intent, especially where it does not appear that BOEM has any legitimate justification for keeping the reports confidential and exempt from the Freedom of Information Act (FOIA). We have reviewed BOEM’s documents.<br>Contrary to BOEM’s assertions, they do not contain trade secrets or privileged confidential commercial or financial information. Therefore, it is not appropriate for BOEM to keep the public from reviewing them by erroneously exempting them from FOIA’s disclosure requirements. | BOEM has consulted with the ACHP and coordinated with the NPS about a plan on how to handle sensitive information potentially subject to Section 304 of the NHPA. BOEM has not yet formally initiated the Section 304 consultation pursuant to 36 CFR 800.11(c) for the Section 106 consultation on the Project. The NPS has informed us that the Section 304 regulations of the NHPA do not specify when or if an agency is required to initiate consultation with the Secretary of the Interior within the course of an ongoing Section 106 consultation. In addition, the NPS advised BOEM that it is acceptable for a federal agency to wait to disclose project findings to the public until identification of historic properties, including sites of religious and cultural significance to Tribal Nations, and until potential effects to these properties have concluded and consensus evaluations of NRHP eligibility have been completed. From the beginning of the Section 106 consultation for the Project, BOEM has planned to distribute these reports that contain sensitive information to the consulting parties and to post publicly available summaries or redacted versions of Section 106–related documents to BOEM's website. The consulting parties have received all the available information and documentation associated with this Section 106 consultation, including sensitive information that could be subject to Section 304.<br>The basis for making confidential all of the revised technical reports (reports associated with the preparation of the Draft EIS) as opposed to redacting sensitive portions and making the documents public is as follows. The documents could contain sensitive information that could be subject to Section 304 of the NHPA. We have publicly available summaries of the revised technical reports—the MARA, TARA, and offshore HRVEA—posted to BOEM’s website for the Project (https://www.boem.gov/renewable- |

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| | | | energy/state-activities/revolution-wind-farm-construction-and-operations-plan). These summaries were posted shortly after the Project's Draft EIS was made publicly available. The CHRVEA is available on BOEM's website for this Project under the visual simulations tab (https://www.boem.gov/renewable-energy/state-activities/revolution-wind). The Draft EIS contains the Finding and the draft MOA with certain sensitive information redacted. The Finding in the Draft EIS includes information regarding how BOEM has delineated its APE for the Project. All consulting parties received unredacted copies of the MARA, TARA, HRVEA, memorandum on the updated HRVEA (offshore), CHRVEA, and memorandum on BOEM's APE delineation.<br>The basis for making confidential the Finding and draft Memorandum of Agreement and redacting sensitive portions of the documents for the public is as follows. As noted above, the DEIS (Appendix J) contains the Finding of Effect and the draft MOA with certain sensitive information redacted (i.e., on the character and location of archaeological and tribal historic properties). BOEM made these documents available to the public when the Draft EIS was published. The consulting parties received unredacted versions of the Finding and the draft MOA in early August 2022, which contain all the redacted information in the public versions of these documents. |
| BOEM-2022-0045-0082 | | This comment submission is a duplicate of BOEM-2022-0045-0080 and was not coded. | This comment submission is a duplicate of BOEM-2022-0045-0080 and was not coded. |
| BOEM-2022-0045-0099 | 4 | We can appreciate the benefit to all mankind that alternative energy sources represent. However, being the closest landform, we would be the community most visually impacted by this project. We also would not derive any direct benefits in terms of job creation or energy supplied to our Town. We therefore feel that certain considerations are due to us as a community both in terms of limiting the impacts by the numbers and placement of turbines and other substantial monetary remediations to help offset any potential losses to our tourist economy and the revenues generated by lighthouse tours that help pay for the upkeep and ongoing restoration work on this historic structure. | Chapter 2 of the EIS provides information on how alternatives were scoped; this includes providing scoping meetings and a public comment period for public involvement. Alternatives are proposed that would limit proximity of WTGs to the surrounding islands and island communities. See EIS Section 3.11 for BOEM's presentation and analysis of Demographics, Employment, and Economics in relation to the Project's impact producing factors, including consideration of the role of the recreation and tourism in these matters. See EIS Section 3.18 for BOEM's presentation and analysis of Recreation and Tourism in relation to the Project's impact producing factors, including specific consideration of Gay Head – Aquinnah Overlook and other points of interest in the Project area and activities like sightseeing, boating, and recreational fishing. BOEM also has engaged in, currently engages in, and will continue to engage in consultation with THPOs, SHPOs, and private interests involved in historic preservation within the development areas. BOEM's consultation effort has included and will continue to include parties at Gay Head Lighthouse regarding cultural resources identified; assessment of effects; and resolution of adverse effects on historic properties, including the historic Gay Head Lighthouse. |
| BOEM-2022-0045-0101 | 1 | The MPTN is generally not in opposition to the creation and use of alternative forms of energy, and recognizes our need to reduce and eliminate fossil fuel use; however, we have concerns regarding numerous aspects of various wind energy projects to be installed in areas that are culturally sensitive to the MPTN, including RWF/RWEC.<br>The MPTN cares about the effects of the Project on Pequot and other submerged tribal cultural properties (TCPs) we know to exist, as depicted in our oral and written stories and traditions. These include village and burial sites within what BOEM refers to as ancient submerged landforms (ASLs). | Thank you for your comments. The EIS addresses submerged cultural properties, including ancient submerged landforms, in the Marine Cultural Resources subsections throughout Draft EIS Section 3.10. BOEM has engaged in, currently engages in, and will continue to engage in consultation with federally recognized Tribal Nations and their THPOs on historic preservation within the development areas. |
| BOEM-2022-0045-0101 | 43 | We also monitor the potential effects such projects may have on marine life important to sustaining species important to our people such as cod, haddock, lobster, and quahog. Furthermore, the endangered North Atlantic Right Whale (NARW)—among other marine mammal species—holds deep cultural and spiritual significance to the MPTN. We are thus heavily invested in ensuring their well-being and ensuring that project construction, installation, operations and maintenance (O&M), and decommissioning activities avoid further harm to the NARW. | Thank you for your comment. BOEM understands and respects the cultural importance of marine fish and invertebrates, the NARW, and other marine species to the MPTN. The Draft EIS provides a detailed analysis of potential impacts to these species in Section 3.15 Marine Mammals, and, where appropriate, acknowledges uncertainty regarding certain impacts. |
| BOEM-2022-0045-0101 | 14 | Storm Damage—Hurricane-Induced Line Outages<br>MP-THPO Comments and Concerns<br>• Maintenance and repairs made necessary by repeated storms will result in cumulative impacts to submerged landforms. | The Marine Cultural Resources subsections throughout DEIS Section 3.10 discusses how operations and maintenance of cables, which would include maintenance following recurring storm events (as necessary), would be addressed. This includes analyses of the impacts from Project operations and maintenance in relation to ancient submerged |

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| | | | landforms, as discussed throughout DEIS Section 3.10. Bathymetric surveys would be used to inspect and maintain the cables, including after storm events (as necessary). As described in further detail in EIS Sections 3.6 and 3.9, Revolution Wind would conduct bathymetry surveys of cable placements to confirm that cables remain buried and that rock placement and concrete mattresses remain secured and undamaged. Surveys would be performed 1 year after commissioning, 2 to 3 years after commissioning, and 5 to 8 years after commissioning. Survey frequency thereafter would depend on the findings of the initial surveys (i.e., site seafloor dynamics and soil conditions). A survey could also be conducted after a major storm event (see Section 3.9.2.2.2). |
| BOEM-2022-0045-0101 | 17 | Recommended Action Items.<br>Develop mitigation measures for the following conditions:<br>• The cumulative impacts of storm-induced maintenance and repairs to submerged landforms. | BOEM will continue consulting with federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to historic properties, including TCPs and ancient submerged landforms. Through consultation, BOEM will work to adapt and finalize the resolution of adverse effects in revision of the MOA and its attached HPTPs (see EIS Appendix J). As Tribal Nations have requested, this would include considering tribal participation in all aspects of survey and monitoring, such as for bathymetric surveys for ensuring cable placements in relation to ancient submerged landform avoidances. Also, a hazard mitigation plan for historic properties is among the mitigation options proposed in the HPTPs, specifically in reference to storm events, and could be applicable to treatment of ancient submerged landform. The MOA in EIS Appendix J similarly provides for climate adaptation planning study and coastal resilience and habitat restoration at TCPs. |
| BOEM-2022-0045-0101 | 21 | Cable Emplacement in Shallow Waters<br>MP-THPO Comments and Concerns<br>• Regarding cable going through shallow waters, MP-THPO is concerned that in-depth archaeological surveys were not inclusive of full searches for submerged culturally indigenous artifacts but instead focused on the avoidance of large obstructions such as boulders and on cultural heritage, which is defined as—but not extending beyond—shipwrecks within the marine environment.<br>• The MPTN was not made aware of the actual targets until long after completion of the Marine Archaeological and Resources Assessment (MARA), which is too late to provide traditional cultural knowledge of the Project area of potential effects (APE).<br>• Too few vibracore samples were taken along the RWEC to identify potential targets of avoidance.<br>• The vibracore samples extracted for analysis in the WTG lease area are not at an equal depth as the planned embedment depth for securing the WTG and OSS foundations to the ocean floor.<br>Research and Document Review Summary<br>Section 3.10.1.1 of the DEIS, Marine Cultural Resources, addresses the RWEC through shallow waters. Twenty-seven vibracore samples along the RWEC were collected, five of which were taken in Rhode Island state waters. Three of those five samples were taken inside the West Passage of Narragansett Bay. However, the cumulative total number of Nautical miles has not been stated to compare the number of Vibracore samples taken to the overall footprint of the ECR.<br>Additionally, the DEIS references the MARA, which is Appendix M in the COP. The MARA describes potential cultural resources and geographic features of archaeological interest that were investigated as part of the study.<br>Per Section 7 of the MARA, SEARCH identified 19 potential submerged cultural resources within the proposed area of potential effects (APE)—Targets 1 through 11 and 13 through 20—and 10 geomorphic features of archaeological interest (Targets 21 through 30). Twenty-one targets are located within the RWF, including five geomorphic features and one resource within the South Fork Data Area (SFDA). Three targets and five geomorphic features are located along the RWEC. SEARCH recommends avoiding each potential submerged cultural resource by at least 50 meters (164 feet) from the extent of the magnetic anomalies or acoustic contacts.<br>MPTN, however, disagrees with the assertion that "(e)very reasonable effort has been made during this analysis to identify and evaluate possible locations of archaeological sites." Section 1.3 of BOEM Document 2014-005, titled "Underwater Cultural Heritage Law Study," states that "sites once occupied by Native Americans become submerged and are preserved in situ, enabling archaeologists to piece together Native American history... The Law of the Sea (Article 149) imposes a duty on coastal states to preserve historic or archaeological items or to dispose of them for the benefit of mankind." MPTN believes that | BOEM is applying the EIS documentation, and supporting documentation referenced in the EIS, in BOEM's reasonable and good faith efforts to identify historic properties, in accordance with 36 CFR 800.4. These efforts include BOEM taking into account past planning, research and studies, the magnitude and nature of the Project undertaking and the degree of federal involvement, the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties within the APE. BOEM has produced the Finding (see EIS Appendix J) for BOEM's determination of adverse effects pursuant to the undertaking. BOEM is applying the criteria of adverse effect from 36 CFR 800.5 et seq. and applying the special requirements for minimizing harm to NHLs at 36 CFR 800.10 and for Section 110(f) compliance. BOEM remained in consultation with consulting parties on the identified historic properties, the assessment of effects, and in planning for the resolution of adverse effects under NHPA Section 106.<br>For all offshore archaeological investigations, as presented in the MARA, BOEM analyzed geophysical and remote sensing techniques (e.g., side-scan sonar) to identify where not only possible historic shipwrecks would be but also ancient submerged landforms, which may contain archaeological assemblages associated with Native American heritage. Identification of soil and sediment deposits onshore and offshore guided the placement, number, and depth of subsurface probes (vibracores offshore and shovel tests onshore) and helped confirm the presence or absence of soils and sediments capable of retaining archaeological materials. All ancient submerged landform features offshore would be avoided to the extent feasible. All such features may not be avoidable, such as on the RWEC where ancient stream channels must be crossed somewhere for the Project to be feasible but it cannot be fully determined in advance if cable burial depth would remain in sediments above the submerged landform. If avoidance is not feasible, ancient submerged landforms would be treated as historic properties and adverse effects to them would be mitigated under NHPA Section 106, as presented in the EIS (see Appendix J). Post-review discovery planning would also be applied should any unanticipated archaeological materials be identified during construction or O&M. |

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| | | BOEM, as the lead federal agency, is obligated to ensure that project proponents who hire cultural resource management (CRM) firms to conduct terrestrial and marine research and survey work include direction to specifically conduct full archaeological surveys for all indications of cultural remains or features. To date, project proponents direct CRMs to specifically look only for surface-level artifacts that could affect the project.<br>As outlined in BOEM Document 2014-005, the focus of avoidance remains in shipwrecks but not Native American cultural sites, toward which the MPTN feels that the current approach is "if we hit some, we'll address it at that time" (hence the need for the unanticipated discovery plan (UDP) (Appendix J in the DEIS)). Because the MPTN believes that the MARA upon which BOEM relies did not specifically consider indigenous-based artifacts and that due diligence for unanticipated discoveries of Native American cultural sites was not completed, the UDP itself is premature.<br>Furthermore, the MPTN believes that Revolution Wind is not qualified to "preserve and protect" undefined Native American cultural resources when affected tribes have not meaningfully participated in the creation of the MARA. BOEM and Ørsted/Eversource provided the MPTN neither opportunities to be aboard the research vessel nor attend meetings in which targets were determined. MPTN was informed only of collected cores and the opportunity to participate in core openings. | |
| BOEM-2022-0045-0101 | 22 | Recommended Action Items<br>• Conduct all additional archaeological research on geomorphic features recommended by SEARCH.<br>• Provide the methodology for determining the number of vibracore samples that were taken, including the length of the route to shore in nautical miles.<br>• Provide a definition of "cultural resource" as used by SEARCH. Were shipwrecks, indigenous artifacts, and paleolandforms considered cultural resources?<br>• Define the "determined targets" to be avoided before avoidance plans are finalized; the MPTN will accept only mitigation measures that are negotiated, summarized, or conducted before an ROD is issued. Additionally, the MPTN insists that all mitigations are outlined in a separate, MPTN-signed memorandum of agreement (MOA) before the Final Environmental Impact Statement (FEIS) and ROD are issued.<br>• Conduct a new, independently funded marine archaeological analysis as a mitigation measure to address that the original MARA included no complete indigenous survey studies. All affected tribes must be involved with all aspects of data collection, with a specific focus on tribal confirmation of the evidence of indigenous habitation (or a lack thereof) within the lease area and cable corridor routes. | Please note that no additional archaeological research of geomorphic features, onshore or offshore, will be necessary; EIS Appendix C was corrected to reflect this. Please refer to the MARA for information on coring approaching and methods, as referenced in the EIS. Please note that shipwrecks, paleolandforms (ancient submerged landforms), and associated archaeological assemblages were considered cultural resources. As described at EIS Section 3.10, the term cultural resources refers to archaeological sites, buildings, structures, objects, and districts, which may include cultural landscapes and TCPs. The term cultural resources includes resources that may or may not be eligible for the NRHP.<br>BOEM remains in consultation with consulting parties on the identified historic properties, the assessment of effects, and in planning for the resolution of adverse effects under NHPA Section 106. This includes consultation on the avoidance and mitigation of ancient submerged landforms, which are among the resources identified as potential archaeological sites (magnetometer and sonar targets) in the high-resolution remote sensing survey data. These sites were subsequently further defined as cultural resources following the investigations detailed in the MARA. The MOA is presented as a draft for further input from consulting Tribal Nations and other parties before finalizing or signing. BOEM is open to additional mitigation proposals, such as for added offshore studies, including those further involving the MPTN and other Tribal Nations. |
| BOEM-2022-0045-0101 | 25 | Figures K-5 through K-12 in DEIS Appendix K (Alternative E) show various WTG layout simulations; however, only Figure K-13 provides a visual for an alternative (Layout Option E2-4) in which the WTGs remain. Appendix K shows no layout option figures with the WTGs removed; the lack of visuals showing alternative layouts provides DEIS reviewers no way to determine which alternative may provide the best viewshed.<br>Additionally, Appendix K states that—<br>• The alternatives shown in Figures K-5 through K-12 were simulated and shared with the Wampanoag Tribe of Gay Head (Aquinnah), with no specific response provided.<br>• Per BOEM's subject matter experts, Options E1-3 (Figure K-7) and E2-4 (Figure K-12) will most effectively reduce "visual impacts of concern at or near the Gay Head Cliffs, as well as other national historic landmarks and culturally important resources in Rhode Island and Massachusetts."<br>Why these simulations were not shared with other cooperating Native American tribes for review and feedback is unclear to the MPTN. | The Wampanoag Tribe of Gay Head (Aquinnah) proposed reduction of WTG proximity to the Martha's Vineyard area. BOEM considered multiple alternative layouts and simulations of WTGs to help develop a feasible alternative to address these concerns and shared early renditions with the Aquinnah. BOEM did not include information in the EIS that was not carried forward from scoping. BOEM can provide those simulations to the MPTN and other consulting Tribal Nations. Visual simulations for all alternatives analyzed in detail in the EIS are posted on BOEM's website for the Project at the Visual Simulation tab here: https://www.boem.gov/renewable-energy/state-activities/revolution-wind. |
| BOEM-2022-0045-0101 | 26 | Cumulative Historic Resources Visual Effects Analysis (CHRVEA)<br>The Project CHRVEA "assesses the contribution of the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (the Project) to cumulative visual effects on historic properties as defined at 36 CFR 800.16(l) and inclusive of National Historic Landmarks (NHLs) as defined at 36 CFR 800.16(p)."<br>Section 2.1.1—Native American Sites, Buildings, Districts, and Traditional Cultural Properties—states the following:<br>Due to the importance of views toward the water, as well as the visual character of the landscape and seascape that | Please note that the proposed mitigation measures for addressing visual adverse effects to TCPs, presented in the HPTPs attached to the draft MOA (EIS Appendix J), are consistent with the scale, nature, and range of those approved by BOEM for other offshore wind development projects in vicinity, including the Vineyard Wind I and South Fork Wind Farm, through the NHPA Section 106 consultation process. The mitigation drafted for TCPs in the MOA includes a GIS database of contributing resources, development of interpretative |

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| | | contribute to the significance of some previously identified archaeological sites and TCPs, the introduction of modern, man-made vertical elements such as turbines could become focal points and have an adverse effect on the integrity of setting that directly contribute to the significance of these properties located within the [viewshed] APE.<br>With respect to the three [Tribally documented and] identified TCPs within the [viewshed] APE, the assessment suggests [visual adverse effects] to the Nantucket Sound TCP is unlikely. The visibility of the offshore facilities is substantially attenuated by distance from the property and terrestrial viewpoints located within or along its boundaries.<br>Section 2.1.1 further states the following:<br>The Project does, however, have the potential to cause [visual adverse effects] to the Vineyard Sound and Moshup's Bridge and the Chappaquiddick Island TCPs:<br>• The turbines will be visible along the horizon from several points within the Vineyard Sound and Moshup's Bridge TCP, including those at or near the Aquinnah Overlook location identified by the Wampanoag Tribe of Gay Head (Aquinnah) as particularly sensitive. The turbines and [OSS] will be visible along portions of the ocean horizon when viewed from the Overlook and may become focal points during sunset conditions. As noted above, under common daytime viewing conditions, the distance from the nearest turbines and atmospheric conditions would reduce the visual contrast of the offshore facilities against the water and sky. However, the introduction of new manmade visual elements to a largely unobstructed view of the setting sun from Aquinnah Overlook, when visual contrast is high, may diminish the TCP's integrity of setting and feeling. Although expected to be less obtrusive when viewed from Peaked Hill, the turbines may be clearly visible to observers at sunset or during other high contrast conditions.<br>Table 1 of the CHRVEA lists the distances from various aboveground historic properties to the nearest RWF WTG—the Moshup's Bridge TCP and Gay Head are 6 and 13.7 miles from the nearest WTG, respectively. According to Table 2 of the CHRVEA, a total of 1,060 WTGs/OSSs from all proposed projects are theoretically visible from the Moshup's Bridge TCP—even though RWF structures comprise only 9.6 percent of the total. All 102 RWF WTGs are visible from Moshup's Bridge and Gay Head (Aquinnah); these structures are the closest with the greatest impact.<br>Regarding lighting, Section 3.1.5 of the CHRVEA states the following:<br>• At Aquinnah Overlook at night, the HRVEA notes that flashing red aviation warning lights would be visible higher upon WTGs but that flashing amber USCG warning lights around WTG foundations would have a greater visual prominence due to their lighter coloring against the black sky and ocean. The addition of warning lights on the WTGs would increase visual clutter at the horizon. Also, the number and mass of lights would diminish the sense of openness (EDR 2022a).<br>• USCG navigation warning lights (yellow or amber) would be obscured by the curvature of the earth beyond approximately 16 miles (30 km) from vantage points along the shoreline at approximately sea level. (Epsilon Associates, Inc. 2020)<br>The MPTN does not agree that the applicant-proposed mitigation measures in the Project draft MOA—as part of the DEIS—are appropriate to fully address the nature, scope, size, and magnitude of adverse visual effects by the project to the Moshup's Bridge TCP and Gay Head. | materials, climate adaptation planning study, support for improved tribal connections to Nomans Land Island, scholarships and training for tribal resource stewardship, and coastal resilience and habitat restoration. All of these measures take into account information BOEM has received from Tribal Nations in consultation on the past and current projects. BOEM will continue consulting with federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to historic properties, including TCPs and ancient submerged landforms. Through consultation, BOEM will work to adapt and finalize the resolution of adverse effects in revision of the MOA and its attached HPTPs (see EIS Appendix J). |
| BOEM-2022-0045-0101 | 28 | Recommended Action Items<br>• Provide visual renderings of impacts to TCPs that include the following:<br>o WTGs from anticipated future projects (i.e., worst-case scenario) if those previously provided do not already do so.<br>o WTG layouts for each identified alternative.<br>o WTG nacelle movement caused by wind from all directions. | Please note that the simulations appended to the CHRVEA include visualizations of full possible build out of visible lease areas for all known future wind farms from areas within Project TCPs. Layouts of each identified alternative are presented in EIS Section 2.1, by alternative. The still images of simulations in the VIA, HRVEA, and CHRVEA generally provide views toward different positioning of WTG nacelles, most often intending to display the worst-case scenario for blade visibility.<br>In response to comments, BOEM directed Revolution Wind to produce further simulations that include some cumulative views. The new simulations have multiple updates to the views from Aquinnah Overlook, Aquinnah, Massachusetts including the following:<br>• "Cones of view" to help orient the viewer<br>• South Fork Wind Farm with and without Revolution Wind<br>• Bay State Wind Farm with and without Revolution Wind<br>• Vineyard Wind 1 with and without Revolution Wind<br>• Nighttime views with FAA lighting<br>The photo simulations can be found at BOEM's Project website, here: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Panorama Simulations Booklet_MV07_Combined_508.pdf |

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| BOEM-2022-0045-0101 | 29 | Tribal Monitors in Marine Environments<br>MP-THPO Comments and Concerns<br>• Tribal monitoring in a marine environment is another unresolved concern. Without it, how will tribes be assured that any negotiated mitigation or avoidance measures will be executed or complied with? Coordination challenges or the inexperience of tribes in the cable laying process should not be used as justification for not allowing tribal monitoring offshore; provisions must be made to ensure compliance.<br>• How do we know that artifacts will not be destroyed by bringing cables to shore?<br>Research and Document Review Summary<br>Regarding the impacts of new cable emplacement and maintenance, Section 3.10.2.3.1 of the DEIS states the following:<br>The impacts from new cable emplacement and maintenance for the Proposed Action would not introduce greater impacts to terrestrial resources over the No<br>Action Alternative in the terrestrial APE. The cable landing envelope use and the crossing of the historic Quonset Point Naval Air Station would produce negligible negative long-term impacts. The route selected for the onshore transmission cable is located within existing rights-of-way (ROWs) and would minimize impacts to, or avoid, potential terrestrial cultural resources, to the extent practicable. Additionally, the onshore transmission cable route has been substantially altered by development, demolition, remediation, and associated grading activities postdating 1941. Also, BOEM would require a post-review discovery plan that would include stop-work and notification procedures to be followed if a terrestrial cultural resource is encountered during cable emplacement or maintenance. This plan would serve to reduce the level of impact to previously undiscovered, NRHP-eligible terrestrial cultural resources to long term moderate negative or lower (minor or negligible). Therefore, the risk of potentially encountering undisturbed archaeological deposits is minimized in these areas, and the resultant impact to terrestrial cultural resources would be long term negligible to minor negative.<br>The MPTN believes that Section 3.10.2.3.1 addresses only terrestrial impacts associated with the landing envelope but not those associated with the marine cable corridor route. Additionally, BOEM derives its authority over the ROWs from the Outer Continental Shelf Lands Act (OCSLA), which is silent regarding tribal rights to the Outer Continental Shelf (OCS). Because the MPTN has not relinquished its rights to the OCS or any state waterways, it does not recognize any previously and/or privately established ROW in those areas. Furthermore, the MPTN does not concur with BOEM's conclusion that the chosen onshore transmission cable route would "minimize impacts to, or avoid, potential terrestrial cultural resources."<br>Attachment 28 in Appendix J of the DEIS outlines procedures "guiding the unanticipated discovery of cultural resources and human remains" for construction activities for the onshore portion of the APE, which were formulated in conjunction with federally recognized Native American tribes. Among these provisions are a commitment by Revolution Wind to provide MP-THPO the opportunity to have monitors onsite during archaeological and construction activities. The MPTN, however, asserts that it never participated in any such discussions.<br>Attachment 29 of the DEIS (Appendix J), which addresses such procedures for construction activities in offshore areas of the preliminary APE (PAPE), directs only that MP-THPO be notified of the discovery of an unanticipated submerged cultural resources—no provision for an onsite tribal monitor is included.<br>The MPTN believes it is the foremost expert on ancient artifact identification. Although all phases of the MARA were "designed, directed, and managed by professional cultural resource specialists who meet the Secretary of the Interior's 'Standards and Guidelines for Archeology and Historic Preservation,'" no MPTN members were consulted.<br>As previously noted in this letter, the MPTN—<br>• Insists that all marine archaeological surveys be conducted before the issuance of the FEIS and ROD.<br>• Believes that the UDP was prepared prematurely and should be issued only after all surveys have been completed to the satisfaction of all consulting parties.<br>Additionally, the MPTN questions why a remotely operated vehicle (ROV) is not referenced as having been used in the survey work leading to the establishment of the MARA, as outlined in Appendix J of the DEIS. To the best of our knowledge, ROVs were used only in situations falling under the UDP.<br>Recommended Action Items<br>• In conjunction with the THPO of each federally recognized tribe, develop provisions to allow a monitor on site at all offshore construction and archaeological sites, as is the case for terrestrial sites.<br>• Provide documentation of MPTN participation in discussions regarding unanticipated discoveries. In the absence of such documentation, revise the FEIS as appropriate. | Regarding tribal monitoring in a marine environment being an unresolved concern for the MPTN, BOEM provides the following response. On all matters discussed, BOEM respects the rights of Tribal Nations and is consulting in good faith with the MPTN and other sovereign Tribal Nations, including in accordance with EO 13175 and the 2018 BOEM Tribal Consultation Guidance; see EIS Appendix A. BOEM will continue to consult with the MPTN and other consulting Tribal Nations, including on the construction and monitoring of offshore Project facilities, and to document its ongoing consultation. This will include further government-to-government consultation meetings and consultation on the draft MOA and post-review discovery plans (UDPs) attached to the draft MOA prior to finalization of those documents. BOEM looks forward to receiving continued input from our tribal partners.<br>BOEM has added an Acknowledgement of the Special Expertise of Tribal Nations statement to the MOA (EIS Appendix J). BOEM recognizes that all tribal participants and knowledge need not conform to Secretary of the Interior standards and acknowledges that Tribal Nations possess special expertise in assessing the eligibility of historic properties that may possess religious and cultural significance to Tribal Nations, pursuant to 36 CFR 800.4(c)(1).<br>Regarding the potential for artifact destruction on the export cable route, BOEM provides the following response. For all offshore archaeological investigations, as presented in the MARA, BOEM analyzed the results of geophysical and remote sensing techniques (e.g., side-scan sonar, multi-beam echo profiler, magnetometer, and sub-bottom profiler), which were used to identify not only the locations of possible historic shipwrecks but also ancient submerged landforms that potentially retain archaeological assemblages associated with Native American heritage. The identification of potential archaeological sites at the cable route landfall locations included standard terrestrial archaeology techniques and followed BOEM guidelines. Identification of soil and sediment deposits onshore and offshore guided the placement, number, and depth of subsurface probes (vibracores offshore and shovel tests onshore) used to confirm the presence or absence of soils and sediments capable of retaining archaeological materials. All ancient submerged landform remnants are planned for avoidance. However, all such features may not be avoidable, such as on the RWEC where ancient stream channels must be crossed somewhere for the Project to be feasible but it cannot be fully determined in advance if cable burial depth would remain in sediments above the submerged landform. If avoidance is not feasible, ancient submerged landforms would be treated as historic properties and adverse effects to them would be mitigated under NHPA Section 106, as presented in the EIS (see Appendix J).. Post-review discovery planning would also be applied should any unanticipated archaeological materials be identified during construction or O&M.<br>Regarding research and document review summary, BOEM provides the following response. BOEM's reasonable and good faith efforts to identify historic properties have been undertaken in accordance with 36 CFR 800.4. All surveys for the identification and evaluation of marine archaeological resources have been completed. For all offshore archaeological investigations, as presented in the MARA, geophysical and remote sensing techniques (e.g., side-scan sonar, multi-beam echo profiler, magnetometer, and sub-bottom profiler) were used to identify not only the locations of possible historic shipwrecks but also ancient submerged landforms that potentially retain archaeological assemblages associated with Native American heritage. Coupled with the application of these state-of-the-art technologies to the surveys, BOEM took into account past planning, research, and studies; the magnitude and nature of the Project undertaking and degree of federal involvement; the nature and extent of potential effects on historic properties; and the likely nature and location of historic resources within the APE. Post-review discovery planning would be applied should any unanticipated archaeological materials be identified |

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| | | • Consider the THPO or a designee as a professional cultural resource specialist who should be involved in the design, direction, and management of all phases of work along with Register of Professional Archaeologists (RPA)-registered archaeologists. | during construction or O&M. Finally, please note that no additional archaeological research of geomorphic features, onshore or offshore, would be necessary; EIS Appendix C was corrected to reflect this.<br>Regarding the UDPs and ROV use, BOEM provides the following response. On all matters discussed, BOEM respects the rights of Tribal Nations and is consulting in good faith with the MPTN and other sovereign Tribal Nations, including in accordance with EO 13175 and the 2018 BOEM Tribal Consultation Guidance; see EIS Appendix A.<br>The MOA and UDP were ordered for finalization and implementation by BOEM subsequent to the identification efforts and Finding for the Project. BOEM will continue consulting with the MPTN and other consulting Tribal Nations regarding their interests in the Project prior to the execution of that MOA, including input on the post-review discovery plans attached to the draft MOA.<br>As stated in prior comments, BOEM is meeting its reasonable and good faith efforts to identify historic properties in accordance with 36 CFR 800.4. A submersible ROV was not required for identification of offshore marine cultural resources to accomplish these efforts. A ROV could be useful to assess post-review discoveries and impacts on offshore marine cultural resources, should underwater visibility or other conditions make the situation infeasible for human divers to inspect a specific discovery or impact location.<br>Regarding the recommended actions, on all matters discussed, BOEM respects the rights of Tribal Nations and is consulting in good faith with the MPTN and other sovereign Tribal Nations, including in accordance with EO 13175 and the 2018 BOEM Tribal Consultation Guidance; see EIS Appendix A. BOEM will continue to consult with the MPTN and other consulting Tribal Nations regarding their interests on the Project, including taking into account those interests and Tribal Nation's input on the post-review discovery plans (UDPs) attached to the draft MOA, prior to execution of the MOA.<br>EIS Appendix A has been revised to reflect the MPTN's comments on their participation in consultation.<br>BOEM has added an Acknowledgement of the Special Expertise of Tribal Nations statement to the MOA (EIS Appendix J). BOEM recognizes that all tribal participants and knowledge need not conform to Secretary of the Interior standards, acknowledging that Tribal Nations possess special expertise in assessing the eligibility of historic properties that may possess religious and cultural significance to Tribal Nations, pursuant to 36 CFR 800.4(c)(1).<br>Summary<br>BOEM is applying the EIS documentation, and supporting documentation referenced in the EIS, in BOEM's reasonable and good faith efforts to identify historic properties, in accordance with 36 CFR 800.4. State-of-the-art technology was used in the surveys, as described in the MARA, following BOEM guidelines. Coupled with the application of this technology, BOEM took into account past planning, research and studies, the magnitude and nature of the Project undertaking and the degree of federal involvement, the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties within the APE. BOEM has produced the Finding (see EIS Appendix J) for BOEM's determination of adverse effects pursuant to the undertaking. BOEM is applying the criteria of adverse effect from 36 CFR 800.5 et seq. and applying the special requirements for minimizing harm to NHLs at 36 CFR 800.10 and for Section 110(f) compliance. BOEM remains in consultation with consulting parties on the identified historic properties, the assessment of effects, and in planning for the resolution of adverse effects under NHPA Section 106.<br>For all offshore archaeological investigations, as presented in the MARA, BOEM analyzed geophysical and remote sensing techniques (e.g., side-scan sonar, multi-beam echo profiler, magnetometer, and sub-bottom profiler) to identify not only the locations of |

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| | | | possible historic shipwrecks but also ancient submerged landforms that potentially retain archaeological assemblages associated with Native American heritage. The identification of potential archaeological sites at the cable route landfall locations included standard terrestrial archaeology techniques, following BOEM guidelines. Identification of soil and sediment deposits onshore and offshore guided the placement, number, and depth of subsurface probes (vibracores offshore and shovel tests onshore) used to confirm the presence or absence of soils and sediments capable of retaining archaeological materials. All ancient submerged landform remnants offshore are planned for avoidance. However, all such features may not be avoidable, such as on the RWEC where ancient stream channels must be crossed somewhere for the Project to be feasible but it cannot be fully determined in advance if cable burial depth would remain in sediments above the submerged landform. If avoidance is not feasible, ancient submerged landforms would be treated as historic properties and adverse effects to them would be mitigated under NHPA Section 106, as presented in the EIS (see Appendix J). Post-review discovery planning would also be applied should any unanticipated archaeological materials be identified during construction or O&M.<br>Please note that no additional archaeological research of geomorphic features, onshore or offshore, will be necessary; EIS Appendix C was corrected to reflect this.<br>On all matters discussed, BOEM respects the rights of Tribal Nations and is consulting in good faith with the MPTN and other sovereign Tribal Nations, including in accordance with EO 13175 and the 2018 BOEM Tribal Consultation Guidance; see EIS Appendix A. BOEM will continue to consult with the MPTN and other consulting Tribal Nations regarding their interests on the Project, including taking into account those interests and Tribal Nation's input on the post-review discovery plans (UDPs) attached to the draft MOA, prior to execution of the MOA.<br>BOEM has added an Acknowledgement of the Special Expertise of Tribal Nations statement to the MOA (EIS Appendix J). BOEM recognizes that all tribal participants and knowledge need not conform to Secretary of the Interior standards, acknowledging that Tribal Nations possess special expertise in assessing the eligibility of historic properties that may possess religious and cultural significance to Tribal Nations, pursuant to 36 CFR 800.4(c)(1).<br>All surveys for the identification and evaluation of cultural resources are complete. For NEPA substitution, the MOA and UDP were ordered for finalization and implementation by BOEM subsequent to the identification efforts and Finding on the Project; however, the draft MOA and its attached UDPs were included in the Draft EIS to provide the opportunity for the public to review these documents. BOEM provided consulting parties under Section 106 the opportunity to review the draft MOA and UDP prior to their public release. Also as stated by BOEM above, BOEM is meeting its reasonable and good faith efforts to identify historic properties in accordance with 36 CFR 800.4. A submersible ROV was not required for identification of offshore marine cultural resources to accomplish these efforts. A ROV could be useful to assess post-review discoveries and impacts at offshore marine cultural resources, should underwater visibility or other conditions make the situation unfeasible for human divers to inspect a specific discovery or impact location.<br>BOEM will continue to consult with the MPTN and the consulting Tribal Nations on the Project, including on the construction and monitoring of offshore Project facilities, and continue to document its ongoing consultation. This will also include further government-to-government consultation meetings and consultation on the MOA, which will be implemented to resolve adverse effects to historic resources (both onshore and offshore). This ongoing consultation will provide the MPTN and the consulting Tribal Nations the opportunity to participate in all aspects of BOEM's Project review, including design review as detailed in the COP and the review and setting of conditions for COP approval, such as |

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| | | | carried forward in the MOA. BOEM looks forward to receiving continued input from our tribal partners. |
| BOEM-2022-0045-0101 | 30 | MP-THPO Comments and Concerns<br>• When you put all these projects together it's overwhelming and there are still questions not answered. Additionally, the MPTN is concerned that BOEM is reaching conclusions regarding project impacts before the EIS review is complete. For example, BOEM released a draft memorandum of agreement on September 27th long before the DEIS has been completed. Said MOA was actually drafted as early as August 1st of 2022. Even on the date of this submittal of MPTN's comments on the RWF & RWEC (October 17th, 2022) the EIS for this project is still in draft form. Yet the opening language in the draft MOA states:<br>"WHEREAS, the Bureau of Ocean Energy Management (BOEM) plans to authorize construction and operation of the Revolution Wind Farm and Revolution Wind Export Cable Project (Project)…"<br>MPTN fails to understand how the BOEM EIS review process is fair to our tribal nation and its concern or its ancestral TCP's when BOEM drafting MOA's so early into the EIS review process. | The EIS considers the environmental impacts of the Project and makes the bases of BOEM's environmental assessment available for public review prior to reaching a decision, as would be documented by BOEM under a ROD. The Final EIS will take into account the comments received on the Draft EIS regarding Project impacts.<br>On March 8, 2022, BOEM provided to the MPTN and other consulting parties notification that the MOA development was added by BOEM to the consultation schedule and that an MOA would be completed prior to the issuance of the ROD. Distribution of this schedule was to inform discussion of the steps and timing of Project review and of the MOA at the NHPA Section 106 consultation meeting on April 8, 2022. In the schedule provided to consulting parties on March 8, 2022, BOEM further specified that the first draft MOA would be provided to consulting parties by the time of Draft EIS release on September 2, 2022, and that a series of scheduled redrafts and reviews of the MOA would occur in consultation following Draft EIS release and prior to the ROD.<br>Accordingly, BOEM released the draft MOA to the consulting parties under NHPA Section 106 on August 1, 2022, to provide these parties and consulting Tribal Nations an extended time period to consider the identification; assessment of effects; and avoidance, minimization, and mitigation of adverse effects. BOEM began this consulting party review period prior to the release of the Draft EIS on September 2, 2022; in advance of the NHPA Section 106 meeting on these matters on September 27, 2022; and extending over the Draft EIS public comment period between September 2 and October 17, 2022. BOEM extended the review period for NHPA Section 106 consulting parties on the first draft of the MOA to October 31, 2022 (totaling 90 days), and continued to consult on revision of the MOA for inclusion in the Final EIS and for final MOA execution prior to issuance of a ROD. The regulations for NHPA Section 106 Coordination with the National Environmental Policy Act require at 36 CFR 800.8(c)(1)(v) that BOEM develop, in consultation with identified consulting parties, alternatives and proposed measures that might avoid, minimize, or mitigate any adverse effects of the undertaking on historic properties and describe them in the Draft EIS. Under 36 CFR 800.8(c), for NEPA substitution, BOEM is required at the Draft EIS stage to identify and describe the proposed measures to resolve any adverse effects to historic properties. These measures also were included in the Draft EIS to provide the opportunity for public review. BOEM provided consulting parties under Section 106 the opportunity to review the draft MOA prior to their public release. The draft MOA in Draft EIS Appendix J is among the documentation in the Draft EIS that describes the measures for treating adverse effects to historic properties. BOEM proceeded with the development of these draft measures in consultation with the NHPA Section 106 consulting parties on the Project before issuance of the Draft EIS, requested Tribes input and comments on these proposed mitigation measures during government-to-government consultation meetings with consulting Tribes on January 24 and February 3, 2023, and looks forward to receiving further input on the MOA from our tribal partners. |
| BOEM-2022-0045-0101 | 31 | • The MPTN does not concur that the applicant-proposed mitigation measures in the DEIS are appropriate to fully address the nature, scope, size, and magnitude of potential adverse effects caused by the Project—including cumulative effects on ASLs, terrestrial archaeological historic properties, and TCPs. These mitigation measures were developed without input or collaboration from the MPTN as a consulting party under National Historic Preservation Act (NHPA) Section 106. | BOEM will continue consulting with the MPTN and other federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to resources important to Tribal Nations, onshore and offshore. This includes holding further government-to-government consultation meetings with Tribal Nations and considering all proposed mitigation measures in consultation on the MOA, which would be implemented to resolve adverse effects to historic properties. BOEM looks forward to receiving additional input on the mitigation measures from our tribal partners. |

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| BOEM-2022-0045-0101 | 32 | Research and Document Review Summary<br>Appendix A of the DEIS—Required Environmental Permits and Consultations—states that on 9 April 2021, BOEM held a government-to-government consultation meeting with representatives from several area tribes, including the MPTN. Most of the meeting focused on topics and issues applicable to all proposed offshore wind projects off the coast of New England, including the Project.<br>During the meeting, representatives from the tribes voiced concerns about potential Projectbased and cumulative impacts to water quality; marine mammals; coastal habitats; benthic communities; culturally, economically, and historically significant fisheries and shellfish populations; chemical pollutants; the financial and time burden on tribes of participating in multiple, simultaneous offshore wind project reviews; visual impacts on TCPs; and preserving the marine and terrestrial environments for future generations, particularly the current and future ability of tribal youth to perform sacred ceremonies and have safe havens for traditional cultural practices in the future. Additionally, tribal representatives requested that BOEM consult with federally recognized tribes on all proposed wind projects as a single federal action instead of on a project-by-project basis.<br>The MPTN, however, has no record of its participation in the 9 April 2021 meeting. The following are the only government-to-government meetings with BOEM for which MP-THPO has records documenting its participation:<br>• A visual impact assessment on 12 January 2020.<br>• Environmental justice meetings on 5 May and 23 June 2021.<br>• A meeting for scoping comments and review alternatives on 24 June 2021.<br>• A cooperating agency review on 21 July 2021. | BOEM has updated EIS Appendix A's Government-to-Government Consultation with Federally Recognized Indian Tribes section based on this comment from the MPTN. |
| BOEM-2022-0045-0101 | 34 | • Produce visual renderings of impacts to TCPs that include WTGs from anticipated future projects (e.g., worst-case scenario) if those previously provided do not already do so. | The CHRVEA analyzes the cumulative visual effects (for both daytime and nighttime) on historic resources for past, present, and reasonably foreseeable offshore wind energy development activities. This provides a maximum-case scenario for WTG presence. The assessment includes TCPs that span Elizabeth Islands, Martha's Vineyard, and Nomans Land Island.<br>Cumulative visual simulations are included in Appendix C of the CHRVEA and on BOEM's website and include Cuttyhunk Island, Aquinnah Overlook, Peaked Hill, Wasque Point, Nomans Land Island, and Madaket Beach. These simulations provide sunset and nighttime perspectives as well as daytime viewing conditions. The HRVEA includes visual simulations from a number of KOPs, including Aquinnah Overlook (MV 07), South Beach (MV 10), and Peaked Hill (MV 12), which were selected to best represent views from, and the visual setting of, TCPs. These also provide various viewing conditions.<br>All visual simulations are posted on BOEM's website for the Project at the Visual Simulations tab here: https://www.boem.gov/renewable-energy/state-activities/revolution-wind.<br>In response to comments, BOEM directed Revolution Wind to produce further simulations that include some cumulative views. The new simulations have multiple updates to the views from Aquinnah Overlook, Aquinnah, Massachusetts including the following:<br>• "Cones of view" to help orient the viewer<br>• South Fork Wind Farm with and without Revolution Wind<br>• Bay State Wind Farm with and without Revolution Wind<br>• Vineyard Wind 1 with and without Revolution Wind<br>• Nighttime views with FAA lighting<br>The photo simulations can be found at BOEM's Project website, here: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Panorama Simulations Booklet_MV07_Combined_508.pdf |
| BOEM-2022-0045-0101 | 38 | • Ensure that the FEIS accurately reflects MPTN participation in government-to-government meetings. | BOEM has updated Appendix A of the EIS to reflect the information the MPTN has provided to BOEM regarding its participation in government-to-government meetings and has updated Appendix A to include additional BOEM meetings with Tribal Nations held between release of the Draft and Final EIS. BOEM has included notes on other meetings in Appendix A from government to government meetings, beyond solely the Revolution Wind |

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| | | | Project, taking into account broader concerns of Tribal Nations related to all BOEM offshore wind energy development in the region. |
| BOEM-2022-0045-0101 | 39 | • Meet with all consulting tribes (along with Ørsted/Eversource) to revise the proposed mitigation measures and develop new, more equitable mitigation measures. | BOEM conducted government-to-government meetings on January 24 and February 3, 2023, with the MWT and other Tribal Nations. BOEM will continue to schedule government-to-government meetings with the Tribal Nations throughout the remainder of Section 106 consultation and as requested. BOEM remains in consultation with consulting parties on the identified historic properties, the assessment of effects, and in planning for the resolution of adverse effects under NHPA Section 106. This includes consultation on the avoidance, minimization, and mitigation measures that would be included in a final MOA. |
| BOEM-2022-0045-0101 | 40 | MP-THPO Comments and Concerns<br>Our tribe name keeps getting omitted; the MPTN should appear as a consulting party and finds this omission from the Project DEIS to be disrespectful.<br>Research and Document Review Summary<br>Attachment 28 in Appendix J of the DEIS, which addresses unanticipated discovery of cultural resources and human remains, states the following regarding consulting parties:<br>Under the ACHP's regulations, "descendants" are not identified as consulting parties by right. However, federal agencies shall consult with Indian tribes and Native Hawaiian organizations that attach religious and cultural significance to burial sites, human remains and associated funerary objects, and be cognizant of their expertise in, and religious and cultural connection to, them. In addition, federal agencies should recognize a biological or cultural relationship and invite that individual or community to be a consulting party [36 CFR § 800.3(f)(3)]. Federal agencies also must comply with President Biden's memorandum to the heads of executive departments and federal agencies on January26, 2021 regarding tribal consultation and strengthening Nation to Nation Relationships. The president's memorandum realigns the efforts of federal agencies to engage directly with federally recognized tribes in consultation to Executive Order 13175 of November 6, 2000 (Consultation and Coordination With Indian Tribal Governments).<br>The MPTN, however, still seeks clarification regarding what constitutes a consulting party versus a cooperating party or agency, and about how much information it would receive according to each term. Additionally, the MPTN would like the difference between a cooperating agency and a "task force," both of which seem to comprise the same participants, clarified. | BOEM has recognized the MPTN as a consulting party and accepted the MPTN's participation 1) on the Project, 2) in government-to-government consultation, 3) in consultation under NHPA Section 106, and 4) in cooperating on the EIS under the NEPA regulations at 40 CFR 1501.8.. In letters dated April 2021, BOEM invited MPTN to consult on the Project under NHPA Section 106 and in cooperation under NEPA. A cooperating agency is a governmental role under the NEPA process, as described in CEQ's regulations and is specific to the NEPA review of a project. A BOEM Task Force is a partnership between federal, state, and local agencies and tribal governments tasked with coordinating renewable energy planning activities on the OCS prior to lease issuance. |
| BOEM-2022-0045-0101 | 41 | • Acknowledge the MPTN as a consulting party in all finalized documents for the Project—including the FEIS—in accordance with 36 CFR § 800.3(f)(3), and ensure that MP-THPO has all Project information to which a consulting party is entitled. | NHPA Section 106 documents (Finding and MOA [see EIS Appendix J]) acknowledge MPTN as a consulting party on the Project, and these acknowledgments will be carried through the Final EIS. BOEM has made all Project consultation information and documents available to MP-THPO from the initiation of the consultation process immediately prior to BOEM's release of the NOI in April 2021. BOEM has communicated to MP-THPO variously in letters, emails, and meetings when information and documents were made available. BOEM will continue to share information with MPTN and also looks forward to receiving continued input from our tribal partners. |
| BOEM-2022-0045-0101 | 42 | MP-THPO Comments and Concerns<br>These wind farm decisions will impact all tribal communities, and we need to solve the questions we have before it gets carried across the country.<br>Research and Document Review Summary<br>Appendix A of the DEIS—Required Environmental Permits and Consultations—mentions several consultations between BOEM and numerous area tribes, including the MPTN, between August 2018 and February 2022. Topics discussed included overall procedural/process issues, possible effects of all current and proposed projects on marine mammals and other marine life as well as on the Nantucket Sound TCP, the importance of open-sea views to the east during sunrise, and the tribes' long historical association with the sea.<br>The DEIS does not fully describe how BOEM intends to address each issue.<br>Recommended Action Items<br>Fully address each issue raised during the various government-to-government consultations as listed in Appendix A of the | BOEM addresses the Project background, purpose and need for the Proposed Action, regulatory framework, relevant existing NEPA and consulting documents, methodology for assessing the PDE, and methodology for assessing impacts from planned actions in the EIS Introduction, Section 1.<br>The possible effects of all current and proposed projects on mammals and other marine life are addressed in EIS Section 3.6, Benthic Habitat and Invertebrates; Section 3.9, Commercial Fisheries and For-hire Recreational Fisheries; Section 3.13, Finfish and Essential Fish Habitat; Section 3.15, Marine Mammals; and Section 3.19, Sea Turtles.<br>The Nantucket Sound TCP is addressed in Section 3.10, Cultural Resources, and introduced under Subsection 3.10.1.3, Viewshed Resources. The importance of seaward views to TCPs and other historic resources is particularly addressed in EIS Section 3.10, Cultural Resources, as well as in Section 3.20, Visual Resources. In particular, EIS Section 3.20, |

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| | | DEIS, then document those resolutions in the FEIS (the MPTN's disagreement with the presentation in Appendix A of our participation in those consultations notwithstanding). | Visual Resources, addresses atmospheric and environmental factors such as haze, sun angle, time of day, cloud cover, fog, sea spray, and wave action. Three-dimensional renderings of the Project superimposed on video footage depict sunrise, daytime, sunset, and nighttime views and were provided to consulting parties at NHPA Section 106 meetings on April 8 and September 27, 2022, as well as being publicly available on BOEM's website for the Project under the Visual Simulations tab at https://www.boem.gov/renewable-energy/state-activities/revolution-wind. Eastward views toward the Project are specifically available from the North Light Video, linked on BOEM's website under the Visual Simulations tab or on Vimeo at https://vimeo.com/380256305/3c98b1d920.<br>Tribal Nations' long historical association with the land and seas in the region and at the Project are discussed in the Finding (EIS Appendix J). Other issues related to Tribal Nations and communities are addressed in EIS Section 3.12, Environmental Justice. Further issues noted in government-to-government consultation in EIS Appendix A are considered in mitigation measures for TCPs proposed in the draft MOA and the MOA's attached draft HPTP for ancient submerged landforms (see EIS Appendix J), including for support of youth education. BOEM will continue to consult with the MPTN and other Tribal Nations on mitigation measures planned in the MOA, including on proposed measures to better support Tribal Nations' staff, time, and funding resources in Project participation. BOEM has addressed the MPTN's disagreement with the presentation in EIS Appendix A of their participation through revision of the Appendix A text. |
| BOEM-2022-0045-0102 | 1 | The Mashpee Wampanoag Tribe (MWT) Tribal Historic Preservation Office (MWT THPO) submits its direct response to the DEIS for the RWF/RWEC project (the Project), the proposed location of which is in federal waters approximately 18 miles southeast of Point Judith, Rhode Island, and approximately 15 miles east of Block Island, Rhode Island. This area is covered by BOEM Renewable Energy Lease Number OCS-A 0486.<br>For offshore wind energy projects, the MWT THPO acts on behalf of the MWT in matters pertaining to historic preservation and ocean management.<br>The MWT is generally not in opposition to the creation and use of alternative forms of energy; however, we have concerns regarding numerous aspects of various wind energy projects to be installed in areas that are culturally sensitive to the MWT, including RWF/RWEC.<br>The MWT cares about the effects of the Project on submerged tribal cultural properties (TCPs) we know to exist, as depicted in our oral and written stories and traditions. These include village and burial sites and ancient landscapes. We also monitor the potential effects such projects may have on marine life important to sustaining species important to our people such as cod, haddock, lobster, quahog, scallop, oysters, soft shell clams and other coastal fisheries the tribe relies on for substance.<br>Furthermore, the endangered North Atlantic right whale (NARW)— among other marine mammal species—holds deep cultural and spiritual significance to the MWT. We are thus heavily invested in ensuring their well-being and ensuring that Project construction, installation, operations and maintenance (O&M), and decommissioning activities avoid further harm to the NARW and other culturally significant beings. | BOEM will continue consulting with the MWT and the federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to resources important to Tribal Nations, onshore and offshore, including TCPs (with villages, burials, and ancient landscapes) and on the cultural connections to the environment, including the NARW and other marine mammals and wildlife. BOEM will continue involving the MWT and other federally recognized Tribal Nations on the EIS, providing information and opportunities to participate in review of ocean management concerns, including for marine fisheries (vertebrate and invertebrate). BOEM will also continue to hold government-to-government meetings to discuss tribal concerns. |
| BOEM-2022-0045-0102 | 2 | MWT THPO Comments and Concerns<br>· The tribe has reverence for whales, specifically the NARW, and are culturally obligated to protect them | BOEM acknowledges MWT's reverence for the NARW and has given careful consideration to the potential impacts to NARWs throughout development of the EIS, focused within EIS Section 3.15, Marine Mammals. BOEM is also consulting with NMFS under the ESA and would require compliance with all mitigation and reporting measures in the NMFS biological opinion if the COP were approved or approved with modification. |
| BOEM-2022-0045-0102 | 21 | It is imperative to us that paleolandscapes be avoided completely. We are dissatisfied with "avoid where possible" language. Research and Document Review Summary Table F-1 in Appendix F of the DEIS states, "the RWF and RWEC will be sited to avoid or minimize impacts to potential submerged cultural sites and paleolandforms, to the extent practicable" (EPM No. CR-7).<br>Recommended Action Item Revise EPM No. CR-7 to read, "The RWF and RWEC will be sited to avoid impacts to potential submerged cultural sites and paleolandforms." | BOEM reviewed and revised "avoid where possible" language in the EIS documents where this occurs, more specifically stating where avoidance would be set for historic properties, including ancient submerged landforms, and where and what mitigation would be required where avoidance cannot be realized. |

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| BOEM-2022-0045-0102 | 22 | MWT THPO Comments and Concerns<br>· Evidence of tribal presence in area (e.g., in Nantucket and Vineyard Sounds) going back 20,000 or so years exists despite having been submerged and experienced turbidity, storm surges, etc. (These areas also provide scientific clues to help deal with current climate change.) Will this project disrupt those artifacts?<br>· The technology to perform adequate archeological surveys of shoreline and marine areas does not exist. | BOEM is applying the EIS documentation, and supporting documentation referenced in the EIS, in BOEM's reasonable and good faith efforts to identify historic properties in accordance with 36 CFR 800.4. State-of-the-art technology was used in the surveys, as described in the MARA, following BOEM guidelines. Coupled with the application of this technology, BOEM took into account past planning, research and studies, the magnitude and nature of the Project undertaking and the degree of federal involvement, the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties within the APE. BOEM has produced the Finding (see EIS Appendix J) for BOEM's determination of adverse effects pursuant to the undertaking. BOEM is applying the criteria of adverse effect from 36 CFR 800.5 et seq. and applying the special requirements for minimizing harm to NHLs at 36 CFR 800.10 and for Section 110(f) compliance. BOEM remains in consultation with consulting parties on the identified historic properties, the assessment of effects, and in planning for the resolution of adverse effects under NHPA Section 106.<br>For all offshore archaeological investigations, as presented in the MARA, BOEM analyzed geophysical and remote sensing techniques (e.g., side-scan sonar, multi-beam echo profiler, magnetometer, and sub-bottom profiler) to identify where not only possible historic shipwrecks would be but also ancient submerged landforms able to retain archaeological assemblages associated with Native American heritage. The transition to onshore identification included standard terrestrial archaeology techniques, following BOEM guidelines. Identification of soil and sediment deposits onshore and offshore guided the placement, number, and depth of subsurface probes (vibracores offshore and shovel tests onshore) to confirm the presence or absence of soils and sediments capable of retaining archaeological materials. All ancient submerged landform remnants offshore are planned for avoidance. However, all such features may not be avoidable, such as on the RWEC where ancient stream channels must be crossed somewhere for the Project to be feasible but it cannot be fully determined in advance if cable burial depth would remain in sediments above the submerged landform. If avoidance is not feasible, ancient submerged landforms would be treated as historic properties and adverse effects to them would be mitigated under NHPA Section 106, as presented in the EIS (see Appendix J). Post-review discovery planning would also be applied should any unanticipated archaeological materials be identified during construction or O&M. |
| BOEM-2022-0045-0102 | 23 | If not already completed, conduct additional research regarding geomorphic features as recommended by SEARCH. | Please note that no additional archaeological research of geomorphic features, onshore or offshore, will be necessary; EIS Appendix C was corrected to reflect this. |
| BOEM-2022-0045-0102 | 24 | Schedule a government-to-government meeting with the MWT and other interested tribes to further discuss complete avoidance of sensitive areas, as proposed in the 27 September 2022 National Historic Preservation Act (NHPA) Section 106 meeting. | BOEM held a government-to-government meetings January 24 and February 3, 2023, with the MWT and other Tribal Nations. BOEM will continue to schedule government-to-government meetings with the Tribal Nations throughout the remainder of Section 106 consultation and as requested. |
| BOEM-2022-0045-0102 | 25 | MWT THPO Comments and Concerns<br>Only the tribes can determine the cultural importance of submerged landscapes, yet BOEM issued a draft MOA without tribal approval. The tribes never had the opportunity to respond to this issue.<br>Research and Document Review Summary<br>Not applicable.<br>Recommended Action Item<br>Solicit tribal input regarding the cultural importance of submerged landscapes when compiling the final MOA | BOEM acknowledges the expertise of tribes in determining the cultural importance of submerged landscapes and will continue consulting with the MWT and other Tribal Nations on these resources.<br>The regulations for NHPA Section 106 coordination with NEPA require at 36 CFR 800.8(c)(1)(v) that BOEM develop, in consultation with identified consulting parties, alternatives and proposed measures that might avoid, minimize, or mitigate any adverse effects of the undertaking on historic properties and describe them in the Draft EIS. Under 36 CFR 800.8(c), for NEPA substitution, BOEM is required at the Draft EIS stage to identify and describe the proposed measures to resolve any adverse effects to historic properties. These measures also were included in the Draft EIS to provide the opportunity for public review. BOEM provided consulting parties under Section 106 the opportunity to review the |

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| | | | draft MOA prior to its public release. The draft MOA in Draft EIS Appendix J is among the documentation in the Draft EIS that describes the measures for treating adverse effects to historic properties. BOEM proceeded with the development of these draft measures in consultation with the NHPA Section 106 consulting parties on the Project before issuance of the Draft EIS, requested Tribes input and comments on these proposed mitigation measures during government-to-government consultation meetings with consulting Tribes on January 24 and February 3, 2023, and looks forward to receiving further input on the MOA from our tribal partners.<br>BOEM made the first draft MOA available to consulting Tribal Nations and other consulting parties under NHPA Section 106 on August 1, 2022, 30 days in advance of the September 2, 2022, public release of the Draft EIS (which included the draft MOA in Appendix J). This allowed consulting Tribal Nations and other consulting parties an extended period of time totaling 90 days (through October 31, 2022) to review the MOA and other documents under NHPA Section 106. BOEM continued to consult on revision of the MOA for inclusion in the Final EIS and for final MOA execution prior to issuance of a ROD.<br>It should also be noted that on March 8, 2022, BOEM notified the MWT and other consulting parties that MOA development was being added to the consultation schedule and that an MOA would be completed prior to issuance of the ROD. Distribution of the schedule was to inform discussion of the steps and timing of Project review and of the MOA at the NHPA Section 106 consultation meeting held on April 8, 2022. BOEM specified in the schedule provided on March 8, 2022, that the first draft of the MOA would be provided to consulting parties by the Draft EIS release on September 2, 2022, with a series of scheduled redrafts and reviews of the MOA occurring in consultation following Draft EIS release and prior to the issuance of the ROD. |
| BOEM-2022-0045-0102 | 26 | Tribes have expressed the desire and need for dynamic visual renderings of lease areas in previous wind projects that were never received. The government should have been capable of producing these and must do so going forward. | The photo simulations can be found at BOEM's Project website, here: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Panorama Simulations Booklet_MV07_Combined_508.pdf |
| BOEM-2022-0045-0102 | 27 | The MWT does not concur that the applicant-proposed mitigation measures in the draft MOA— as part of the DEIS—are appropriate to fully address the nature, scope, size, and magnitude of adverse visual effects by the project to the Moshup's Bridge TCP and Gay Head. | BOEM will continue consulting with the MWT and other federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to resources important to Tribal Nations, onshore and offshore. This includes holding further government-to-government consultation meetings with Tribal Nations and consultation on the proposed mitigation measures in the MOA, which would be implemented to resolve adverse effects to historic resources, including TCPs. BOEM continues to welcome tribal input on mitigation measures for Moshup's Bridge TCP and Gay Head. |
| BOEM-2022-0045-0102 | 28 | Neither the DEIS nor the COP address visual renderings, nor do they mention a tribal desire or need for them. Ørsted, however, references the use of a three-dimensional (3D) hydrodynamic model simulating circulation patterns near the seabed caused by tidal forcing, wind stress, and water flows throughout the study area. In any case, no evidence in either document exists that the tribes received any dynamic visual renderings. | Please note that the hydrodynamic model was provided in COP Appendix J, which was made publicly available with Draft EIS publication. COP Appendix J was also provided to all of the cooperating agencies, including tribes, for their preliminary review of the Draft EIS and also made available in advance of April consulting party meetings under NHPA Section 106. The document is on BOEM's Project website at https://www.boem.gov/renewable-energy/state-activities/app-j-sediment-transport-modeling-report. |
| BOEM-2022-0045-0102 | 29 | The MWT was shown BOEM-provided video simulations containing visual impacts from Moshup Beach, Sachuest Point National Wildlife Reserve (NWR), Aquinnah Overlook, and North Light during the BOEM-led Section 106 meeting on 27 September 2022. The MWT is unsure of whether these simulations represent the worst-case scenario. | Please note that the video introduction for each location presents information indicating that each video simulation considers the maximum proposed number and height of WTGs for the Project. The video simulations are available on BOEM's Project website at https://www.boem.gov/renewable-energy/state-activities/revolution-wind. |
| BOEM-2022-0045-0102 | 30 | Cumulative Visual Impacts<br>Meet with all consulting tribes (along with Revolution Wind, LLC) to revise the proposed mitigation measures and develop new, more equitable mitigation measures. | BOEM will continue consulting with the MWT and other federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to resources important to Tribal Nations, onshore and offshore, including cumulative visual impacts. This includes holding further government-to-government consultation meetings with Tribal Nations. |

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| | | | BOEM will continue to consider all proposed mitigation measures during consultation on the MOA, which would be implemented to resolve adverse effects to historic resources. |
| BOEM-2022-0045-0102 | 31 | Visual Renderings<br>· Ensure that THPOs are provided with all available visual renderings as early in the process as possible.<br>· Provide visual renderings of the aforementioned viewsheds that include the following:<br>o WTGs from anticipated future projects if those previously provided exclude them.<br>o WTG layouts for each identified Project alternative.<br>o WTG nacelle movement caused by wind from all directions. | BOEM has made all Project consultation information and documents available to Tribal Nations starting from the initiation of the consultation process, which was immediately prior to BOEM's release of the NOI in April 2021. BOEM has communicated to the Tribal Nations variously in letters, emails, and meetings as information and documents were made available. This communication has included all available visual renderings, visualizations, or visual simulations.<br>Cumulative visual simulations incorporating reasonably foreseeable future offshore wind energy developments are appended to the CHRVEA and are available at the Visual Simulations tab on BOEM's website for the Project at https://www.boem.gov/renewable-energy/state-activities/revolution-wind. This tab also includes cumulative simulations for each Project alternative analyzed in the EIS.<br>Although the simulations may not include WTG nacelle movement from all directions, the visualizations that support the EIS, and made available with the VIA, HRVEA, CHRVEA, and the NHL Supplementation Documentation for the Project, present a broad range of lighting and atmospheric conditions appropriate to assess the potential visual effects to historic resources located within the Project viewshed. BOEM finds the documentation acceptable and sufficient to enable any reviewing parties to understand the basis of BOEM's determination and findings on the undertaking under NEPA and NHPA Section 106 (per 36 CFR 800.11(a)).<br>In response to comments, BOEM directed Revolution Wind to produce further simulations that include some cumulative views. The new simulations have multiple updates to the views from Aquinnah Overlook, Aquinnah, Massachusetts including the following:<br>• "Cones of view" to help orient the viewer<br>• South Fork Wind Farm with and without Revolution Wind<br>• Bay State Wind Farm with and without Revolution Wind<br>• Vineyard Wind 1 with and without Revolution Wind<br>• Nighttime views with FAA lighting<br>The photo simulations can be found at BOEM's Project website, here: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Panorama Simulations Booklet_MV07_Combined_508.pdf |
| BOEM-2022-0045-0102 | 32 | MWT THPO Comments and Concerns<br>The specific, tangible benefits that the MWT will receive to mitigate the adverse effects of this project must be better articulated and codified, especially if the projects will proceed regardless of tribal concerns.<br>Research and Document Review Summary<br>Neither the DEIS nor the COP address benefits that the tribes will receive in exchange for their cooperation with the Project.<br>Recommended Action Items<br>Describe and codify specific benefits the MWT and other tribes will receive to help mitigate all anticipated and actual adverse Project effects. | BOEM will continue consulting with the MWT and other federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to resources important to Tribal Nations, onshore and offshore. This includes holding further government-to-government consultation meetings with Tribal Nations. BOEM will consider all proposed mitigation measures in consultation on the MOA, which would be implemented to resolve adverse effects to historic resources, including those measures that may benefit Tribal Nations. |
| BOEM-2022-0045-0102 | 33 | MWT THPO Comments and Concerns<br>· Government does not understand that the MWT is not a treaty tribe and thus has retained aboriginal hunting and fishing rights to the area. Because the MWT retained more sovereignty upon receiving federal recognition than other New England tribes and waived no aboriginal rights, a shared jurisdiction approach to the Project should be adopted. The MWT finds it disrespectful that the federal government has not proceeded as such on the Project.<br>· Because of the terms of federal recognition, the MWT is bound by neither state laws nor regulations. International laws, which are applicable to the seas, should be followed in this context.<br>· Under the cooperating agency mechanism, the tribes—including the MWT—should have input regarding scheduling matters and should be included on all correspondence. This is not occurring. | BOEM respects the rights of Tribal Nations and is consulting with the MWT in accordance with EO 13175, Secretarial Order No. 3317, and BOEM's tribal consultation policy (BOEM 2018) (see EIS Appendix A).<br><br>BOEM will continue to consult with the MWT and other Tribal Nations regarding their interests on the Project. The EIS analyzes the use of the area for fishing see Sections 3.12 Environmental Justice, 3.13 Finfish and Essential Fish Habitat, and 3.18 Recreation and Tourism. BOEM acknowledges that the MWT is "not a treaty tribe." |

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| | | | OCSLA gives BOEM the authority to manage the outer continental shelf and it doesn't provide for sharing that authority with tribes. BOEM, as a federal agency, must follow applicable federal laws for management of the outer continental shelf.<br><br>BOEM invited MWT to participate as a cooperating agency under NEPA in letters sent to MWT in April 2021. BOEM has communicated with Tribal Nations through letters, emails, and meetings as information and documents were made available including on release of schedules and correspondence. BOEM will continue to communicate with Tribes through Government to Government consultations. |
| BOEM-2022-0045-0102 | 34 | Recommended Action Items<br>· Outline a response to tribal assertions of aboriginal rights and adopt a shared jurisdiction approach to the Project.<br>· Grant the MWT an appropriate agency status that affords it the opportunities to—<br>o Ensure that proper information is considered during the scoping process.<br>o Secure funding that can help relieve the THPO of the burdens created by unfunded mandates for review of offshore renewable energy projects.<br>o Be included on all correspondence and scheduling matters.<br>· Follow international law for all appropriate Project matters. | The Outer Continental Shelf Lands Act gives the Secretary the authority (delegated to BOEM) to manage the Outer Continental Shelf, and it doesn't provide for shared jurisdiction or decision making with tribes, irrespective of any claims of aboriginal rights. BOEM will respond to MWT's assertion of aboriginal rights in Government to Government consultation.<br><br>BOEM invited MWT to participate as a cooperating agency under NEPA in letters sent to MWT in April 2021. BOEM has communicated with Tribal Nations through letters, emails, and meetings as information and documents were made available including on release of schedules and correspondence.<br><br>BOEM is working with federally recognized tribes to explore opportunities to assist tribes in document review and build capacity to address tribal coordination as part of offshore wind development.<br><br>BOEM, as a federal agency, must follow applicable federal laws and procedures, as well as the agency's regulations for management of the outer continental shelf. To the extent that any international laws apply to BOEM's action on the Revolution Wind COP, BOEM's actions are consistent with them. |
| BOEM-2022-0045-0102 | 35 | · MWT has never made concessions regarding inherent aboriginal title, rights nor interests in the territorial seas and jurisdictional waters of our Tribal Nation; therefor the MWT shall be designated as a cooperating Tribal Government on all lease activities within the adjacent OSW Lease areas | BOEM respects the rights of Tribal Nations and is consulting with the MWT in accordance with EO 13175, Secretarial Order No. 3317, and BOEM's tribal consultation policy (BOEM 2018) (see EIS Appendix A). BOEM will respond to MWT's assertion of aboriginal rights in Government to Government consultation.<br><br>BOEM invited MWT to participate as a cooperating agency (cooperating tribal government) under NEPA (see 40 CFR 1501.8) in letters sent in April 2021. BOEM has communicated with Tribal Nations through letters, emails, and meetings as information and documents were made available including on release of schedules and correspondence. |
| BOEM-2022-0045-0102 | 36 | · Projects have a 25 year life cycle and many of the potential impacts are ambiguously discounted, tribes require the internal capacity to monitor and track resulting impacts and further map sensitive areas of concerns within our territorial maritime areas. | BOEM will continue consulting with federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to resources important to Tribal Nations, onshore and offshore. This includes consultation on applying tribal monitoring under the measures of the MOA (EIS Appendix J). BOEM would also consider proposed measures under the MOA that directly support the participation and capacity of Tribal Nations, including proposals for staff, time, and funding support. |
| BOEM-2022-0045-0102 | 39 | · Ensure that all affected stakeholders have adequate time with which to express comments and concerns throughout all project phases, with timeframes clearly defined and agreed upon by affected tribes. | At the onset of the consultation process and immediately before releasing the NOI in April 2021, BOEM made all Project announcements and notifications, including Project timing and dates, available to Tribal Nations. BOEM has communicated to the Tribal Nations variously in letters, emails, and meetings when information and documents were made available, including on the release of schedules and notifications of meeting times. |

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| | | | In response to the consulting parties' request following the initial December 17, 2021, consulting party meeting, BOEM polled all consulting parties, including MWT, on meeting dates and normally set all meeting dates to provide at least 30 days advance notice following polling. BOEM has provided more than the usual 30-day review period for most documents consulted on under the NHPA Section 106 process, integrated with the NEPA review, also at the consulting parties' request.<br>On December 13, 2021, BOEM provided the Table of Revolution Wind Offshore Wind Project Section 106 Consultation Schedule Milestones and Approximate Dates under BOEM's NEPA Substitution Process directly to the MWT and other consulting parties in preparation for the NHPA Section 106 consultation meeting on December 17, 2021; that schedule and the timing of the NEPA and NHPA review on the Project were further reviewed at that meeting and in meeting slides provided to consulting parties.<br>On March 8, 2022, BOEM provided the MWT and other consulting parties with an updated Table of Revolution Wind Offshore Wind Project Section 106 Consultation Schedule Milestones and Approximate Dates in preparation for discussion of the schedule during the April 8, 2022, NHPA Section 106 consultation meeting and in meeting slides provided to consulting parties. BOEM additionally reviewed this schedule progress in the NHPA Section 106 consultation meeting of September 28, 2022. The March 8 schedule extended the overall Project consultation schedule, generally pushing out the dates of Project milestones.<br>On October 1, 2022, BOEM provided the MWT and other consulting parties with a further updated Table of Revolution Wind Offshore Wind Project Section 106 Consultation Schedule Milestones and Approximate Dates that extended the review period for NHPA Section 106 documents then under review. |
| BOEM-2022-0045-0102 | 40 | Standardize the comment solicitation process and timeframes for this and each future project with tribal input (if the government cannot or will not consider all individual projects as being under the umbrella of one large project in accordance with previous tribal requests). | BOEM is following the requirements of the NEPA and NHPA Section 106 processes in the solicitation of comments. Consulting Tribal Nations have generally requested longer than the usual 30-day review and comment period on documents for NHPA Section 106 consultation for this Project, and BOEM has generally granted these requests. For reasons other than the requests of Tribal Nations, BOEM also extended the originally planned Project schedule, which had the effect of providing all parties with more time to consider the Project and anticipate Project milestones as they were moved outward. |
| BOEM-2022-0045-0102 | 41 | Research federal funding and resources that will enable THPOs to seek advice from subject matter experts and other outside consultants as needed. Expecting understaffed and underfunded THPOs to conduct all necessary reviews and pay consultants to help meet unrealistically short deadlines amounts to an unfunded mandate. | BOEM would consider proposed measures, as could be implemented under the MOA (EIS Appendix J), that directly support the participation and capacity of Tribal Nations, including proposals for staff, time, and funding support. |
| BOEM-2022-0045-0102 | 42 | Remove the requirement to submit comments through the website portal. | Regarding comments on the DEIS, the Federal Register Notice of Availability identified multiple methods of submitting comments to BOEM. Additionally, BOEM would accept information from Tribal Nations participating in government-to-government consultation on the Project in direct submittal to their BOEM point of contact(s) on the Project. Once received, BOEM can process the Tribal Nation comments on the EIS into the docket on regulations.gov. |
| BOEM-2022-0045-0102 | 43 | MWT THPO Comments and Concerns<br>· The government is not acting on tribal concerns expressed in previous projects (to the extent that the MWT refused to sign off on the MOAs for the South Fork and Vineyard Wind projects).<br>· The MWT does not concur that the applicant-proposed mitigation measures in the DEIS are appropriate to fully address the nature, scope, size, and magnitude of potential adverse effects caused by the Project—including cumulative effects on ancient submerged landforms, terrestrial archaeological historic properties, and TCPs. These mitigation measures were developed without input or collaboration from the MWT as a consulting party under NHPA Section 106. | BOEM will continue consulting with MWT and other federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to resources important to Tribal Nations, onshore and offshore. This includes holding further government-to-government consultation meetings with Tribal Nations. BOEM will consider all mitigation measures proposed during consultation on the MOA. The MOA would be implemented to resolve adverse effects to historic resource; this includes treatment of cumulative visual impacts to cultural resources. |

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| BOEM-2022-0045-0102 | 44 | · Consult with federally recognized tribes on all proposed projects as a single federal action instead of on a project-by-project basis. | BOEM has consulted with federally recognized Tribal Nations in New England on multiple proposed offshore wind energy projects simultaneously, as described in EIS Appendix A. BOEM would continue to support these simultaneous consultation efforts in ongoing and future government-to-government meetings with Tribal Nations. However, the reasonably foreseeable future offshore wind energy developments do not represent a single federal action; they would each proceed (or not proceed) independent of each other. BOEM has analyzed the cumulative effects of the Project and other reasonably foreseeable future offshore wind energy developments throughout the EIS, namely in Section 3, Affected Environment and Environmental Consequences. |
| BOEM-2022-0045-0102 | 45 | · Provide visual renderings of viewsheds that include WTGs from anticipated future projects if those previously provided exclude them. | Cumulative visual simulations of reasonably foreseeable future offshore wind energy developments are appended to the CHRVEA. These and additional cumulative visual simulations of future offshore wind developments are available at the Visual Simulations tab on BOEM's website for the Project at https://www.boem.gov/renewable-energy/state-activities/revolution-wind. This tab also includes cumulative simulations for each Project alternative analyzed in the EIS. In response to these comments, BOEM directed Revolution Wind to produce further simulations that include some cumulative views. The new simulations have multiple updates to the views from Aquinnah Overlook, Aquinnah, Massachusetts including the following:<br>• "Cones of view" to help orient the viewer<br>• South Fork Wind Farm with and without Revolution Wind<br>• Bay State Wind Farm with and without Revolution Wind<br>• Vineyard Wind 1 with and without Revolution Wind<br>• Nighttime views with FAA lighting<br>The photo simulations can be found at BOEM's Project website, here: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Panorama Simulations Booklet_MV07_Combined_508.pdf |
| BOEM-2022-0045-0102 | 46 | · Provide sufficient time for document review and feedback solicitation during all Project phases, and consult with the tribes regarding all scheduling matters. | At the onset of the consultation process and immediately before releasing the NOI in April 2021, BOEM made all Project announcements and notifications, including Project timing and dates, available to Tribal Nations. BOEM has communicated to the Tribal Nations variously in letters, emails, and meetings when information and documents were made available , including on the release of schedules and notifications of meeting times.<br>In response to the consulting parties' request following the initial December 17, 2021, consulting party meeting, BOEM polled (i.e., through Doodle polls) all consulting parties, including MWT, on meeting dates and normally set all meeting dates to provide at least 30 days advance notice following polling. BOEM has provided more than the usual 30-day review period for most documents consulted on under the NHPA Section 106 process, integrated with the NEPA review, also at the consulting parties' request.<br>On December 13, 2021, BOEM provided the Table of Revolution Wind Offshore Wind Project Section 106 Consultation Schedule Milestones and Approximate Dates under BOEM's NEPA Substitution Process directly to the MWT and other consulting parties in preparation for the NHPA Section 106 consultation meeting on December 17, 2021; that schedule and the timing of the NEPA and NHPA review on the Project were further reviewed at that meeting and in meeting slides provided to consulting parties.<br>On March 8, 2022, BOEM provided the MWT and other consulting parties with an updated Table of Revolution Wind Offshore Wind Project Section 106 Consultation Schedule Milestones and Approximate Dates in preparation for discussion of the schedule during the April 8, 2022, NHPA Section 106 consultation meeting and in meeting slides provided to consulting parties. BOEM additionally reviewed this schedule progress in the NHPA Section 106 consultation meeting of September 28, 2022. The March 8 schedule extended the |

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| | | | overall Project consultation schedule, generally pushing out the dates of Project milestones.<br>On October 1, 2022, BOEM provided the MWT and other consulting parties with a further updated Table of Revolution Wind Offshore Wind Project Section 106 Consultation Schedule Milestones and Approximate Dates that extended the review period for NHPA Section 106 documents then under review. |
| BOEM-2022-0045-0102 | 47 | · Meet with all consulting tribes (along with Revolution Wind, LLC) to revise the proposed mitigation measures and develop new, more equitable mitigation measures. | BOEM will continue consulting with the MWT and other federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to resources important to Tribal Nations, onshore and offshore. This includes holding further government-to-government consultation meetings with Tribal Nations. BOEM will consider all proposed mitigation measures during consultation on the MOA. The MOA would be implemented to resolve adverse effects to historic properties. |
| BOEM-2022-0045-0102 | 48 | MWT THPO Comments and Concerns<br>· The MWT views the entire area—including their own way of life—holistically (i.e., all things are interconnected); government does not necessarily share this view. (This includes relationships with whales and other wildlife.)<br>· The Section 106 process does not take effect until the project is so far underway that tribes are not in a strong position to address their concerns when doing so would be effective.<br>· The timeframe for comment solicitation is too brief. Three weeks from the Section 106 meeting to close of comments (27 September to 17 October) is far too short a window to adequately review and discuss concerns internally and among tribes, especially given the lack of resources THPOs have to address such a large volume of documents and multiple projects. This burden creates what amounts to an unfunded mandate.<br>· The federal government is rushing these offshore wind projects for financial and political reasons, which presents an obvious conflict of interest. | BOEM respects the views of the MWT and Tribal Nations on the interconnectedness of their way of life and the environment, including their relationship with whales and other wildlife. BOEM will continue consulting with the MWT and other Tribal Nations to receive their views and input and continue holding government-to-government meetings.<br>BOEM initiated the NHPA Section 106 consultation process in letters sent directly to the MWT and other Tribal Nations immediately prior to BOEM's release of the NOI for the Project in April 2021. BOEM has communicated to the Tribal Nations variously in letters, emails, and meetings when information and documents were made available, including on the release of schedules and notifications of meeting times.<br>In review, on December 13, 2021, BOEM provided the Table of Revolution Wind Offshore Wind Project Section 106 Consultation Schedule Milestones and Approximate Dates under BOEM's NEPA Substitution Process directly to the MWT and other consulting parties in preparation for the NHPA Section 106 consultation meeting on December 17, 2021; that schedule and the timing of the NEPA and NHPA review on the Project were further reviewed at that meeting and in meeting slides provided to consulting parties. At the consulting parties' request following the initial December 17, 2021, consulting party meeting, BOEM polled consulting parties (including MWT) on meeting dates and normally set all meeting dates to provide at least 30 days advance notice. Meeting materials have generally been disseminated 1 or more weeks in advance. At the consulting parties' request, BOEM provided more than the usual 30-day review period for most documents consulted on under the NHPA Section 106 process, integrated with the NEPA review.<br>BOEM made the revised cultural resources technical reports, APE delineation memorandum, Finding, and draft MOA available to consulting Tribal Nations and other consulting parties under NHPA Section 106 on August 1, 2022, over 30 days in advance of the September 2 public release of the Draft EIS; nearly 60 days in advance of the September 27, 2022, NHPA Section 106 consultation meeting; and approximately 75 days in advance of the Draft EIS public comment period end date of October 17, 2022. On October 1, 2022, BOEM extended the review period for the NHPA Section 106 documents under review to October 30, 2022, for a total review period of 90 days. BOEM will continue consulting with the MWT and other federally recognized Tribal Nations, including through holding further government-to-government consultation meetings.<br>BOEM follows all applicable laws on the Project, including as described in the regulatory framework at EIS Section 1.3. As noted in other responses, BOEM would consider proposed measures for implementation under the MOA (see EIS Appendix J) that directly support the participation and capacity of Tribal Nations, including proposals for staff, time, and funding support. |

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| BOEM-2022-0045-0102 | 49 | Address IPFs and impacts to resource areas from an interconnectedness/holistic point of view, soliciting tribal input as appropriate. | IPFs are addressed in EIS Section 3.1, Impact-Producing Factors. Impacts to resources and resource areas are summarized by resource type in Affected Environment and Environmental Consequences, Section 3.4 through 3.22.<br>BOEM invited the MWT to consult on the Project under NHPA Section 106 and in cooperation under NEPA in letters sent by BOEM to the MWT in April 2021 and has made all Project consultation information and documents available to Tribal Nations. BOEM has met with the MWT and other Tribal Nations in government-to-government consultation, in consultation under NHPA Section 106, and in cooperating party consultation on the EIS under NEPA. BOEM will continue consulting with the MWT and other Tribal Nations to receive their views and input. |
| BOEM-2022-0045-0102 | 50 | Extend the deadline for comments on the Section 106 process such that THPOs have adequate time to internally and collaboratively discuss and articulate concerns. | BOEM initiated the NHPA Section 106 consultation process in letters sent directly to the MWT and other Tribal Nations immediately prior to BOEM's release of the NOI for the Project in April 2021. BOEM has communicated to the Tribal Nations variously in letters, emails, and meetings when information and documents were made available, including on the release of schedules and notifications of meeting times. On December 13, 2021, BOEM provided the Table of Revolution Wind Offshore Wind Project Section 106 Consultation Schedule Milestones and Approximate Dates under BOEM's NEPA Substitution Process directly to the MWT and other consulting parties in preparation for the NHPA Section 106 consultation meeting on December 17, 2021; that schedule and the timing of the NEPA and NHPA review on the Project were further reviewed at that meeting and in meeting slides provided to consulting parties. At the consulting parties' request following the initial December 17, 2021, consulting party meeting, BOEM polled consulting parties (including MWT) on meeting dates and normally set all meeting dates to provide at least 30 days advance notice. Meeting materials have generally been disseminated 1 or more weeks in advance. At the consulting parties' request, BOEM has provided more than the usual 30-day review period for most documents consulted on under the NHPA Section 106 process, integrated with the NEPA review. If the MWT or other Tribal Nations need additional time to review documents, BOEM would consider this on a case-by-case basis and try to work with the Tribal Nation(s) to accommodate this request. |
| BOEM-2022-0045-0102 | 51 | Ensure that all affected stakeholders have adequate time with which to express comments and concerns throughout all project phases, with timeframes clearly defined and agreed upon by affected tribes. | BOEM initiated the NHPA Section 106 consultation process in letters sent directly to the MWT and other Tribal Nations immediately prior to BOEM's release of the NOI for the Project, in April 2021. BOEM has communicated to the Tribal Nations variously in letters, emails, and meetings when information and documents were made available, including on the release of schedules and notifications of meeting times. On December 13, 2021, BOEM provided the Table of Revolution Wind Offshore Wind Project Section 106 Consultation Schedule Milestones and Approximate Dates under BOEM's NEPA Substitution Process directly to the MWT and other consulting parties in preparation for the NHPA Section 106 consultation meeting on December 17, 2021; that schedule and the timing of the NEPA and NHPA review on the Project were further reviewed at that meeting and in meeting slides provided to consulting parties. At the consulting parties' request following the initial December 17, 2021, consulting party meeting, BOEM polled consulting parties (including MWT) on meeting dates and normally set all meeting dates to provide at least 30 days advance notice. Meeting materials have generally been disseminated 1 or more weeks in advance. At the consulting parties' request, BOEM provided more than the usual 30-day review period for most documents consulted on under the NHPA Section 106 process, integrated with the NEPA review. If the MWT or other Tribal Nations need additional time to review documents, BOEM would consider this on a case-by-case basis and try to work with the Tribal Nation(s) to accommodate this request. |

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| BOEM-2022-0045-0102 | 52 | MWT THPO Comments and Concerns<br>Responses to MWT's questions concerning the DEIS that include references to the Environmental Studies Program or other BOEM-created documentation are unacceptable. Only peer-reviewed studies will be considered acceptable.<br>Recommended Action Items<br>Reference only peer-reviewed reports and studies to support EIS determinations. | BOEM has followed proper reference and citation procedures in the EIS, and as summarized in EIS Appendix B and as maintained in the administrative record for the EIS. |
| BOEM-2022-0045-0102 | 53 | Research and Document Review Summary<br>Appendix A of the DEIS notes references a 20 August 2020 consultation between BOEM and various tribes, including the MWT, that concluded with a BOEM action item to provide consulting parties with additional reports. Whether that action item was completed is unclear. | BOEM has continued to provide Tribal Nations with available information and reports through time, including on the Project, as described in previous response to MWT comments regarding scheduling and review. |
| BOEM-2022-0045-0086 | 30 | Additionally, the DEIS states in Table 3.10-7, "The impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative." This statement ignores the climate benefits of the Project, which are noted in the same table entry. | Thank you for your comment. The text in Table 3.10-7 has been revised to clarify Project climate benefits. |
| BOEM-2022-0045-0086 | 31 | Table 3.10-7 - Alternatives C to F assesses seabed disturbance impacts to submerged cultural resources and states that greater separation between WTGs and submerged cultural resources is preferable. The distance separating a submerged resource from a foundation is not a meaningful measure of impact if the resource - which is submerged and not visible to the public - is not disturbed by any of the options being considered. The submerged cultural resources would be either disturbed or not disturbed. This analysis should focus on whether resources are avoided by the various alternatives, not whether avoidance is by "a lot" or "a little". For example, see Table 3.10-7 "New Cable emplacement" under Alternative B: "Where Revolution Wind would avoid the shipwreck sites by a distance of 50 meters (m) (164 feet), the Project would have no impact on them."<br>Revolution Wind will be providing additional feedback on the draft Memorandum of Agreement and Finding of Effects in a formal comment letter in accordance with the Section 106 review timeframe. | Please note that all alternatives consider whether ancient submerged landforms and potential historic shipwrecks are avoided by alternatives or not. However, consulting parties under NHPA Section 106 have expressed concerns for the distances by which shipwrecks and ancient submerged landforms are avoided. Greater avoidance buffering is considered to afford greater protection tolerances. |
| BOEM-2022-0045-0086 | 38 | The DEIS states that "disturbance and destruction of even a portion of an identified submerged landform could degrade or eliminate the value of these resources as potential repositories of archaeological knowledge and cultural significance to tribes." The DEIS does not support this statement with a reference to communication made during Government to Government (G2G) consultations with the Tribes and is inconsistent with Revolution Wind's engagement with Tribes. The DEIS does not clearly establish why minor adverse impacts could occur to Ancient Submerged Land Forms (ASLFs) even if all seabed disturbance within the protective buffers is avoided. If these statements are based on G2G consultations, Revolution Wind respectfully requests a reference be included. | BOEM adjusted the text in EIS Section 3.12, Environmental Justice, regarding the disturbance and destruction of identified submerged landforms. The EIS further notes that BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects. Both government-to-government consultation, as summarized in EIS Appendix A, and ongoing NHPA Section 106 consultation with tribes, as summarized in the Finding in EIS Appendix J, support Tribal Nation concerns with the disturbance of ancient submerged landforms. The EIS states that the range of impacts to ancient submerged landforms would range from potentially negligible to minor; negligible and minor impacts are defined in EIS Section 3.3, Definition of Impact Levels. |
| BOEM-2022-0045-0086 | 81 | Page 3.10-27, Section 3.10.2.1: The following statement incorrectly asserts a conditional framework for the post-review discovery plan: "If previously undiscovered or unimpacted historic properties are identified and moderate to major negative effects cannot be avoided, BOEM would require a post-review discovery plan (see Appendix J) be implemented to assess and resolve any negative effects." Such a plan is required under the S106 MOA, regardless of whether a discovery actually occurs or whether avoidance is feasible. | The text regarding the post-review discovery plan was revised in EIS Section 3.10 to clarify that use of the appropriate onshore or offshore discovery plan would be pursuant to the MOA. |
| BOEM-2022-0045-0116 | 2 | Oh, thank you for being here. And I don't mean this as a reproach. But when you come into Tribal lands, you all must do a Land Acknowledgement. And this was not done by BOEM. | BOEM acknowledges the Tribal Nations' current and ancestral ties to the area lands, waters, and environment. BOEM further recognizes Tribal Nations' long historical association with the land and seas in the region and at the Project, as discussed in BOEM's detailing of ancient submerged landform contexts in the Finding (see EIS Appendix J). |
| BOEM-2022-0045-0116 | 11 | Bettina Washington; for some of you folks, you all know that I'm the Tribal Historic Preservation Officer for the Wampanoag Tribe at Gay Head, Aquinnah. This particular wind project, out of all of them that are planned for south of our island, I believe, from what I have seen, will have the most detrimental effect on our viewshed. Tribally speaking, this is off our sacred place. It affects Nomans. It affects Moshup's Rock. It affects the Aquinnah Cliffs, Moshup's Bridge, the Elizabeth Islands, the Vineyard Sound. That's the cultural viewshed for us. There's nothing more important in terms of our oral history. That is the place. We have been here for time immemorial. It was interesting when I heard the NEPA. It says harm to humans. Speaking as a Tribal person, we are part of the chain, that whole circle. We cannot separate ourselves from our relatives that live in the ocean. | BOEM will continue consulting with the Wampanoag Tribe at Gay Head (Aquinnah) and other federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to historic properties, including TCPs and ancient submerged landforms. Through consultation, BOEM will work to adapt and finalize the resolution of adverse effects in revision of the MOA and its HPTPs in Draft EIS Appendix J. BOEM will continue involving the Wampanoag Tribe at Gay Head (Aquinnah) and other federally recognized |

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| | | And I have stated more than once how important the Right Whale is to our culture. There are 340 of those whales in the world, in the world. I am concerned with the boat traffic. How many of these boats are going to be running back-and-forth? Where they're coming from, where are they going to be in the harbor?<br><br>There are a lot of unknowns. These cables will be running through and they will be running into ancient submerged archaeological sites. Once these are uncovered, they are destroyed. How are we going to gather that information without destroying them? We can't. They're gone. We don't have the technology yet.<br><br>And once we are -- we don't know about the siltation of when these turbines are placed into the ocean. Where is that going? How is that going to affect the fish? I know there are closed periods. However, we still need to be careful. Right now, we have the bass derby going on. Is that going to affect that, when -- if that is, indeed, when the construction time happens? What about our herring run in the spring? Well, that's the spring and the fall. That leaves the summer and that's when the whales are here.<br><br>I don't -- I have not received the complete picture of the effects on the marine environment, which, in turn, affects the economy of this island that relies so heavily. Not the fishing in and of itself, but also the economic part of it. People come to the island to fish. People come here for tourism. And I'm not so sure that's what they want to see, especially at sunset, because they will be backlit.<br><br>So those are just some of the issues, because, as some of you may understand, Section 106, BOEM has been consulting with us for quite some time. And there are a number of issues. And once you go on one issue, you end up down a rabbit hole. But I'd like to thank you, all, for coming here. Thank you for putting that comment notice in the paper, because I had asked for that. I tell people not everybody reads the Federal Register. So I do appreciate that. Thank you | Tribal Nations on the EIS, providing information and participation in consideration of the marine mammal concerns important to the Wampanoag Tribe at Gay Head (Aquinnah). |
| BOEM-2022-0045-0116 | 14 | There are a lot of unknowns. These cables will be running through and they will be running into ancient submerged archaeological sites. Once these are uncovered, they are destroyed. How are we going to gather that information without destroying them? We can't. They're gone. We don't have the technology yet. | Thank you for your comment. BOEM will continue to consult with federally recognized Tribal Nations on the avoidance, minimization, and mitigation of adverse effects to historic properties, including TCPs and ancient submerged landforms. Through consultation, BOEM will work to adapt and finalize the resolution of adverse effects in revision of the MOA and its attached HPTPs (see EIS Appendix J).<br>BOEM is applying the EIS documentation, and supporting documentation referenced in the EIS, in BOEM's reasonable and good faith efforts to identify historic properties, in accordance with 36 CFR 800.4. These efforts include, but are not limited to, BOEM taking into account past planning, research and studies, the magnitude and nature of the Project undertaking and the degree of federal involvement, the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties within the APE. BOEM has produced the Finding (see EIS Appendix J) for BOEM's determination of adverse effects pursuant to the undertaking. BOEM is applying the criteria of adverse effect from 36 CFR 800.5 et seq. and applying the special requirements for minimizing harm to NHLs at 36 CFR 800.10 and for Section 110(f) compliance. BOEM remains in consultation with consulting parties on the identified historic properties, the assessment of effects, and in planning for the resolution of adverse effects under NHPA Section 106.<br>For all offshore archaeological investigations, as presented in the MARA, BOEM analyzed geophysical and remote sensing techniques (e.g., side-scan sonar) to identify where not only possible historic shipwrecks would be but also ancient submerged landforms may contain archaeological assemblages associated with Native American heritage. Identification of soil and sediment deposits onshore and offshore guided the placement, number, and depth of subsurface probes (vibracores offshore and shovel tests onshore), to confirm the presence or absence of soils and sediments capable of retaining archaeological materials. All ancient submerged landform features offshore would be avoided. However, |

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| | | | all such features may not be avoidable, such as on the RWEC where ancient stream channels must be crossed somewhere for the Project to be feasible, but it cannot be fully determined in advance if cable burial depth would remain in sediments above the submerged landform. If avoidance is not feasible, ancient submerged landforms would be treated as historic properties and adverse effects to them would be mitigated under NHPA Section 106, as presented in the EIS (see Appendix J). Post-review discovery planning would also be applied should any unanticipated archaeological materials be identified during construction or O&M. |
| BOEM-2022-0045-0116 | 17 | So those are just some of the issues, because, as some of you may understand, Section 106, BOEM has been consulting with us for quite some time. And there are a number of issues. And once you go on one issue, you end up down a rabbit hole. But I'd like to thank you, all, for coming here. Thank you for putting that comment notice in the paper, because I had asked for that. I tell people not everybody reads the Federal Register. So I do appreciate that. Thank you | Thank you for your comment. BOEM endeavors to provide notification of the opportunity to review and comment through a variety of means. In addition, BOEM advertised public hearings with the release of the Draft EIS on the BOEM website for the Project as well as other media, such as local newspapers. Remote access was provided through virtual meetings, and in-person hearings were provided in local locations in Rhode Island and Massachusetts near the Project. |
| BOEM-2022-0045-0123 | 1 | Analysis of Incomplete Documents - Section 106 and NEPA Substitution<br><br>We continue to be concerned that NPS is repeatedly asked to review documents that are either unavailable, incomplete, or missing whole sections regarding the identification of and impacts to historic properties, specifically NHLs, which is central to our main concerns with many of these projects. Revolution Wind is no exception to this pattern. BOEM is sending incomplete documents for review because they have not finished writing the sections and asking the NPS to read and comment on conclusions when the analysis is missing. When the completed sections become available, it takes time to understand where they fit in the DEISs and the now available documents, requires NPS staff to review the original documents, understand how the new material will be incorporated and what the resulting impacts to resources of NPS concern would be. This piecemeal approach makes it difficult for the NPS, as a Section 106 consulting party and participating agency under NEPA, to provide meaningful review or comment on resources that may be impacted or what the impacts may be. It is creating unacceptably short timeframes for review, impacting our ability to fulfill our role as a participating or cooperating agency and provide useful and timely comments to BOEM. We ask that future documents be complete before they are released for agency (and public) comment. | As a cooperating agency under NEPA, the NPS is provided an early opportunity to review the EIS and its appendices, which means they are in a preliminary state. The NPS further has the opportunity to review the issued EIS, draft and final, in their complete state. BOEM has made available to the NPS all completed NHPA Section 106 reports and documents, including unredacted and full copies of cultural resources documents that were redacted or summarized for public release. These documents include full information on NHLs. Where the NPS has commented previously that the agency did not have access to Appendix BB of the COP, please note access to this document (indeed, all parts of the Project COP) were provided to the NPS along with other consulting parties, as part of BOEM's release of the cultural resources technical reports under NHPA Section 106 consultation, on February 28, 2022. The NHL supplemental documentation was created by Revolution Wind and distributed by BOEM on October 1, 2022, pursuant to comments and requests from NHPA Section 106 consulting parties on the cultural resources technical reports; therefore, the NHL supplemental documentation was released separate from and subsequent to the cultural resources technical reports. However, BOEM then extended the review period for all cultural resources technical reports, the Finding, and draft MOA from August 1–October 17 to August 1–October 31, 2022, so that the NHL supplemental documentation could be considered over a 30-day period with the other documents. Although a 30-day review period is the usual period provided pursuant to NHPA Section 106 document review, it should be noted that BOEM has provided a longer period for most NHPA Section 106 document reviews on the Project. |
| BOEM-2022-0045-0123 | 2 | Given this piecemeal approach, we question whether and how BOEM can meaningfully use NEPA substitution to address its responsibilities under Section 106 of the National Historic Preservation Act.<br>For example, we note from Appendix C (pg. C-5) that "Information pertaining to the identification of historic properties within certain portions of the marine archaeology area of potential effects will not be available until after the record of decision (ROD) is issued and the COP is approved. BOEM will prepare a ROD in consultation with the National Historic Preservation Act Section 106 consulting parties that will allow for deferred identification and evaluation of historic properties within the marine archaeology area of potential effects, facilitating that a good faith effort to identify historic properties and assess effects is fully performed prior to construction. The ROD will apply to the alternative(s) selected. Therefore, BOEM has not identified incomplete or unavailable information on cultural resources that is essential to a reasoned choice among alternatives." The language above clearly means that the identification of historic properties that may be affected and an assessment of effects to historic properties will be completed during or after the development of the ROD. How BOEM will be able to conduct consultation on these steps in the Section 106 process after the FEIS is complete (including its assessment of impacts) is unclear. How can impacts to resources such as historic properties be analyzed within the NEPA process when those resources | Please note that no additional archaeological research of geomorphic features, onshore or offshore, will be necessary; EIS Appendix C was corrected to reflect this. |

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| | | have yet to be identified? The NPS is concerned the use of NEPA substitution in lieu of the Section 106 process may result in a less than satisfactory assessment of effects to historic properties. | |
| BOEM-2022-0045-0123 | 3 | National Historic Landmarks (NHLs)<br><br>As previously mentioned, NPS has specific responsibilities for NHLs under the NHPA. NHLs are historic properties that illustrate the heritage of the United States. The NPS has specific responsibilities with regards to administration of the NHL Program. All NHLs are also included on the National Register of Historic Places (NRHP), a list of some 80,000 historic properties that the National Park Service deems to be worthy of recognition, while just over 2,600 are designated as NHLs. NHLs found in the U.S. today come in many forms: historic buildings, sites, structures, objects, cultural landscapes, and districts. Each NHL represents an outstanding aspect of American history and culture. Of note, federal funding or licensing of activities that affect historic properties are regulated principally by Sections 106 and 110(f) of the National Historic Preservation Act (NHPA). Other federal effects are listed in 36 CFR § 65.2. Under Sections 106 and 110(f) of the Act, federal agencies must "take into account" the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the undertaking and its effects. Implementing regulations of the ACHP may be found in 36 CFR § 800 "Protection of Historic Properties," which establishes a process of consultation with the State Historic Preservation Officer (SHPO) and the ACHP leading, in most instances, to agreement on how the undertaking will proceed. Steps in the process include identification and evaluation of historic properties that may be affected, assessment of the effects of the federal action, and resolution of any adverse effects that would occur. If a federal activity will "directly and adversely affect" an NHL, Section 110(f) of the Act also calls for federal agencies to undertake "such planning and actions as may be necessary to minimize harm to such Landmark." As with Section 106, the agency must provide the ACHP with a reasonable opportunity to comment in accordance with 36 CFR § 800. | As stated in BOEM’s Finding (see EIS Appendix J), BOEM has notified the NPS (as delegate of the Secretary of the Interior) and the ACHP of BOEM’s determination of adverse effect to NHLs. BOEM provided the Finding to the NPS, ACHP, and other NHPA consulting parties on August 1, 2022. The ACHP and NPS have been active consulting parties on the Project since BOEM invited them to consult at the initiation of the NHPA Section 106 process on the Project on April 6 and April 29, 2021, respectively. BOEM is fulfilling its responsibilities to give a higher level of consideration to minimizing harm to NHLs, as required by NHPA Section 110(f), through implementation of the special requirements outlined at 36 CFR 800.10 (BOEM 2021a). |
| BOEM-2022-0045-0123 | 4 | Nighttime Impacts and NHLs: Assessment of Effects<br><br>Please explain how BOEM arrived at the conclusion that "The impacts of construction and operations lighting would be limited to cultural resources on the shoreline for which a nighttime sky is a contributing element to historic integrity. This excludes resources that are closed at night, such as historic buildings, lighthouses, and battlefields, and resources that generate their own nighttime light, such as historic districts." DEIS, pg. E1-68. If this is tied to law or policy, please provide a citation. NPS has seen this language in other PDEISs and does not understand or agree with these seemingly required elements.<br>It is also important to note that National Register and National Historic Landmark nominations, the principal documents describing historical significance and resource integrity of designated properties, very likely would not explicitly address nighttime skies as a contributing element to historic integrity. Furthermore, National Register nomination forms and requirements have evolved over time and can vary significantly in depth and breadth, ranging from a few pages to hundreds of pages in length. More recent nominations may more fully consider contemporary relevance and more complex social contexts. Additionally, while National Register and National Historic Landmark facilities may not be regularly staffed at night, there are a variety of ways visitors and user groups may passively enjoy and associate with important cultural resources and where a dark night sky/dark seascape setting contributes to that experience. For example, battlefields and cemeteries are often used by individuals and groups as places of quiet reflection, contemplation, connection, and ceremony. Lighthouses and Light Stations, such as Block Island South East Light NHL, are often iconic symbols of a community’s maritime history and identity, where views to the resource, especially from the water, and from long distances, particularly at night, are important. | Lighting is specifically analyzed as an IPF for cultural resources and was found to contribute to adverse effects on historic properties where it reached moderate to major impact levels in the analyses. These cultural resources include historic properties and buildings, such as lighthouses and properties within historic districts, for which a nighttime sky is a contributing element to historic integrity. Please note that although the language referenced in the comment is included in Table E2-9 in Draft EIS Appendix E1 under Sub-IPF “Light: Vessels,” the analysis of impacts on cultural resources and the analyses of the various alternatives in EIS Section 3.10 consider Project construction lighting and navigation lighting. See, for example, the Light subsection at Section 3.20.2.2. The Finding (see Section 5.1.2.1) specifically considers adverse effects from construction and installation lighting, and discusses this in context of consideration of Project alternatives considered, cross-referencing to the EIS.<br>Further, the EIS considers that existing ambient lighting would reduce the impacts of Project lighting at some locations and, therefore in contrast, be greater where darker skies prevail. Weather and atmospheric conditions are considered, as is distance from offshore Project facilities to historic properties because that would ameliorate the effects of lighting impacts. The lighting impacts would be most pronounced (although for a short duration with the implementation of an ADLS) for locations that can be currently characterized as undeveloped within the seascape both from an onshore and offshore perspective, where lighting from infrastructure and activities is not dominant or perceivable by the casual observer (viewer), as described in the EIS lighting analysis under Visual Resources Section 3.20.1.1.1. This could occur at more remote and isolated properties, like some lighthouses, including Gay Head Light and Southeast Lighthouse NHL, as well as other historic properties adversely affected by lighting impacts in the Project APE. The HRVEA documentation that supports the assessment of visual effects in EIS Section 3.10 Cultural Resources does not simply rely on the NHL or NRHP nominations for historic properties, but further considers the historic significance and character of the historic properties in the |

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| | | | APE in relation to their maritime settings as assessed in relation to the current Project and its potential for visual impacts. |
| BOEM-2022-0045-0123 | 6 | The CHRVEA on pgs. 46 and 47 in its Nighttime Lighting analysis makes some good points about the use of aircraft detection lighting systems (ADLS) and the curvature of the earth reducing lighting impacts at night. However, most of the wind turbine generators (WTGs) would be less than 16 miles away, so all lights would be visible, especially the U.S. Coast Guard (USCG) lights on the WTG foundations which would always be on. "At Aquinnah Overlook at night, the HRVEA notes that flashing red aviation warning lights would be visible higher upon WTGs but that flashing amber USCG warning lights around WTG foundations would have a greater visual prominence due to their lighter coloring against the black sky and ocean. The addition of warning lights on the WTGs would increase visual clutter at the horizon. Also, the number and mass of lights would diminish the sense of openness (EDR 2022a)."<br>NPS requests additional analysis to determine if there is anything else in addition to use of ADLS that would reduce these impacts. Are there options for the USCG lighting without sacrificing safety? Could lights be put on motion sensors, timers or keyed to vessel identifiers so they come on only when boats are near? Could lumens be reduced on the USGS lights? NPS will participate in discussions of avoidance, minimization and mitigation measures during the Memorandum of Agreement (MOA) discussions that will take place in the future. | BOEM follows the guidance of the lighting and safety requirements of the USCG and the FAA for marine navigation and aircraft warning, as established in BOEM's 2021 Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development, cited in the EIS (Appendix B, see Chapter 2). The use of the ADLS system is intended by BOEM to be consistent with FAA guidance. The USCG requires that offshore wind lessees and grantees obtain permits for private aids to navigation and USCG lighting, and other safety requirements would need to be met for that permitting (PATON, see 33 CFR 67).<br>It should be noted that the ADLS is proposed to have a shorter duration synchronized flashing that is activated as needed by passing aircraft and would reduce visual impacts at night. As described on p. 3.20-5 of the Draft EIS, "Based on a recent study by Capital Airspace related to ADLS efficacy associated with the RWF, historic air traffic data for flights passing through the warning light activation area indicated that the ADLS would have been activated for a total of 3 hours 35 minutes and 39 seconds over a 1-year period." Please see COP Appendix S4 for this ADLS efficacy analysis.<br>Additionally, the developer has committed to limiting construction and operational lighting to the minimum needed for safety and compliance with applicable regulations and to using light technology such as low-intensity strobe lights that still comply with FAA and USCG requirements in order to reduce impacts to avian species, bats, and cultural/visual resources. See Draft EIS Appendix F. Therefore, minimization of lighting in compliance with FAA and USCG requirements would be addressed. Please also see new simulations that BOEM requested Revolution prepare, with multiple updates to the views from Aquinnah Overlook, Aquinnah, Massachusetts including the following:<br>• "Cones of view" to help orient the viewer<br>• South Fork Wind Farm with and without Revolution Wind<br>• Bay State Wind Farm with and without Revolution Wind<br>• Vineyard Wind 1 with and without Revolution Wind<br>• Nighttime views with FAA lighting<br>The photo simulations can be found at BOEM's Project website, here: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Panorama Simulations Booklet_MV07_Combined_508.pdf<br>In relation to the avoidance, minimization, and mitigation of adverse effects from lighting, BOEM will continue consulting with the NPS, ACHP, and other consulting parties to further minimize harm to NHLs and on the resolution of adverse effects to historic properties. This will include considering all proposed mitigation measures in consultation on the MOA. |
| BOEM-2022-0045-0123 | 7 | In many places, the DEIS contains the language: "Given the minimal and localized nature of lighting effects anticipated under this guidance, the related effects from proposed future activities on [a resource] are likely to be negligible adverse." In other places, project-related lighting impacts are determined to be negligible to minor adverse because the lightings are "localized and short term." NPS does not agree with the methodology of determining the level of lighting impact based on the subjective assessment of lighting level, area, and duration. The construction phase, for example, takes several months if not years. While this time frame might seem short on the overall project scale, it is not short when viewed by itself. For the operations and maintenance (O&M) phase, Service Operation Vessels will likely operate at the site 24/7 so its lighting should not be considered short term. Furthermore, from a cumulative standpoint of multiple projects, lighting impact could be constant for decades. Therefore, please reconsider rating the lighting impact with more supportive evidence or reevaluate the impacts accordingly. | The effects of construction lighting best meet the definition of temporary effects as presented in EIS Table 3.3-4, Definition of Duration Terms. The EIS text has been corrected in relation, where needed, in Section 3.10. Project construction is anticipated to occur within an 18-month period, necessarily persisting multiple calendar years; however, the visual effects of construction would end when construction ends. Nevertheless, temporary effects are effects and can be adverse. The effects of construction lighting on NHLs and historic properties were specifically used in the analysis of visual impacts in EIS Section 3.10, Cultural Resources. Adverse effects from the continuous lighting from construction through installation and decommissioning were found for the Project, specifically in relation to the cumulative effects of the Project with the potential lighting effects of other future offshore wind energy developments. The CHRVEA, which is relied upon and cited in the EIS (Appendix B), informs this cumulative analysis. The CHRVEA Construction Lighting section identifies where the anticipated calendar years of Project construction (and the |

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| | | | resulting installation lighting) would overlap with the construction and installation lighting of other future offshore wind energy developments. The Finding (see Section 5.1.2.1) specifically considers adverse effects from construction and installation lighting, and discusses this in context of consideration of Project alternatives considered, cross-referencing to the EIS. |
| BOEM-2022-0045-0123 | 8 | Lighting impacts from Alt. F do not appear to be fully described (DEIS, pg. 3.10-36). Due to the taller WTGs, there would be fewer total WTGs, but those WTGs would all have additional mid tower lighting. We ask BOEM to disclose this and the impacts of additional lighting assessed.<br>BOEM recognizes that the viewshed is integral to the historic setting of the properties. “BOEM defines the APE for visual impact analysis (hereafter the viewshed APE) as the geographic areas from which the offshore and onshore Project components could be seen." (DEIS, pg. 3.10-15.) BOEM doesn’t differentiate between daytime or nighttime. In other parts of the DEIS, as noted above, the impact analysis for nighttime visuals is restricted to those historic properties that are only associated with nighttime visuals or dark skies as part of their significance or setting and feel of the listed property. NPS requests BOEM use a broader approach/metric for nighttime visual analysis for all wind projects, such as "can the WTGs be seen from the cultural resources?" This is in contrast to only analyzing the cultural resources where dark skies is written in the National Register Form for the listed or eligible historic property, which as we also noted above may be rare given the National Register form age and level of detail. | Alternative F does not include taller WTGs than any of the other action alternatives for the Project. BOEM’s specifications for Alternative F would require that the alternate use of 14-MW WTGs be implemented within the same physical dimensions of the PDE as proposed for any other MW WTG for the Project, limiting maximum WTG height to 873 feet at vertical blade tip above the mean sea level. See the description of Alternative F in EIS Section 2.1.6.<br>For the delineation of the APE for potential visual effects, BOEM took into account the full potential visibility for the Project facilities, daytime or nighttime, in defining combined day and night viewshed areas for the Project within the APE, onshore and offshore (see EIS Figures 3.10-3 and 3.10-4). BOEM differentiates nighttime lighting and daytime presence of structure visibility as analyzed under separate IPFs throughout the EIS Cultural Resources and Visual Resources sections (3.10 and 3.20 respectively), as well as the onshore, offshore, and CHRVEA and the VIA, which are relied upon for viewshed analyses as cited in the EIS (see Appendix B). Lighting is specifically analyzed as an IPF for cultural resources and, as a result of this analysis, lighting was found to contribute to adverse effects on historic properties where reaching moderate to major impact levels (EIS Section 3.10). The HRVEA documentation that supported the assessment of visual effects in EIS Section 3.10, Cultural Resources, did not simply rely upon the NHL or NRHP nominations for historic properties, but further considered the historic significance and character of the historic properties in the APE in relation to their maritime settings as assessed in relation to the current Project and its potential for visual impacts. |
| BOEM-2022-0045-0123 | 13 | Need for Clarification<br>NPS found a number of specific concerns and inconsistencies we ask BOEM to correct or clarify. For instance, "From 451 viewshed resources identified within the offshore HRVEA, viewshed analyses found 101 above ground viewshed resources with the potential to be negatively affected from a moderate to major degree in the viewshed APE (EDR 2022). These moderate to major impacts would rise to a level of adverse effects under the NHPA Section 106 criteria at 36 CFR 800. These 101 viewshed resources consist of two Traditional Cultural Properties (TCPs) and 99 historic buildings, structures, or districts (including five National Historic Landmarks [NHLs]" (Pg 277 of DEIS). However, on page 292, the DEIS says: "Twelve of the NHRP-listed viewshed resources are also NHLs (EDR 2022)." We understand that pg. 277 is talking about terrestrial cultural resources and pg. 292 drills down to viewshed resources, but it is our understanding that all are within the APE. This discussion also references 3 TCPs, which would appear to total five TCPs in the APE. Please clarify these inconsistencies. | BOEM appreciates the complexity of the analysis but does not believe that any of the cited examples present inconsistencies. Within the context of the presentation of cultural resources in EIS Section 3.10, please note that 12 of the total 451 viewshed resources identified within the offshore HRVEA are NHLs. However, of the 101 aboveground viewshed resources with the potential to be negatively affected from a moderate to major degree in the viewshed APE, only five are NHLs. Within these counts, there are five TCPs in the viewshed APE, and only two of these TCPs would have the potential to be negatively affected from a moderate to major degree in the viewshed APE. EIS Section 3.10 identifies viewshed resources, terrestrial resources, and marine resources in separate subsections due to the differing potential for Project effects on these resource types, and identifies them in different situations within the APE, situating them in the viewshed APE, the terrestrial APE, or the marine APE subareas. |
| BOEM-2022-0045-0124 | 1 | Terrestrial Archaeological Resources Assessment and Site Identification Survey – Revolution Wind Farm Project – Onshore Facilities<br>The Phase I archaeological survey conducted by PAL in North Kingstown in the project area for the interconnection to the exiting electrical system identified the Mill Creek Swamp #1, Mill Creek Swamp #2, and Quonset Substation sites and QDC Find Spot on Quonset Development Corporation and The Narragansett Electric Company properties. We concur with PAL’s recommendation that the Mill Creek Swamp #1 and Mill Creek Swamp #2 sites are eligible for listing in the National Register of Historic Places (National Register). We further concur that the Quonset Substation site, a low-density lithic scatter, and the QDC Find Spot, an isolated quartz flake, are not eligible for listing in the National Register. We recommend that Mill Creek Swamp #1 and Mill Creek Swamp #2 sites be avoided through redesign of the project. If this is not possible, an archaeological mitigation plan, developed in consultation with the Narragansett Tribal Historic Preservation Officer, will be necessary to address adverse effects to these sites. | The TARA indicates, preliminarily, the Project’s potential for effect on cultural resources, including historic properties, as defined under the regulations for Section 106 of the NHPA at 36 CFR 800. BOEM has produced the Finding for BOEM's determination of adverse effects pursuant to the regulations. BOEM, applying the criteria of adverse effect from 36 CFR 800.5 et seq., determined that the Project would adversely affect the Mill Creek Swamp # 1 and #2 sites where Project actions are unable to avoid them. BOEM remains in consultation with consulting parties on identified historic properties, the assessment of effects, and in planning for the resolution of adverse effects. To minimize unavoidable adverse effects to these two historic properties, BOEM would limit the Project disturbance at these properties to the extent feasible. BOEM would mitigate remaining adverse effects under the Project MOA and has released a revised draft of this MOA, including the draft |

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| | | | HPTP for mitigation of these two historic properties, for consulting party comment. BOEM is engaged in government-to-government consultation with tribes on the Project, in particular if they have any comments or concerns regarding these historic properties. |
| BOEM-2022-0045-0124 | 2 | Memorandum: Revolution Wind Project – Updates to Historic Resources Visual Effects Analysis (HRVEA)<br>The Memorandum summarizes responses to RIHPHC comments transmitted by letter dated 27 April 2022. Of the issues that we raised which are covered in the Memorandum, one is not addressed fully. We again request information on how Revolution Wind determined the significant maritime setting for properties that have been determined eligible for National Register of Historic Places (NRHP) listing by the RIHPHC, but which are not listed. In most cases, the contextual information about these properties is not in print or is minimal, at best. | In the revised offshore HRVEA, BOEM made available additional detail on how the significant maritime setting was assessed for historic properties, as BOEM had stated in response to the prior RIHPHC comments on the HRVEA. The revised HRVEA and BOEM's response to prior comments were distributed to NHPA Section 106 consulting parties on August 1, 2022. As BOEM stated, further information was provided in the HRVEA, beyond Revolution Wind's supplemental memorandum, that summarized further how Revolution Wind addressed RIHPHC and other consulting party comments in revising the HRVEA.<br>Within the revised offshore HRVEA, distributed by BOEM to NHPA Section 106 consulting parties on August 1, 2022, the authors substantially expanded various sections describing the contexts within which significance and integrity of historic properties were considered. In particular, the description of the siting of historic properties in the APE, including the summary of the attributes important to a range of historic properties, was substantially expanded in HRVEA Section 3, which discusses the historic properties within the study area for potential visual effects. The HRVEA documentation that supported the assessment of visual effects did not simply rely upon the NHL or NRHP nominations for historic properties, but further considered the historic significance and character of the historic properties in the APE in relation to their maritime settings as assessed in relation to the current Project and its potential for visual impacts. Revised HRVEA Section 4, Visual Effects Analysis, provides a more extensive review of the characteristics contributing to historic significance for each of the identified aboveground historic properties. The HRVEA assesses whether or not the property has a significant maritime setting. Once this was determined, the HRVEA provides concise description of the contexts within which the range of aboveground historic properties in the APE were considered to have both significance and integrity of maritime setting. In response to RIHPHC and consulting party comments, the HRVEA Appendix A was correspondingly revised to reflect the consideration of the maritime setting and other contextual details of each historic property identified in the APE for potential visual effects from offshore Project facilities. The EIS reflects these matters where BOEM applied the information in the revised offshore HRVEA to inform its analysis of aboveground historic properties and NHLs in EIS Section 3.10 and in the Finding in EIS Appendix J. |
| BOEM-2022-0045-0124 | 3 | National Historic Landmarks Supplemental Documentation<br>The new simulations that were provided in the National Historic Landmarks (NHL) Supplemental Documentation are very helpful in assessing the effects for these nationally significant properties. While we are in agreement with Revolution Wind and BOEM regarding the affects to these properties, for future projects, we reiterate from our 27 April letter that in NHL Districts including a sizable area, multiple simulations should be included and sunrise, sunset, and night simulations should be included for NHLs, if not for all of the key observation points. | BOEM reiterates that the visualizations prepared for the Project VIA, HRVEA, CHRVEA, and NHL supplementation documentation present a broad range of lighting and atmospheric conditions appropriate to assess the potential visual effects to historic properties located in the APE. BOEM finds the documentation acceptable and sufficient to enable any reviewing parties to understand the basis of BOEM's determinations and findings on the undertaking under NHPA Section 106 (per 36 CFR 800.11(a)).<br>The HRVEA and supporting VIA visualizations are not found by BOEM to underrepresent the size or number of WTGs. Numerous visualizations are provided in the VIA, HRVEA, and CHRVEA for a range of high-contrast conditions from various KOPs. It is neither feasible nor required to simulate all potential viewing conditions for BOEM to determine whether individual historic properties would be adversely affected and to accurately characterize the nature of any such adverse effects. The visualizations presented in the HRVEA include five KOPs in the City of Newport and a sixth on Sachuest Point. The KOPs were selected to provide a range of vantages and elevations (e.g., bluffs, coastlines, landscape features) with unobstructed views toward the Project and, therefore, represent views with the greatest scope of change from existing conditions. The visualizations presented in the |

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| | | | HRVEA were created methodically to accurately characterize views of the Project from representative viewpoints throughout the APE. Consistent with BOEM's guidance and extensive analyses of visual effects conducted over the previous decade on offshore wind facilities, the VIA and HRVEA contain extensive field photography and visualizations to accurately depict how the Project would appear from vantages throughout the APE. The Project visualizations have been prepared by qualified consultants, and reviewed by BOEM's visual and Section 106 subject matter experts, to best support robust and accurate characterization of Project visibility. BOEM is uniquely experienced in preparing and evaluating visual studies for offshore wind facilities, and has consistently moved to incorporate best practices from ongoing research. BOEM's guidance and requirements are applied sufficiently in the HRVEA, CHRVEA, and VIA for the Project. BOEM's review and consultation on the Project remain ongoing, and BOEM welcomes continued input that will improve its NHPA Section 106 and other regulatory reviews and consultation. Please note that simulations and visualizations are only one supporting aspect of BOEM's analyses for adverse effects to historic properties, including NHLs and TCPs important to Tribal Nations, and not the entire basis of the assessment of effects. The VIA and HRVEAs for the Project provides detail on the fuller contexts of the visual impacts analyses.<br>The VIA, HRVEA, and CHRVEA specifically provide Project simulations from and directly at NHL viewpoints at Newport Cliff Walk and Block Island Southeast Lighthouse and from TCP viewpoints at Massachusetts offshore islands. The NHL supplemental documentation adds visual simulations and information for all 12 NHL locations in the APE.<br>In response to comments, BOEM directed Revolution Wind to produce further simulations that include some cumulative views. The new simulations have multiple updates to the views from Aquinnah Overlook, Aquinnah, Massachusetts including the following:<br>• "Cones of view" to help orient the viewer<br>• South Fork Wind Farm with and without Revolution Wind<br>• Bay State Wind Farm with and without Revolution Wind<br>• Vineyard Wind 1 with and without Revolution Wind<br>• Nighttime views with FAA lighting<br>The photo simulations can be found at BOEM's Project website, here:<br>https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Panorama Simulations Booklet_MV07_Combined_508.pdf |
| BOEM-2022-0045-0124 | 4 | Cumulative Historic Resources Visual Effects Analysis – Revolution Wind Farm and Revolution Wind Export Cable Project<br>One specific issue that we have with the Cumulative Historic Resources Visual Effects Analysis (CHRVEA) is the application of the criteria of adverse effect to only the 101 historic properties that are determined to be adversely affected by the Revolution Wind project. We understand that "the CHRVEA assesses the Project's [emphasis added] offshore elements' cumulative visual effects… on historic properties when combined with past, present, and reasonably foreseeable offshore wind energy development activities in the APE for the project" (CHRVEA page ii). However, the point at which the Revolution Wind WTGs are added into the array (the second hundred turbines or the eighth hundred turbines, for example), would be relevant in considering an adverse cumulative effect threshold. This would be relevant not only to the historic properties identified in the Revolution Wind APE, but also in other projects' APEs where the effect may have been minimal until that cumulative effect threshold is reached. Additionally, while there is no difference in the regulations of Section 106 between a slight adverse effect and a major adverse effect, the degree of adversity does impact how much mitigation is appropriate or whether an adverse effect is even acceptable with mitigation.<br>The CHRVEA also does not include photographic simulations from enough points, and should include sunrise, sunset, and night views, as well. | In the CHRVEA and BOEM's Finding (in EIS Appendix J), BOEM applies the criteria of adverse effect (at 36 CFR 800.5) in considering cumulative effects to all historic properties identified in the APE. BOEM has determined that cumulative visual effects could occur at the 451 aboveground historic properties identified in the APE from visual impacts from offshore Project facilities. However, BOEM has determined that only when the Project has visual effects that would be adverse would the Project incrementally contribute to cumulative adverse effects. Visual adverse effects from the Project, and consequently cumulative adverse effects, were determined at 101 aboveground historic properties. To reiterate, BOEM has determined with its Finding that where adverse visual effects would result from the Project at historic properties, cumulative visual adverse effects would also result from the Project. The CHRVEA further details the basis of this determination. Where the Project would result in no effect or in no visual adverse effects to historic properties, the Project would not incrementally contribute to the adverse visual effects of other future offshore wind energy developments. This result for this Project would still occur despite whether other offshore wind energy development(s) at these historic properties were determined to have an adverse effect or not. In accordance with the regulations for the NHPA Section 106 Process (36 CFR Part 800), the threshold remains whether the Project would result in no effect, no adverse effect, or adverse effect, regardless of whether the |

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| | | | effect is direct, indirect, or cumulative. BOEM defined the APE to consider the direct, indirect, and cumulative effects of the Project. Areas where other future offshore wind energy developments could result in direct, indirect, and cumulative effects on historic properties beyond the APE for the current Project would be a matter for consideration for those other developments and are outside of the scope of the current undertaking. As other offshore wind energy developments are constructed in the Project APE and add to the cumulative effects, the proportion of the visual impacts from the Project may become less in comparison to the cumulative effects of overall offshore development as described in the EIS (Section 3.10) and CHRVEA; however, any effect introduced by the Project would remain its own and would rise to the level of adverse effect as BOEM has determined at 101 historic properties. Analysis of the No Action Alternative serves in part to suggest where effects would be likely or ongoing without the Project, including for cultural resources in EIS Section 3.10.<br>In its cumulative analyses, BOEM has included review of the maximum potential build out of the full lease areas as indicated at CHRVEA Figure 5 and in the insets on the simulation figures in CHRVEA Appendix C. The number of turbines visible from each of the adversely affected historic properties are specified in the CHRVEA analysis and the simulations across the full set of wind energy lease areas offshore Rhode Island and Massachusetts. The CHRVEA analysis informs the EIS cumulative effects analysis for cultural resources in EIS Section 3.10. Additional cumulative visual simulations of future offshore wind developments are available at the Visual Simulations tab on BOEM's website for the Project at https://www.boem.gov/renewable-energy/state-activities/revolution-wind. Cumulative simulations for each Project alternative analyzed in the EIS are also available there. The cumulative simulations include WTG simulations from the Project as well as reasonably foreseeable future wind energy developments.<br>In response to comments, BOEM directed Revolution Wind to produce further simulations that include some cumulative views. The new simulations have multiple updates to the views from Aquinnah Overlook, Aquinnah, Massachusetts including the following:<br>• "Cones of view" to help orient the viewer<br>• South Fork Wind Farm with and without Revolution Wind<br>• Bay State Wind Farm with and without Revolution Wind<br>• Vineyard Wind 1 with and without Revolution Wind<br>• Nighttime views with FAA lighting<br>The photo simulations can be found at BOEM's Project website, here: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Panorama Simulations Booklet_MV07_Combined_508.pdf<br>The CHRVEA and other technical reports may indicate, preliminarily, the Project potential for effect on cultural resources, including historic properties as defined under the regulation guiding Section 106 of the NHPA at 36 CFR 800. However, BOEM has produced the Finding (see EIS Appendix J) to provide BOEM's determination of adverse effects pursuant to the undertaking and for consultation under NHPA Section 106. |
| BOEM-2022-0045-0124 | 5 | Draft Memorandum of Agreement Among the Bureau of Ocean Energy Management, the State Historic Preservation Officers of Connecticut, Massachusetts, New York, and Rhode Island, and the Advisory Council on Historic Preservation Regarding the Revolution Wind Farm and Revolution Wind Export Cable Project [Draft Memorandum of Agreement]<br>Our concerns about the Draft Memorandum of Agreement… (MOA) are related to the mitigation measures spelled out in detail in the various Draft Historic Property Treatment Plans (HPTPs) attached to the MOA. Some of the mitigation measures appear to be unnecessary or low priorities, and we have suggestions for other measures that may be pursued in addition to or replacement of those proposed in the MOA. Our comments are presented by HPTP (in attachment numerical order) below.<br><br>Attachment 17: The Kay Street – Catherine Street – Old Beach Road Historic District/The Hill; The Ochre Point-Cliffs Historic | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |

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| | | District; The Ocean Drive Historic District, National Historic Landmark - Newport<br>· Section 2.2.2: 10 properties are listed as being subject to RIHPHC-held historic preservation easements. The RIHPHC currently holds easements on 27 properties in Newport. It is unclear if this list of 10 includes only properties that are within the Revolution Wind project APE.<br>· Section 3.3: The Kay Street-Catherine Street-Old Beach Road Historic District NRHP nomination was updated and accepted by the National Park Service in March 2018. The report should reference this revision, not the original 1973 nomination.<br>· Section 4.1: We are aware that the city is working on guidelines for climate change scenarios and would like to know if Revolution Wind has consulted with the city to ask if this proposed mitigation measure is needed.<br>· Section 4.2: This section states that, "This HPTP proposes the completion of plans to improve overall stormwater drainage for the historic districts…" What is the current status of this effort?<br>· Additional suggestions reflecting preservation needs directly related to these properties include:<br>o Updating the Ochre Point-Cliffs Historic District National Register nomination (written in 1975)<br>o Updating the Ocean Drive Historic District National Register nomination: though rewritten in 2008, that information was not accepted by the National Park Service. The 2008 nomination needs to be updated, new photographs need to be taken, and the information needs to be submitted to the NPS. | |
| BOEM-2022-0045-0124 | 6 | [Draft Memorandum of Agreement]<br>Attachment 18: The Bellevue Avenue Historic District; Rosecliff; The Breakers; The Marble House - Newport<br>· Section 4.1: The Cliff Walk is already within the bounds of the Ochre Point-Cliffs Historic District. It does not need to be individually listed in the National Register. An update to the Historic District nomination, as suggested above, would include information about the Cliff Walk.<br>· Section 4.2: We understand that an effort is underway to prepare a management plan for the Cliff Walk. How does the proposed resiliency plan fit with the management plan? We are concerned about a duplication of effort, or worse, conflicting documents. Section 1 states that Revolution wind will "provide funding to support" the initiative to prepare a resiliency plan, and section 7 says that Revolution Wind will submit a Final Revised Resiliency Plan. Does Revolution Wind intend to provide support for the project or fund<br>it in its entirety?<br>· Section 4.4: Has the City identified a need for an Invasive Species Management Plan?<br>o Section 1 states that it would be for "the historic properties of the City" – is that city-owned properties, or properties in the city?<br>· These proposed measures are all related to the Cliff Walk, and not to any of the other properties included in this HPTP. The Bellevue Avenue Historic District National Historic Landmark nomination was written in 1976. We suggest preparing an update to this nomination as it would be helpful to RIHPHC and other agencies in future evaluations of historic resources. | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 7 | [Draft Memorandum of Agreement]<br>Attachment 19: Horsehead/Marbella - Jamestown<br>· Has the owner(s) of the historic property been contacted to inquire if they are interested in or will allow the Historic American Buildings Survey documentation to be prepared? | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 8 | [Draft Memorandum of Agreement]<br>Attachment 20: The Abbott Phillips House; The Stone House Inn; The Warren's Point Historic District; Tunipus Goosewing Farm – Little Compton<br>· Section 4.1: Has the town expressed an interest in a Climate Adaptation and Sustainability Plan for Historic Properties?<br>· Section 4.2: Has the town expressed an interest in an Interpretive Exhibit at Goosewing Beach, and specifically in one about climate change?<br>· While these proposed mitigation measures encompass multiple historic properties, they are not specific to any of the properties that will be impacted by the project. We suggest the preparation of Determination of Eligibility/National Register documentation for the | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |

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| | | Abbott Phillips House, Warren's Point Historic District, and Tunipus Goosewing Farm as additional mitigation measures that may aid in the evaluation of these properties for future projects. | |
| BOEM-2022-0045-0124 | 9 | [Draft Memorandum of Agreement]<br>Attachment 21: Nine Historic Properties [Bailey Farm; Clambake Club; Paradise Rocks Historic District; Sea View Villa; St. George's School; Indian Avenue Historic District; Whetstone; Land Trust Cottages; The Bluff] – Middletown<br>· Section 4.1: The scope of work includes "Develop an updated historic property inventory, if required." What would trigger the requirement to perform this survey? The RIHPHC's Historic and Architectural Resources of Middletown, Rhode Island: A Preliminary<br>Report was released in 1979. Thus, the last complete survey of historic resources in the town was conducted over 40 years ago. An updated inventory should be completed if this proposed plan is to be comprehensive and successful.<br>· While the proposed mitigation measures encompass multiple historic properties, they are not specific to any of the properties that will be impacted by the project. We suggest the preparation of Determination of Eligibility/National Register documentation for the<br>Paradise Rocks Historic District, Sea View Villa, Whetstone, and the Land Trust Cottages as additional mitigation measures that may aid in the evaluation of these properties for future projects. | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 10 | [Draft Memorandum of Agreement]<br>Attachment 22: Puncatest Neck Historic District – Tiverton<br>· In the MOA, section xvi, the name of this HPTP is incorrect.<br>· The proposed mitigation measure is not specific to the property that will be impacted by the project. We suggest the preparation of a Determination of Eligibility/National Register documentation for the Puncatest Neck Historic District as an additional mitigation measure that may aid in the evaluation of this resource for future projects. | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 11 | [Draft Memorandum of Agreement]<br>Attachment 23: Eight Historic Properties [Dunmere; Ocean Road Historic District; Towers Historic District; the Towers; Life Saving Station at Narragansett Pier; Fort Varnum/Camp Varnum; Narragansett Pier MRA; Dunes Club] – Narragansett<br>· Section 4.1: While the Ocean Road seawall does protect historic properties, the proposed mitigation would provide funding only for a plan for its preservation. It seems that other sources of funds, specifically from state and federal emergency management sources, could be utilized for this project, freeing up Revolution Wind mitigation funds for other projects.<br>· Section 4.2: A National Register nomination for Camp Varnum is not needed. The installation has recently been the subject of a thorough documentation.<br>· Are there other preservation projects that are needed in Narragansett? The Narragansett survey report is over 30 years old. Perhaps updated survey work? | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 12 | [Draft Memorandum of Agreement]<br>Attachment 24: Block Island South East Lighthouse – New Shoreham<br>· Section 4.1: The determining factor as to whether or not this proposed mitigation is adequate is the amount of funding, which is yet to be established. | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 13 | [Draft Memorandum of Agreement]<br>Attachment 25: Thirty-one Historic Properties – New Shoreham<br>· Section 4.1: Has the town expressed a need or desire for a coastal resiliency plan? The determining factor as to whether or not this proposed mitigation is adequate is the amount of funding, which is yet to be established.<br>· Section 4.2: We question whether a town/island-wide National Register nomination is feasible.<br>o If the town/island were eligible as a whole, it should be treated as such in this project. This leads us to believe that the project's cultural resources consultant does not believe it is eligible. We know that many buildings on the island are not | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party |

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| | | historic, but we are not aware of the ratio of historic to non-historic buildings. A first step in assessing this would be to compile dates from the assessor's data.<br>o A majority of property owners in the town/island would have to consent to National Register listing. Is there any sense of whether this is likely?<br>o An extensive study of the island was conducted for the formerly-named Deepwater Wind project. Presumably, the information from that study is sufficient for Section 106 assessments in the near future.<br>· The Old Harbor Historic District National Register nomination needs to be updated. If this project is not being undertaken as mitigation for the South Fork Wind project, it should be for this project.<br>· Ten historic districts have been identified as eligible for listing in the National Register. Preparing nominations for these districts is a natural next step that could be utilized as mitigation. However, as the Deepwater Wind survey work was extensive and recent, this<br>may not be the best use of funds.<br>· As there are so many historic resources in the small town of New Shoreham that will be adversely affected by the project, the establishment of a community preservation fund appears to be a fitting mitigation measure for the town. We urge the parties to seriously consider this option in lieu of more survey and documentation work – with the exception of the Old Harbor Historic District update. | (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 14 | [Draft Memorandum of Agreement]<br>Attachment 26: The Browning's Beach Historic District – South Kingstown<br>· Section 4.1: Rather than a context study for the town's summer cottage/resort development, more useful mitigation products would be updated historic surveys of the Green Hill and Matunuck areas to determine if there are National Register-eligible historic districts in either or both locations. | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 15 | [Draft Memorandum of Agreement]<br>Attachment 27: Eight Historic Lighthouses [including Sakonnet Light Station; Block Island North Light; Point Judith Light; Beavertail Light in Rhode Island] – Massachusetts and Rhode Island<br>· Section 4.1: It is impossible to determine whether or not this proposed mitigation is needed or adequate without knowing more information about what will be provided for each property. | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 16 | [Draft Memorandum of Agreement]<br>The Historic Context for Summer Cottage/Resort Development mitigation measure is proposed in Attachments 20 (Little Compton), 21 (Middletown), 22 (Tiverton), 23 (Narragansett), and 26 (South Kingstown). Information about this topic is included in each of the towns' RIHPHC survey reports and in some National Register nominations. This is, therefore, not a high-priority need for most of the towns.<br>In all of these HPTPs, it is difficult to evaluate the appropriateness of the proposed mitigation measures without funding values attached to each. There are always more preservation projects to be done, and it would aid greatly in determining whether we want to request additional measures if we knew what the individual measures' values are. | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 17 | [Draft Memorandum of Agreement]<br>The mitigation measures proposed in the MOA/HPTPs and in our above recommendations are primarily focused on properties that are directly impacted by the project, which is, of course, desirable. However, as we stated in our 27 April letter, since Rhode Island does not have a complete inventory of historic resources and the Revolution Wind team has not attempted to conduct exhaustive ground surveys of the APE, the question as to whether or not all of the historic properties in the APE have been identified remains open. Two gaps exist in the RIHPHC records that could be addressed as mitigation measures: updated surveys and GIS work.<br>· Historic property surveys were mostly completed in the 1970s and 1980s. Since that time, more properties have become | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA's HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |

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| | | eligible for survey, and some that were surveyed have no doubt been adversely altered. We would request that targeted survey work be conducted, based on potentially affected areas, though we would not object to wholesale town-wide surveys.<br>· The RIHPHC has a set of GIS data points that represents the vast majority of properties that are listed in the National and State Registers of Historic Places. However, quality control of that data has not been completed, and is at a standstill due to staffing issues.<br>The RIHPHC would request that a consultant be hired to complete the quality control check and to publish the data on the RIHPHC website and format it for outside users.<br>Both of these projects would enable a more complete and accurate assessment of effects for future projects, including offshore wind facilities. They would be beneficial to towns, state and federal agencies, property owners, project consultants, and the RIHPHC. | |
| BOEM-2022-0045-0124 | 18 | [Draft Memorandum of Agreement]<br>Attachment 28: Unanticipated Discoveries - Onshore<br>In the “list of contacts” section, remove Timothy Ives and correct “Jeffry” to “Jeffrey”. | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA’s HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 19 | [Draft Memorandum of Agreement]<br>Attachment 29: Unanticipated Discoveries – Submerged<br>Please add the document entitled “Rules and Regulations Pertaining to Registration and Protection of Historic Cemeteries” to the attachment, for guidance if human remains are encountered in Rhode Island waters. | BOEM thanks RIHPHC for the detailed mitigation proposals and will continue consulting with RIHPHC and the consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties. Consultation on the MOA, which would be implemented to resolve adverse effects to historic properties, is ongoing. A revised MOA (including revisions to the MOA’s HPTP attachments) with all revisions made by BOEM in response to consulting party (including RIHPHC) or public comments will be provided by BOEM in Appendix J of the Final EIS. |
| BOEM-2022-0045-0124 | 20 | Revolution Wind Farm and Revolution Wind Export Cable Project Draft Environmental Impact Statement [RWF DEIS]<br>The Draft Environmental Impact Statement (DEIS) is based on, and repeats, the conclusions of the above-identified reports. We have addressed most of the particulars of those reports in our 27 April letter and in this letter, so we will not restate those issues here. However, there is one issue of note that is worthy of restating: the sheer number of adverse effects to historic resources that revolution Wind, BOEM, and the RIHPHC agree will occur as the result of this project.<br>Overall, 67 properties in Rhode Island are identified in the HRVEA and the DEIS as potentially having adverse visual effects caused by the construction of the Revolution Wind project. While this number is alarming in its own right, there are constituent numbers that are also significant:<br>· Five National Historic Landmarks are identified as potentially having adverse effects<br>o Of these, two are historic districts, which together contain over 510 individual, contributing resources<br>· 24 properties that are listed in the National Register of Historic Places are identified as potentially having adverse effects<br>o Of these, six are historic districts, which together contain just under 800 individual, contributing resources.<br>The Revolution Wind team has explained that counting each historic district as one property is a conservative approach. We think of it in the opposite: while we recognize that not every property in every district will be adversely impacted, it is likely that more than one in each district will be. It is also worth noting that properties in districts are often overlooked for individual National Register listing consideration because they are already listed, so there are likely more individually eligible properties in the APE than are accounted for. When considering these more comprehensive approaches and totals, the impact of the proposed project on historic properties<br>becomes significantly more alarming. | BOEM directed that the offshore HRVEA be revised following RIHPHC’s April 27, 2022, comments on the document, including to further discuss the consideration of historic properties consisting of historic districts, as indicated in BOEM’s response to comments provided to NHPA Section 106 consulting parties on August 1, 2022. BOEM also made the revised offshore HRVEA available to RIHPHC and other consulting parties on August 1, 2022. That revised HRVEA provides further historic district descriptions in illustration of historic property types, which provide known counts of historic properties in the identified historic districts. HRVEA Appendix A tables add each district size and percent of each district area intersected by the Project APE.<br>By nature, alternatives and efforts to minimize effects will reduce but not eliminate adverse effects. BOEM will continue consulting with RIHPHC and consulting parties and to involve the public and property owners on the avoidance, minimization, and mitigation of adverse effects to NHLs and other historic properties, including historic districts. This includes considering all measures proposed in consultation on the MOA.<br>BOEM acknowledges RIHPHC’s preference for Alternative E.<br>Please also note, Alternative F was carried forward in response to cooperating agency and stakeholder requests for evaluation of WTGs capable of greater than 12-MW capacity. This alternative, however, has been bounded as not to exceed the physical parameters or footprint of the structures as described in the PDE and thus does not propose larger structures. Therefore, in terms of assessing impacts, Alternative F does not consider WTGs that fall outside the bounds of the maximum impacts that could occur from the range of parameters in the COP.<br>In the Final EIS, BOEM has further identified and analyzed its preferred alternative, |

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| | | | designated Alternative G.<br>Alternative G: Habitat and Viewshed Minimization Hybrid Alternative (Preferred Alternative)<br>Alternative G (Habitat and Viewshed Minimization Hybrid Alternative), hereafter referred to as the Preferred Alternative, would comprise the construction and installation, O&M, and eventual decommissioning of a wind energy facility including 65 WTGs ranging from a nameplate capacity of 8 to 12 MW and located within 79 WTG positions. The Preferred Alternative allows for the fulfillment of the existing power purchase agreements (total of 704 MW) while eliminating certain WTG locations to reduce impacts to important viewsheds and complex benthic habitats. The Preferred Alternative consists of 21 fewer WTG positions and 35 fewer installed WTGs than the Proposed Action, and maintains a uniform east–west and north–south grid of 1 × 1–nm spacing between WTGs. All applicable EPMs, including micrositing of foundations and cables, would apply as described in the COP.<br>Two of the 65 WTGs have the flexibility to be located in three different spots within the 79 WTG positions. As a result, this alternative includes the analysis of three layouts for installation of the 65 WTGs. This flexibility in design could allow for further refinement for visual resources impact reduction on Martha's Vineyard and Rhode Island, or for habitat impact reduction in the NMFS's Priority 1 area. Additionally, 14 of the 79 WTG positions are "spares" and would only be constructed on a case-by-case basis to accommodate unforeseen siting conditions that render any of the 65 WTG installations impractical in terms of technical feasibility or due to environmental impact or safety concerns (i.e., one of the 65 WTGs could be installed in a "spare" location). |
| BOEM-2022-0045-0124 | 21 | [RWF DEIS]<br>According to the Revolution Wind reports, all possible minimization measures (such as spacing, paint color, and minimized lighting) have been built into the design of the project. Still, the adverse effects remain. Mitigation measures suggested in the MOA and HPTPs will not mitigate views of the WTGs. They will only provide alternative mitigation, sometimes at the properties that will be adversely affected, and sometimes on other historic properties. One has to ask the question: at what point does the number of adverse effects that the project will have on historic resources reach a threshold that is too much to sacrifice to have the project go forward? | |
| BOEM-2022-0045-0124 | 22 | [RWF DEIS]<br>BOEM has included in the DEIS alternative WTG layouts within the lease area that would further minimize the impacts of the project and meet the its power purchase agreements while decreasing the number of WTGs that are constructed. In addition to the "No Action Alternative", eight other alternatives to the proposed project are explored in the DEIS.<br>Alternatives C1 and C2, known as the "Habitat Impact Minimization Alternatives," both decrease the number of WTGs in the lease area. However, the particular WTGs that are proposed to be removed are located in the southern half of the lease area, and would not decrease the proximity of the project to the Rhode Island historic properties. The removal of these WTGs may decrease the visual clutter of the project, but any decrease in the adverse effect would be minimal. | |
| BOEM-2022-0045-0124 | 23 | [RWF DEIS]<br>The "No Surface Occupancy in One or More Outermost Portions of the Project Area Alternative" consists of Alternatives D1, D2, and D3, which could be combined in whole or in part to reduce the total number of WTGs by up to 22. Alternatives D1 and D2 propose removing WTGs that are located on the extreme southern and eastern edges, respectively, of the lease area. While this would reduce the number of WTGs, the effect on the adversely-affected historic properties would be minimal to nil because the reduction would likely be imperceptible due to the remaining number of turbines, all of which are closer to the properties than the removal sites. Alternative D3 proposes to remove up to seven WTGs along the outermost northwest edge of the lease area. This is the row of WTGs that are closest to mainland Rhode Island and some of the closest ones to Block Island, so some visibility would be reduced under this alternative.<br>However, the removal of up to seven WTGs would be a minimal impact reduction with the balance of the up to 100 WTGs still | |

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| | | present. Combining Alternatives D1, D2, and D3 would result in a very minimal impact reduction over Alternative D3 alone, due to the D1 and D2 removals coming on the far side of the lease area from the Rhode Island historic properties. | |
| BOEM-2022-0045-0124 | 24 | [RWF DEIS]<br>Of the proposed alternatives, Alternatives E1 and E2, known as the "Viewshed Alternative," would result in the greatest reduction in impacts to the historic resources in Rhode Island. Under Alternative E1, up to 64 WTGs would be approved, but the WTGs would have to be 12MW models, the largest that are within the design envelope for this project. The reduction would take place along the northern and eastern parts of the lease area. As proposed (DEIS figure 2.1-17, page 2-52), this reduction would primarily reduce visibility from Massachusetts, East Bay Rhode Island, and Aquidneck Island historic properties and traditional cultural places, though it could extend to the southeastern corner of mainland Rhode Island, as well. The impact reduction to Block Island would be minimal due to the 18 WTGs closest to the island remaining. Alternative E2 would remove the row of WTGs along the outside northwest edge of the lease area and WTGs behind that row (DEIS figure 2.1-18, page 2-53). This appears that it would have a minimal reduction of impact to Massachusetts historic properties and TCPs, but the reduction of impacts to East Bay Rhode Island, Aquidneck Island, and southeastern mainland Rhode Island historic properties would be greater than under any of the other alternatives. | |
| BOEM-2022-0045-0124 | 25 | [RWF DEIS]<br>Alternative F, known as the "Selection of a Higher Capacity Wind Turbine Generator Alternative," would require utilizing WTGs of up to 14 MW capacity, however, the WTGs must fall within the parameters of the project design envelope. BOEM has not identified any WTGs that fit these parameters. Thus, as we understand, this alternative is not an option. | |
| BOEM-2022-0045-0124 | 26 | [RWF DEIS]<br>Of the proposed alternatives, Alternative E2 would provide the greatest reduction in visual impacts to the Rhode Island properties that will be adversely affected by the project. It will not eliminate the adverse effects to any of the historic resources. The RIHPHC is in favor of any Alternative that reduces the number of WTGs in the lease area, but Alternative E2 is our preference. | |
| BOEM-2022-0045-0124 | 27 | All of the reports reviewed by the RIHPHC and discussed above reach the same conclusion, that the Revolution Wind project will have effects on the environment, including adverse effects on significant prehistoric and historic resources. The State of Rhode Island has enacted policies that are supportive of renewable energy and the RIHPHC and historic preservation, in general, are not in inherent conflict with renewable energy goals and the means to meet them. However, other environmental factors, including historic resources, must be fully considered in evaluating whether or not these projects are prudent. We look forward to continued consultation on this important project. | |

## Demographics, Employment, and Economics

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| BOEM-2022-0045-0075 | 1 | Equitable Economic Development & Job Creation<br>BOEM should choose a project alternative that allows for the project to meet the conditions of the project's three Power Purchase Agreements (PPAs), while producing the greatest economic benefit and protecting critical habitat, wildlife, and the environment.<br>Robust socioeconomic analysis is critical to achieve the maximum economic benefits from offshore wind projects. The FEIS should detail, to the greatest extent possible, all anticipated job-creation involving port utilization and development, supply chain and manufacturing of offshore wind components, construction, operations and maintenance, and decommissioning. In addition to salary, information should include health and safety, certifications, training pathways, recruitment and retention plans, project labor agreements and union neutrality commitments if applicable, and commitments and requirements for targeted hire of disadvantaged and underrepresented communities. While some of the details may not be available, the FEIS should reference agreements that are in place, such as the National Offshore Wind Agreement (NOWA) between Ørsted and North America's Building Trades Unions (NABTU) covering all of Ørsted's contractors and subcontractors for construction of the company's offshore wind projects. In addition, the FEIS should update background information regarding state commitments, including Rhode Island's recently passed legislation "Labor Standards in Renewable Energy Projects," which would extend to this project. 8 BOEM should also identify where information is unavailable or incomplete and why. | A reference to Revolution Wind's Project Labor Agreements and its committed funds to train Rhode Island workers for jobs related to Project construction has been added to Section 3.11 Demographics, Employment, and Economics. See subsection 3.11.2.3.1. |
| BOEM-2022-0045-0060 | 1 | Commenters support the responsible development of offshore wind that incorporates robust environmental mitigation and ensures<br>family-sustaining jobs. The environmental impact statement (EIS) should assess the potential biological, socioeconomic, physical, and cultural impacts that could result from the construction, operations and maintenance, and decommissioning of the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) ("the project"). In particular, we ask that BOEM include a more detailed assessment of the socioeconomic impacts of the project in the final EIS, including impacts on the workforce and environmental justice.<br>Connecticut recognized the importance of the quality, not just quantity, of jobs created in the offshore wind sector when it passed legislation in 2019 requiring offshore wind projects procured by the Connecticut Department of Energy and Environmental Protection (CT DEEP) to pay prevailing wages, negotiate project labor agreements, and explore opportunities for workforce development partnerships. Since the Revolution Wind project was selected in a solicitation that preceded Connecticut Public Act 19-71, An Act Concerning the Procurement of Energy Derived from Offshore Wind Facilities, there is no statutory obligation to develop a project labor agreement or to pay prevailing wages. P.A. 19-71 (Reg. Sess.) However, in its successful Revolution Wind proposal in response to the Request for Proposals from Private Developers for Clean Energy issued by CT DEEP in 2018, which required bidders to "describe the project's use of skilled labor and apprenticeship programs," Deepwater Wind (acquired by Ørsted in 2018) made commitments to Connecticut related to labor, workforce development, and economic development. As these commitments likely contributed to the project's selection by CT DEEP, we expect they will be honored by Ørsted. | A reference to Revolution Wind's Project Labor Agreements and its committed funds to train Rhode Island workers for jobs related to Project construction has been added to Section 3.11 Demographics, Employment, and Economics. See subsection 3.11.2.3.1. |
| BOEM-2022-0045-0099 | 1 | The Gay Head Light has been a beacon to mariners for over 200 years. Sitting atop of the colorful Gay Head Cliffs it has also attracted visitors for just as long. This historic lighthouse and the sweeping Atlantic views attract thousands of tourists to the small Town of Aquinnah during the summer months. The income that this generates for the Town and the many shops and restaurants on the Cliffs Is vital to the economy of Aquinnah. | Thank you for your comment. The Gay Head Cliffs and the Gay Head Lighthouse are evaluated as part of the cultural resources viewshed resources in Chapter 3.10 of the EIS. Impacts to recreation and tourism are discussed in Chapter 3.18. |
| BOEM-2022-0045-0116 | 1 | I will say that the registration was a little confusing. I thought I was just registering to be here. So -- but I guess my comments or questions would be, you know, how does this project really benefit the residents of Martha's Vineyard? And I also want to say welcome to our indigenous homeland of Aquinnah, where we've been here for quite some time. So, I guess that's it. That's my question | The benefits of the Revolution Wind project are discussed throughout the EIS. For example, Section 1.2 discusses the purpose and need for the Revolution Wind project, and Section 3.11 discusses the economic contributions of the project. The project will provide clean energy and will generate indirect economic benefits (e.g., jobs), although the geographic distributions of these benefits are not fully known. |
| BOEM-2022-0045-0113 | 2 | As BOEM works to develop a Final Environmental Impact Statement (FEIS), we urge the agency to ensure the maximum beneficial impacts are fulfilled by employing the following standards to create a high-road, responsibly developed offshore wind industry:<br>• Maximize the creation of quality, high-paying, union jobs over projects lifetime; | Thank you for your comment. BOEM has considered these issues in the EIS and for other policy-making efforts. A reference to Revolution Wind's Project Labor Agreements, which state that all Tier 1 contractors and all subcontractors performing covered construction work on the Project will source labor from Rhode Island local union hiring halls, and |

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| | | • Expand domestic manufacturing along robust domestic, regional, and local supply chains;<br>• Deliver community benefits with attention to improving access to disadvantaged communities; | Revolution Wind's committed funds to train Rhode Island workers for jobs related to Project construction has been added to Section 3.11. |
| BOEM-2022-0045-0060 | 2 | In addition to stating that Deepwater Wind will seek to create a project labor agreement that ensures local hiring as it did for its Block Island Wind project in Rhode Island, the Revolution Wind developer stated that it would work with the Eastern Connecticut Workforce Development Board and their existing programs. The developer also committed to partnering with city and state officials, as well as other stakeholders, to develop training programs specific to offshore wind that meet the needs of Connecticut's skilled labor workforce.<br>The final EIS should analyze additional details about the project's equitable workforce development plans with the local Building Trades Council and job creation plans, including plans to train and hire local residents and disadvantaged workers: those who are underrepresented in the relevant employment, those who have been formerly incarcerated, and those from low-income ZIP codes. Job creation and workforce development have a clear socioeconomic impact on Connecticut and the region. On a larger scale, it is important to note that Ørsted has executed a memorandum of understanding with North America's Building Trades Unions (NABTU), known as the National Offshore Wind Agreement (NOWA), which includes a project labor agreement to construct the company's U.S. offshore wind farms with an American union workforce. The final EIS should acknowledge the positive socioeconomic impacts of family-sustaining wages and strong labor standards promised by the developer in this agreement. The final EIS should also acknowledge Deepwater Wind and Ørsted's commitments to invest in the New London State Pier to support Revolution Wind and future offshore wind projects and the community and economic development benefits delivered by the Host Community Agreement between Revolution Wind's developers and the City of New London. | A reference to Revolution Wind's Project Labor Agreements and its committed funds to train Rhode Island workers for jobs related to Project construction has been added to Section 3.11 Demographics, Employment, and Economics. See subsection 3.11.2.3.1. |
| BOEM-2022-0045-0115 | 2 | Thank you. My name is Patrick Crowley, and I am the secretary treasurer of the Rhode Island AFL CIO, as well as the co-chair of climate jobs Rhode Island, a coalition of labor and environmental organizations within the State of Ireland. Thank you for accepting my comments. Today. Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. As we begin recovering from the unprecedented social and economic impact of the Covid nineteen pandemic. The approval of the Revolution wind project developed by Orsted and eversource will directly lead to the creation of union jobs that come with good pay and benefits as a Union leader. I support offshore wind large-scale utility development, like offshore wind will not only help reduce our massive carbon footprint, but will also mean tremendous amount of economic opportunity in the form of jobs and community benefits My eighty thousand members across Rhode Island believe that the American that Americans should not have to choose between a good job and a clean environment. We can and must have both. The Revolution Wind Project is an opportunity to not only drive the nation's clean energy future, but also create quality family sustaining union jobs. I urge Ba to move forward with the permitting process. Boeham has provided six alternatives for further review. Within those six alternatives there is one that bomb should not consider no action, no action would harm our State's efforts to address climate change, while also eliminating quality job opportunities and sustainable work for hard working local trades people that come with this project. We need a revolution when to be built offshore wind is critical to our future, of our national security, environmental and economic recovery. We urge Boe to stick with its public schedule for the Revolution, win project and put our trades, men and women to work as soon as possible. Thank you very much for your time and consideration. | Thank you for the comment. |
| BOEM-2022-0045-0114 | 3 | Similarly, the creation of more than $270 milion per year in zero emissions electric power and the creation of thousands of skiiled construction jobs are noteworthy benefits. All of this flows from a multi-billion dollar private invesbnent in a 83,798 acre parcel of leased seabed, the vast majority of which will remain undisturbed by project construction and operation. | Thank you for your comment. Section 3.11 evaluated the potential short and long-term impacts from the proposed Project to demographics, employment, and economics, including job creation. Appendix G provides a summary of the assumptions and methodologies used to generate estimates of the employment impacts of the proposed Project under the alternatives assessed in Chapter 3.11. |
| BOEM-2022-0045-0060 | 3 | The draft EIS states that port selections for each phase of the project have not yet been determined and lists Connecticut State Pier in New London as one of five sites under consideration for use during the installation phase.<br>This contradicts Ørsted and Eversource's seemingly definitive public statements, including on the Revolution Wind website,that the<br>project will be staged and assembled at State Pier. The developers projected that the State Pier redevelopment itself would create more than 400 construction jobs by the end of 2023 and that the Revolution Wind project would create 80-120 long-term, high-skilled, well-paying jobs at the State Pier. New London, an environmental justice area of concern as noted in the | The analysis in the EIS is based on information provided in the COP. All ports listed in the COP are required to be and have been analyzed in the EIS. The level of detail that the comment is requesting is not provided in the COP. |

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| | | draft EIS, has a high poverty rate and a highly vulnerable population and needs the jobs promised to the community by the developers. As stated in the draft EIS, New London is the only major port between New York and Maine that does not have vertical obstruction and offshore barriers, two factors that are critical for offshore wind turbine assembly.<br><br>If Ørsted and Eversource are considering a reversal of their commitment to stage and assemble the Revolution Wind project at State Pier, the final EIS should specify why the Port of New London is less suitable than the alternatives. While some developers choose to exploit workers by paying poverty wages that make workers more dependent on government benefits and community resources, good-paying jobs filled by local residents contribute to the entire local economy. Ensuring the jobs created by this project are family-sustaining jobs with dignified wages, benefits, and working conditions will maximize the positive socioeconomic impacts of the project. Revolution Wind's commitment to pay prevailing wages, create a project labor agreement, and support workforce development are not considered in the draft EIS but are important socioeconomic factors that should be included in the final EIS. | |
| BOEM-2022-0045-0086 | 3 | In addition to supporting the clean energy goals of Rhode Island and Connecticut, the Project will create new high-paying jobs and provide economic and infrastructure improvements to Rhode Island, Connecticut, and surrounding states. Specifically, the Project is expected to result in the creation of over 1,200 direct construction and ongoing operations and maintenance jobs; as well as major investments in infrastructure, including $117.5 million to support port infrastructure redevelopment efforts in both states. Revolution Wind has a Host Community Agreement with New London, CT to provide $5.25 million, or $750,000 annually, to the City for seven years. Combined with other Connecticut Port Authority and Gateway Terminal payments, New London, CT will realize more than $1 million per year for the initial seven-year period. During that time, State Pier will support at least two additional wind farms in the region, which collectively will provide enough clean energy to power more than 900,000 homes in the Northeast. Revolution Wind has selected two regional vessel operators that will partner with Rhode Island shipyards to build crew transfer vessels (CTVs) serving the Ørsted offshore wind farms in the Northeast. Revolution Wind will also host the first-ever U.S. helicopter contract to support offshore wind, operating out of Quonset State Airport. | Thank you for your comment. Section 3.11 evaluated the potential short- and long-term impacts from the proposed Project to demographics, employment, and economics, including job creation. Appendix G provides a summary of the assumptions and methodologies used to generate estimates of the employment impacts of the proposed Project under the alternatives assessed in Chapter 3.11. |
| BOEM-2022-0045-0113 | 4 | As BOEM works to develop a Final Environmental Impact Statement (FEIS), we urge the agency to ensure the maximum beneficial impacts are fulfilled by employing the following standards to create a high-road, responsibly developed offshore wind industry: Development guided by robust and inclusive stakeholder engagement, including labor organizations, Tribal nations, historically underrepresented or disadvantaged communities, low-wealth communities, communities of color, and impacted ocean users. | Thank you for your comment. BOEM has considered these issues in the FEIS and for other policy-making efforts. A reference to Revolution Wind's supportive programs designed to provide craft-entry opportunities for minorities, women, and economically disadvantaged non-minority males has been added to Section 3.12. |
| BOEM-2022-0045-0086 | 4 | Revolution Wind is donating to multiple educational initiatives within the area. The Project will contribute $1.25 million to Mystic Aquarium to support critical marine research and protection of wildlife. The Mystic Aquarium funds will also support educational programming and career resources for children and women. The Project will contribute $950,000 for Groton-based Project Oceanology to launch a hands-on, inquirybased Kindergarten through 12th grade Science, Technology, Engineering, and Math (STEM) program focused on climate change, sustainability, energy generation, and offshore wind. Revolution Wind will contribute a $100,000 grant to the Niantic Children's Museum to support the creation of several new handson, STEM-focused exhibits that will help educate and inspire the next generation of scientific leaders. | Thank you for the comment. |
| BOEM-2022-0045-0113 | 5 | Environmentally responsible development, robust stakeholder engagement, equitable distribution of benefits, and attention to quality job creation domestically are all critical to achieving the goals set out in the OCSLA. The Biden Administration has also reinforced in various executive orders that it is the policy of the federal government to pursue solutions to the climate crisis with attention to union labor, domestic manufacturing, environmental justice, and protection of natural resources. The announcement of the National Offshore Wind Target (NOWT) to deploy 30 gigawatts (GW) of offshore wind by 2030 further underscored this approach. In the White House Fact Sheet containing that announcement, the White House declared: "The President recognizes that a thriving offshore wind industry will drive new jobs and economic opportunity up and down the Atlantic Coast, in the Gulf of Mexico, and in Pacific waters. The industry will also spawn new supply chains that stretch into America's heartland, as illustrated by the 10,000 tons of domestic steel that workers in Alabama and West Virginia are supplying to a Texas shipyard where Dominion Energy is building the Nation's first Jones Act compliant turbine installation vessel. "Federal leadership, in close coordination with states and in partnership with the private sector, unions and other key stakeholders is needed to catalyze the deployment of offshore wind at scale. "…the Administration is taking coordinated steps to support rapid offshore wind deployment and job creation: | Thank you for the comment. A reference to Revolution Wind's supportive programs designed to provide craft-entry opportunities for minorities, women, and economically disadvantaged non-minority males has been added to Section 3.12. |

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| | | 1. Advance ambitious wind energy projects to create good-paying, union jobs<br>2. Investing in American infrastructure to strengthen the domestic supply chain and deploy offshore wind energy<br>3. Supporting critical research and data-sharing."4<br>The White House also recently released strategies for "Advancing Equity and Racial Justice Through the Federal Government" as mandated in Executive Order 13985, including action plans for each federal department to fulfill the whole-of-government equity agenda.5 The strategies included in the Department of Interior (DOI) action plan should be integrated in BOEM offshore wind activities and include employment opportunities for historically disadvantaged and low-wealth communities.6 Another White House report, "Worker Organizing and Empowerment" states that union approval is at its highest since 1965, with 68% of Americans approving of labor unions.7 Support rates increase to 74% for workers aged 18 to 24, 75% for Hispanic workers, 80% for Black workers, and 82% for Black women workers.8 The Department of Labor's White House Task Force on Organizing and Empowerment has published guidance for how unions advance equity for underserved populations, including greater transparency around pay and higher wages, greater job security, and increased access to career pathways for women and workers of color.9 In addition to the authority granted to BOEM to facilitate energy development on the OCS, the president also has authority to direct requirements on leases of the OCS and precedent exists for the president to do so. Current BOEM leases of the OCS include lease terms mandated by presidential executive order (EO), specifically Executive Order 11246, which prohibits employment discrimination and establishes affirmative action requirements for nonexempt federal contractors and subcontractors.10 Article II, § 1 of the United States Constitution provides that "executive power shall be vested in" the president. Such power gives the president the right—in the absence of an express congressional declaration to the contrary—to control the terms upon which public lands or property may be sold, leased, or used by private individuals or entities.11 Additionally, the president has been delegated "broad-ranging authority" over governmental procurement under various laws including, for instance, the Federal Property and Administrative Services Act, 40 U.S.C. 101 et seq. which authorizes the president to "prescribe such policies and directives . . . as he shall deem necessary" for the promotion of an economical and efficient system for procurement and supply."12 Furthermore, the DEIS references numerous Executive Orders, including President Biden's Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad." EO 14008 includes the goal of doubling offshore wind by 2030 while creating well-paying union jobs and economic growth; delivering environmental justice; an equitable, clean energy future; and ensuring robust protection for our lands, waters, and biodiversity. In this EO, President Biden also called for a whole of government approach to the climate crisis that will "create well-paying union jobs to build a modern and sustainable infrastructure." The executive order further emphasized that "[t]his Nation needs millions of construction, manufacturing, engineering, and skilled-trades workers to build a new American infrastructure and clean energy economy."13 Specifically, EO 14008 § 204 states: "It is the policy of my Administration to lead the Nation's effort to combat the climate crisis by example—specifically, by aligning the management of Federal procurement and real property, public lands and waters, and financial programs to support robust climate action. By providing an immediate, clear, and stable source of product demand, increased transparency and data, and robust standards for the market, my Administration will help to catalyze private sector investment into, and accelerate the advancement of America's industrial capacity to supply, domestic clean energy, buildings, vehicles, and other necessary products and materials."14 In § 206, President Biden further directed all agencies to "adhere to the requirements of the Made in America Laws in making clean energy, energy efficiency, and clean energy procurement decisions" consistent with Executive Order 14005, "Ensuring the Future Is Made in All of America by All of America's Workers."15 President Biden's February 4, 2022 EO 14063, "Use of Project Labor Agreements for Federal Construction Projects" also demonstrates the importance of utilizing project labor agreements (PLAs) for large-scale construction projects. Specifically, EO 14063 §1b states: "Project labor agreements…provide structure and stability to large-scale construction projects…[and] avoid labor-related disruptions by using dispute-resolution processes to resolve worksite disputes and by prohibiting work stoppages, including strikes and lockouts. They secure the commitment of all stakeholders on a construction site that the project will proceed efficiently without unnecessary interruptions."16 All of these statements make clear that it is the policy of the United States to ensure that all agencies should take action to develop clean energy technologies and combat climate change while also strengthening domestic supply chains and an equitable, high-quality union workforce. To achieve this will require high road employment practices such as PLAs and domestic content requirements and incentives to be solidified into offshore wind lease contracts and permitting activities. PLA's have been proven to reduce project costs for developers, save public funds in the long run, and result in increased economic benefits for the local community.17 In addition, PLAs often lead to safer working conditions as a result of a more skilled workforce. Data suggests that the construction industry is volatile and accidents are more common in states with low- | |

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| | | road contractors.18 Union firms are also 16% less likely to report difficulty in filling open positions, 13% less likely to fail in retaining skilled workers and 21% less likely to report project delays due to retention issues,19 which is key to timely and efficient deployment during construction labor shortages. Also, reports indicate that PLAs decrease the significant gap between expected and realized energy savings in various energy efficiency measures.20 | |
| BOEM-2022-0045-0116 | 6 | Thank you for being here. I have been on School Committee and I'm an Official Man. I'm looking for resources for island children. And if we have something that we can aim at them to participate in looking for employment, looking for opportunities, curriculum frameworks. Okay. That's good. Thank you | Socioeconomic impacts were estimated for the proposed ports and landing locations that would be utilized by Revolution Wind. No proposed ports or landing locations for the Project are located on Martha's Vineyard. Indirect impacts of Revolution Wind on communities that are not directly affected by the project are not fully known. Impacts that could affect Martha's Vineyard are discussed in Chapter 3.9 Commercial Fisheries and For-Hire Recreational Fishing, 3.16 Navigation and Vessel Traffic, 3.18 Recreation and Tourism, and 3.20 Visual Resources. For more information about Renewable Energy please see BOEM's website https://www.boem.gov/renewable-energy, for specific state activity projects and project status see this website: https://www.boem.gov/renewable-energy/state-activities. |
| BOEM-2022-0045-0115 | 7 | good afternoon. Can you hear me? Yes, we can and that has been set by others. I mean the offshore wind in the industry. Sectors will provide great economic opportunity in the Us. As it will create the good industrial construction on service jobs, and my company is a tangible example of such benefits. As an example. You know, we have invested by of twenty four. We will have invested sales of three hundred million dollars to transform one of our unusual facility, one which, as of two days employing two hundred and twenty industrial team people in any sort of the jobs. This investment for the offshore. We set up at one hundred and sixty American jobs, and this investment was made possible for two reasons: one because we sign up with a trade agreement five years back, with our share to produce up to six hundred miles takes for cable for the up from the Us. And elsewhere last week make sense that I should have announced that we will be the one providing the cable for the reduction in project and today my testimony is about to express the fact that we support the evolution win project for the economic impact. The positive economic impact has in the Us. Uh. We have that such process need to provide clarity and certainty to the supply chain, because without certainty and clarity no investment can happen. We are pioneer, but we hope that others are going to invest in the Us. Or we propose existing facilities and create additional jobs. And this for Jobs construction jobs, and also marine jobs: Without such predictability, such investment will not be able to happen. We appreciate all the effort that governments put in this process. We do not have particular, I think, thought about the different identity but one. We urge them to not consider the new action alternative as it would first slow down the energy transition from harmful source of energy to environmental, friendly source of energy. And so again, it will send a shield into the industry and slow down the creation of jobs that this industry will be able to create if it is allowed to move forward again, make sense, would like to rotate, to support the Revolution for refuge and win project. And We thank you for your time and your consideration. | Thank you for the comment. Section 3.11 evaluated the potential short- and long-term impacts from the proposed Project to demographics, employment, and economics, including supply chain. Appendix G provides a summary of the assumptions and methodologies used to assess impacts of the proposed Project and alternatives in Chapter 3.11, including supply chain effects. |
| BOEM-2022-0045-0113 | 9 | High Road Labor Standards & Domestic Supply Chain<br>The DEIS estimates that the project will create between 3,856 and 4,976 full time equivalents (FTEs) depending on the alternative that is selected.31 The Large Wind Turbine Generator (WTG) Maximum Capacity Project that would construct 73 12-MW WTGs would have the greatest beneficial job creation and economic impact potential. According to the DEIS, this scenario is expected to generate nearly $536 million in value-added production to the combined gross domestic product (GDP) of Rhode Island and Connecticut.32 However, details regarding the job creation and economic benefits of the project are only vaguely described. The DEIS states:<br>"Most of the direct construction-related jobs generated by the Proposed Action would occur in the communities where the ports used for staging and fabrication are located. Most of the direct jobs would occur during engineering and construction of onshore and offshore wind energy facilities, while most of the indirect jobs would occur during wind energy component fabrication, storage, and transport…Under the Proposed Action, construction is expected to occur within a 1-year period, but preconstruction activities such as design/engineering and component manufacturing and fabrication could lengthen the period an additional year. Where possible, local workers would be hired to meet labor needs for construction."33<br>The DEIS also states that although NREL's Jobs and Economic Development Impacts Offshore Wind Model (JEDI-OWM) cannot differentiate between economic impacts generated from onshore activities versus offshore, it can be inferred that most of the engineering and construction of both onshore and offshore facilities are included in direct jobs, while most of the component | Thank you for the comment. Additional information on the types and proportions of anticipated direct and indirect jobs has been added to the Demographics, Employment, and Economics Section of Appendix G. |

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| | | manufacturing, storage, and transport are included in the indirect jobs. Other job categories outlined in the DEIS include technician-level workers in 1) production roles, particularly high-value manufacturing positions; 2) installation and commissioning positions; 3) vessel and offshore equipment operation; and 4) commissioning and testing turbines, cables and substations.34 BVG Associates, which outlined these occupations in their 2017 report referenced in the DEIS, notes that many of these jobs will be created in industrialized coastal areas that have suffered from economic decline in recent years.35 The DEIS also notes that where possible, local workers would be hired to meet labor needs for project construction, operations and maintenance (O&M) and decommissioning.<br>We urge BOEM to provide more information on the types of jobs that will be created through this project in the FEIS, including any commitments that Revolution Wind has made to utilize domestic content and project labor agreements. This information can supplement the NREL JEDI-OWN which doesn't contain recent developments regarding U.S. offshore wind component manufacturing and fabrication. As we described previously in this comment, maximizing the creation of manufacturing jobs across a domestic offshore wind supply chain is key for this industry to fulfill its economic benefit potential. The DEIS should contain all plans that Revolution Wind has for utilizing domestic content, be it in the New England region or elsewhere. If we can infer that indirect jobs include component manufacturing, storage, and transport, the DEIS should at a minimum provide estimates for how many jobs from each category could be expected within the estimated 1,623-2,265 indirect jobs listed in Table 3.11-9. It is imperative that the DEIS reflect accurate information regarding socioeconomic impacts of the project to ensure accountability that positive benefits are realized. | |
| BOEM-2022-0045-0115 | 9 | Thank you, and thanks for all the hard work that your agency is doing for creation of this environmental impact statement for revolution win. We are fully in support of the Revolution Win Energy Project. I am the executive Director of the North Kest Town Chamber of Commerce. The North Kingsstown Chamber of Commerce is one of Rhode Island's leading business membership and trade organizations located in northeast down Rhode Island. That includes the quantit business park that employs more than ten thousand people within over two hundred businesses quantit the home to Port Davisville has served as a staging storage and assembly area for wind turbine equipment, and continues to serve the offshore wind industry Today, while offshore wind is a developing industry for the United States. It is a proven industry that began right here in Rhode Island with the Block Island Winds Park. Now we're looking to continue the momentum with revolution. Wind Project Revolution wind is making investments in our ports, workforce training institutions of higher education and creating opportunities for businesses in the local supply chain. We need revolution wind to be built. We appreciate Oem's careful consideration of the revolution. Win project, and understand that Oem six alternatives for further review. Within those six alternatives there is only one that they should not consider no action without action. Rhode Island will not realize revolution wins tremendous potential to create jobs and grow the local supply chain revolution wind is good for Rhode Island's economy and the region's environment. I urge you to approve this project and keep our state momentum going. Thank you. | Thank you for your comment. Section 3.11 discusses the economic contributions of the Revolution Wind project. |
| BOEM-2022-0045-0116 | 9 | Roxane Ackerman; what are the opportunities for Martha's Vineyard to have a benefit? And all the electricity doesn't go past us, that it comes directly to us. It seems to me, if you go through Rhode Island, and then is that -- are we talking about the (inaudible)? And then, we've offered our locale. Is there any benefit? Thank you | The benefits of the Revolution Wind project are discussed throughout the EIS. For example, Section 1.2 discusses the purpose and need for the Revolution Wind project, and Section 3.11 discusses the economic contributions of the project. The project will provide clean energy and will generate indirect economic benefits (e.g., jobs), although the geographic distributions of these benefits are not fully known. |
| BOEM-2022-0045-0113 | 10 | In terms of construction, Revolution Wind reported in 2021 that a PLA was reached between Ørsted, Eversource and Rhode Island Building and Construction Trades Council to transform Prov Port into a regional offshore wind hub and build an advanced foundation component facility to support the assembly of the developers projects in the Northeast.36 Earlier this year, Ørsted and North America's Building Trades Unions (NABTU) announced a National Offshore Wind Agreement (NOWA) covering all of Ørsted's contractors and subcontractors that will construct offshore wind projects.37 Ørsted's announcement states: "A first-of-its-kind in the United States, the National Offshore Wind Agreement (NOWA) sets the bar for working conditions and equity, injects hundreds of millions of dollars in middle-class wages into the American economy, creates apprenticeship and career opportunities for communities most impacted by environmental injustice, and ensures projects will be built with the safest and best-trained workers in America."38 These agreements have significant impacts on the quantity and quality of offshore wind careers and help ensure there is equitable access. Furthermore, they ensure there is the skilled workforce available to complete the project safely and efficiently. The DEIS notes that offshore wind projects will create a demand for workers skilled in the professions and trades needed for the design, construction, and O&M of offshore wind facilities.39 Including information in the FEIS related to a skilled workforce and domestic supply chain is strongly aligned with | Thank you for the comment. Text has been added into Appendix C (Incomplete or Unavailable Information Analysis for Resource Areas). |

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| | | federal statute as explained in the above section. Furthermore, Rhode Island recently passed legislation "Labor Standards in Renewable Energy Projects," requiring all responding bidders on renewable energy projects at 3 MW of capacity or higher valued at $5,000,000 or more to have an approved apprenticeship program for all crafts or trades with apprenticeship programs that will be employed on the project at the time of the bid.40 Both Rhode Island and Connecticut have underscored the importance of building local and domestic supply chains to maximize job creation and economic benefit for their states. Information such as this, including but not limited to provisions in the PPA's related to labor standards, equity, supply chain, and economic development should be included in the FEIS. As the DEIS notes throughout, there are several components of the project that have not been determined yet and as such, the economic impacts cannot yet be determined. BOEM should identify these unknowns in the FEIS, including those related to supply chain and workforce contracts. | |
| BOEM-2022-0045-0115 | 10 | Yes, I'm. Just an individual Martha's vineyard. Unlike our reputation, we're the poorest county in Massachusetts, and I'm. Concerned that i'm just wondering if there's any policy going forward as we have more and more power. Is there any policy going forward that would guarantee any limit on the cost of electricity for the area around the well, for anybody, for that matter, around the area that's affected by the installations? That's my one question and the other question I have: is Is there any educational campaign possible, or in the works? Or is anybody considering any educational campaign that would reduce consumption? It seems to me, as you go along with the increase in alternative energy. Thank you. | Electricity rates are managed by state and regional energy authorities, and Power Purchase Agreements (PPAs) are negotiated between states and project developers. BOEM does not have authority over PPAs or electric rates. As noted in the DEIS, Section 1.2, Revolution Wind's goal to construct and operate a commercial-scale offshore wind energy facility in the Lease Area is intended to fulfill the following three PPAs: 1. a 200-MW contract with the State of Connecticut approved in January 2019; 2. a 400-MW contract with the State of Rhode Island approved in June 2019; and 3. a 104-MW contract with the State of Connecticut approved in December 2019. The Department of Energy's Office of Efficiency and Renewable Energy offers information on energy efficiency initiatives: https://www.energy.gov/eere/office-energy-efficiency-renewable-energy Socioeconomic impacts were estimated for the proposed ports and landing locations that would be utilized by Revolution Wind. No proposed ports or landing locations for the Project are located on Martha's Vineyard. Indirect impacts of Revolution Wind on communities that are not directly affected by the project are deemed outside the scope of the EIS. Impacts that could affect Martha's Vineyard are discussed in Chapter 3.9 Commercial Fisheries and For-Hire Recreational Fishing, 3.16 Navigation and Vessel Traffic, 3.18 Recreation and Tourism, and 3.20 Visual Resources. |
| BOEM-2022-0045-0116 | 10 | Hi, Anthony Lefeber. I live here in Aquinnah, as well. This is a really good point, seeing as Martha's Vineyard doesn't get all the visual impact of this. Who is going to assure that benefits come back to the island, both in terms of education, employment, environmental protections, and so forth? I think that's an excellent point and really important to the island. Thank you. | The benefits of the Revolution Wind project are discussed throughout the EIS. For example, Section 1.2 discusses the purpose and need for the Revolution Wind project, and Section 3.11 discusses the economic contributions of the project. The project will provide clean energy and will generate indirect economic benefits (e.g., jobs), although the geographic distributions of these benefits are not fully known. |
| BOEM-2022-0045-0065 | 15 | The DEIS fails to address the impacts that the Revolution Wind project will have on small businesses, which will include the vast majoring of fishing companies and supporting businesses. As recommended by the U.S. Small Business Administration, BOEM must conduct a Regulatory Flexibility Act (RFA) analysis of its proposals, including this DEIS, to adequately understand the impacts of offshore wind development activities on small businesses.23 Improved data and analyses of impacts to commercial fishing businesses, port operators, marine equipment retailers, onshore processors, fish markets, and other fishing industry representatives, should inform mitigation strategies. | Thank you for your comment. Text has been added to Section 3.9 in the FEIS describing the percentage of commercial and for-hire recreational fishing operations that engaged in fishing in the Lease Area from 2019 to 2021 that were small businesses as defined by the Small Business Administration. |
| BOEM-2022-0045-0086 | 82 | Page 3.11-13, Table 3.11-5: The footnote to Table 3.11-5 should specify which version of the JEDI-OSW model was used to produce these estimates. If they were produced using both the 2017 and 2021 versions of the model, the table should be updated to use the 2021 version. We also recommend including a discussion of the reason that the number of jobs shown in Table 3.11-5 varies by year. | A footnote has been added to the text preceding the Table referenced in the comment. The footnote documents the two versions of the JEDI OSW model used (Version 1.05.2017 and Version 2021-2). These two versions are cited in the table source notes for all of the tables that utilize the JEDI OSW models as (NREL 2017, 2021). |
| BOEM-2022-0045-0086 | 83 | Page 3.11-26, Table 3.11-9: It should be clarified that Table 3.11-9 provides estimates of Jobs, Earnings, Output, and Value Added specifically in Rhode Island and Connecticut. | Table captions have been changed to indicate that jobs, earnings, output, and value added accrue to Rhode Island and Connecticut during construction; and to Rhode Island during operations and maintenance. |
| BOEM-2022-0045-0086 | 91 | Appendix G states "if Guidehouse were to run a comparison of an 800-MW project and the 712 MW project, changing only the total project capacity by changing the number of WTGs and holding all other factors constant, the results would be remarkably | Thank you for the comment. Text in Appendix G has been edited. |

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| | | similar as those shown below.” That statement would be true if “holding all other factors constant” were changed to “holding all $ per kW ratios constant”. | |
| BOEM-2022-0045-0086 | 92 | Appendix G, Table G-38: A discussion should be added as to why the numbers in Table G-38 vary so widely. Revolution Wind feels that the results would be more accurate if BOEM used the JEDI model (2021 version) with the updated data and MW sizes instead of scaling from the base case. | Thank-you for the comment. The information with respect to operations and maintenance in Tables G-37 and G-38 has been corrected, and the differences are generally smaller than presented in the DEIS. Given the proportional nature of the results for operations and maintenance impacts, these corrections have no impact on the results presented in FEIS. Because of structural differences between JEDI-OSW V1.05.2017 and JEDI-OSW V2021-2, in particular the fact that Revolution Wind is presumed to have provided project-specific inputs to Guidehouse for it baseline work within JEDI OSW V1.05.2017, BOEM has determined that the methodology used to estimate economic impacts is appropriate. |
| BOEM-2022-0045-0086 | 93 | Appendix G, Table G-38: Revolution Wind suggests clarifying how the calculations were developed. Specifically, how was 4,009 acres of seafloor disturbance from inter-array cable and export cable within the tourism GAA calculated. Given the following acreages, a total of 3,785 is obtained: IAC = 2,361 acres; RWEC-OCS = 593 acres; and RWEC-RI = 731 acres. | Thank you for your comment. While the comment references Table G-38, the subject of Table G-38 does not include the number of acres of seabed disturbance. Since the publication of the DEIS, RW has provided BOEM with updated calculations for seafloor disturbance relative to IAC systems per alternative. This information is included in Chapter 2, Section 2.1.2 and 2.1.7. |
| BOEM-2022-0045-0086 | 100 | As stated in Section 3.11.2.2.3, the Proposed Action, when considered in combination with past, present, and other reasonably foreseeable projects, actually has long-term minor beneficial impacts on demographics, employment, and economics. The text and comparative impact tables should emphasize that conclusion rather than the adverse impacts that will occur either with or without the Proposed Action. | Thank you for the comment. BOEM believes that the text in Table 3.11-5 appropriately summarizes the impacts of the proposed action. |

## Essential Fish Habitat (EFH) and Finfish

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| BOEM-2022-0045-0098 | 2 | In 12.3-Effects of particle motion, they were very clear, much more must be done to determine how particle motion effects all. "It is now clear that fishes are primarily detectors of particle motion and relatively fewer species of fish use sound pressure. Thus, criteria and guidelines must be developed in terms of particle motion as well as sound pressure. Yet, very little is known about hearing sensitivity to particle motion and it is imperative that such data be obtained. Concurrently, it is imperative to measure the signal from anthropogenic sources in terms not only of sound pressure, as now done, but also in terms of particle motion." Using a 30 MW "pilot" project such as the Block Island Wind Farm, that often was not working at even 25 percent of its capacity, to draw conclusions for larger projects like the 704MW Revolution Wind project is basically arbitrary, and without a basis in recent, factual information. We hereby request a thorough analysis of the effects of survey and construction work of the Revolution Wind farm and cable laying as it relates to particle motion and those fish and invertebrates species that would be affected, not only by the actual construction work, including pile driving but also that which relates to UXO's within the wind lease area, and all cable laying activities such as jet plowing, jet trenching and boulder ploughing. It must be fully analyzed within BOEM's statement "As stated, ongoing monitoring studies at European wind facilities and the Block Island Wind Farm in the United States provide a useful basis for evaluating the combined effects of these IPFs on the biological community as a whole, even if effects on individual species cannot be predicted with specificity. On balance, the current scientific information is sufficient to support sound scientific judgements and informed decision making because relevant studies monitoring changes at wind farms have not observed significant changes to finfish over years of study," is wholly inaccurate, because the level of build out in Europe at present and in the US utilized thus far is predicated on far smaller turbines in Europe and BIWF than the full build out planned for the Revolution Wind and cumulatively BOEM's Atlantic Seaboard leases. As such, LICFA would request a full analysis of the cumulative impacts of full buildout throughout the Atlantic with 12-15 MW turbines as such are slated for the multitude of lease areas that are slated to be approved by 2023. | Thank you for your comment. The EIS has been updated with additional analyses related to how particle motion stemming from construction-related activities (i.e., seabed preparation/cable laying, pile driving, UXO detonation, and HRG surveys) would impact finfish. BOEM recognizes that there is limited information available regarding particle motion effects to finfish and invertebrates and has funded ongoing studies to help fill this knowledge gap (see https://www.boem.gov/sites/default/files/documents//BOEM-ESP-AT-17-02.pdf and https://www.boem.gov/sites/default/files/documents//BOEM-ESP-AT-20-01.pdf). New information obtained through BOEM-funded research will be used to inform future decisions. The impact analyses of particle motion to finfish stemming from operation and maintenance activities, such as operating wind turbines (see Chapter 3.13.2.2.2), and the analyses assessing the impacts from other planned OSW projects in the region (see Chapter 3.13.2.3.3) used the best available science to inform those analyses. |
| BOEM-2022-0045-0046 | 2 | I am also not clear about what specific fish habitat will be impacted and what the potential long term benefits may be to the fisheries? Were long term benefits factored into the calculations in the EIS? These wind farm areas can create de facto protected areas which can provide refuge to fisheries and ultimately improve fish populations. | The potential benefits of reef effects resulting from presence of structures are considered in the DEIS. Considering the current lack of large-scale, offshore wind farms in the Northwest Atlantic (aside from the small, fiver turbine Block Island Wind Farm), we do not currently have information to support the wind farms in this region will act as de facto protected areas. Recreational fishers do target the area around the BIWF site so it is reasonable to conclude that they may also fish in and around the RWF. Further, commercial fishing activity could still occur within offshore wind farms; although the use of some gear types may be more feasible than others. |
| BOEM-2022-0045-0046 | 3 | I also don't understand how this would negatively impact cod spawning? Other than the development phase which could be done outside of cod spawning season, these fish aggregate and release spawn. How would structures in the water a mile apart impact this behavior? | The WTGs generate underwater noise at low-frequencies that overlap the grunts used by cod to co-locate during spawning. Operational noise could potentially interfere with this communication in the vicinity of the foundations, however the extent and significance of this effect is not currently known. |
| BOEM-2022-0045-0069 | 4 | Conduct comprehensive fisheries resource monitoring surveys consistent with the recommendations outlined by the Responsible Offshore Science Alliance (ROSA): https://4d715fff-7bce-4957-b10baead478f74f6.filesusr.com/ugd/99421e_b8932042e6e140ee84c5f8531c2530ab.pdf.<br>o These surveys should address concerns related to biological impacts associated with pile driving and operational noise, habitat loss and creation, sedimentation, electromagnetic fields, and cumulative impacts.<br>o Surveys should include as many years as possible for data collection during pre, during, and post construction phases of the project to best characterize the environmental impacts. | Thank you for your comment. Revolution Wind developed a fisheries and benthic habitat monitoring plan (dated October 2021) that has been prepared in accordance with recommendations set forth in BOEM's "Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf" Pursuant to 30 CFR Part 585 (BOEM 2019) and has committed to conducting preconstruction, during construction, and postconstruction surveys and monitoring as part of the Proposed Action. The monitoring plan can be found at the following link: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/App_Y%20Fisheries%20Research%20and%20Monitoring%20Plan.pdf ). In addition to BOEM's guidance, the fisheries and benthic monitoring plan was developed using monitoring guidelines as part of The Rhode Island Coastal Resources Management Council's "Rhode Island Ocean Special Area Management Plan" (Ocean SAMP; RICRMC 2010). The FMP was also developed |

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| | | | through an iterative process, whereby survey protocols and methodologies were refined and updated based on feedback received from stakeholder groups. Stakeholder groups involved in this process included NOAA, NMFS, BOEM, Rhode Island Coastal Resources Management Council, Rhode Island Department of Environmental Management (Division of Marine Fisheries), Massachusetts Division of Marine Fisheries, Massachusetts Office of Coastal Zone Management, and representatives from the Responsible Offshore Science Alliance and the Responsible Offshore Development Alliance. Revolution Wind has developed a fisheries and benthic habitat monitoring plan (dated October 2021) that has been prepared in accordance with recommendations set forth in Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 (BOEM 2019). |
| BOEM-2022-0045-0086 | 5 | The hard substrate habitats created through the placement of the wind turbine generator (WTG) foundations will result in artificial reefs for a more diverse community of finfish and invertebrates in the offshore lease area. | Thank you for your comment. These "reef effects" are acknowledged and addressed in the DEIS analysis. |
| BOEM-2022-0045-0100 | 6 | The project substantially overlaps with extensive highly complex and diverse habitats on Cox Ledge as well as known spawning activity for Atlantic cod, a species of biological, ecological, economic, and cultural significance to this region. In June 2022, the New England Fishery Management Council approved a new habitat area of particular concern (HAPC) that overlaps with the Revolution Wind Project. This action was approved to protect complex habitats and cod spawning habitats from negative impacts associated with offshore wind development. While we recognize information related to the new HAPC designation, complex habitats on Cox Ledge, and Atlantic cod spawning activity was added since our PDEIS review, the analysis of impacts to these resources includes inconsistent and inaccurate habitat calculations with limited details, and appears to conflate the new HAPC for complex habitats with cod spawning habitats. Further, there are missing analyses and the DEIS lacks support for conclusions related to adverse impact determinations. For example, while there are multiple activities included under seabed preparation that would occur within known cod spawning aggregations, including boulder plows, grabs, and grapple runs required to clear the cobble/boulder habitats on Cox Ledge, there is no analysis of impacts from seabed preparation on Atlantic cod spawning activity. Further, these activities would result in a substantial alteration of highly complex cobble and boulder habitats on Cox Ledge. The significance of these proposed alterations, in the context of the regional setting of Cox Ledge, is not addressed in the document. We disagree with BOEM's assessment that impacts to benthic habitats, finfish, and EFH would be minor to moderate; this conclusion is not supported by the text in the document, and is not consistent with the best available or most current science. | Comment noted. The analysis has been refined to incorporate a more detailed characterization of impacts to complex habitats on Cox Ledge (including impacts due to seabed preparation) and Atlantic cod spawning activity to support conclusions. Additionally, the EIS has been revised to be consistent with revisions to the EFH document, including EPMs/Mitigation Measures. |
| BOEM-2022-0045-0065 | 6 | Fisheries research plans provide little value if not coordinated among OSW projects in a region. | Comment noted. |
| BOEM-2022-0045-0100 | 7 | The DEIS does not include an analysis of all reasonable mitigation measures we suggested for your consideration to help minimize impacts to cod spawning activity. For example, we identified a time of year restriction for construction activities to protect spawning cod, yet this has not been analyzed. Rather, it suggests a pile-driving time of year restriction for the North Atlantic right whale is sufficient to protect cod, which is contrary to the best available science, including the most recent studies in this area1, as the time of year that cod spawning occurs on Cox Ledge (November - April) does not entirely overlap with the January - April right whale pile driving restriction. Furthermore, BOEM is suggesting that acoustic monitoring for cod during the spawning season to trigger mitigative action is sufficient to protect spawning activity; this is based on assumptions of detection success with an unproven and untested method2. We have concerns that adverse impacts to spawning activity for Atlantic cod and a reasonable range of mitigation measures to reduce impacts are not fully analyzed in the document. | Comment noted. The EIS has been revised to be consistent with revisions to the EFH document, including EPMs/Mitigation Measures. |
| BOEM-2022-0045-0100 | 8 | NMFS considers the proposed action to have unmitigated major adverse impacts to EFH and Atlantic cod as the proposed action includes full build out of the lease area, including Cox Ledge, and the proposed mitigation measures would not protect Atlantic cod spawning. Based on our review of the proposed action, we anticipate project and regional-scale adverse impacts to habitats on Cox Ledge and population-level impacts to Atlantic cod in Southern New England; by BOEM's definition, this is a major adverse impact to benthic habitat, finfish, and EFH. | Comment noted. BOEM evaluated the analysis structure and level of detail and made updates consistent with revisions to the analysis presented in the EFH document. New scientific information proposing a change in cod stock status has been reviewed and incorporated into the FEIS, however, at this time the cod occurring in Southern New England are being managed as a component of a larger stock complex and not an independent metapopulation. BOEM does not agree that the anticipated impacts to large-grained complex and complex habitat and related habitat features would result in regional-scale effects of |

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| | | | the type described. In the two habitat zones comprising most of the concentrated complex habitats and cod spawning activity in the Lease Area, the potential footprint of long-term to permanent habitat impacts constitutes just 3 to 5 percent of the available habitat. When impacts to soft-bottomed habitat are removed, the impact footprint constitutes less than 3 percent of available large-grained complex and complex habitat. Moreover, these habitats would eventually recover with mitigation (i.e., the decommissioning and removal of the project). These impact area percentages do not account for available habitats outside the lease area, which are also used by cod for spawning as is evident in recent survey data. On this basis, the combined effects to benthic habitat and to Atlantic cod do not satisfy criteria for a major impact. |
| BOEM-2022-0045-0069 | 8 | The RIDEM Division of Fish and Wildlife prohibits any in-stream work from March 1 to July 1 to protect the in-migration of anadromous species including alewife (Alosa pseudoharengus), blueback herring (Alosa aestivalis), and American shad (Alosa sapidissima). While the project does not include work instream, construction along the export cable corridor has the potential to affect fish staging to enter the riverine systems during their migration. The Division of Fish and Wildlife recommends that work through this corridor does not take place from February 15 through July 1 to allow the anadromous migrations to take place unimpeded. The Division also limits in-stream work during juvenile out-migrations from September 15 until November 15. However, if the project can demonstrate there will be no entrapment or entrainment of juvenile out-migrants, the Division may reconsider its fall restriction during application review. | Comment noted. Clarified that timing restrictions will be imposed through the permitting process and Revolution Wind will adhere to those restrictions. See Appendix F for details. |
| BOEM-2022-0045-0100 | 11 | During our review of the PDEIS in May, we highlighted several analytical issues that we recommended be addressed prior to publication of the DEIS. Unfortunately, we found that several of the analytical comments we made during that review have not been addressed in this latest draft. In addition to addressing the comments herein and in the attached spreadsheet, we recommend additional review of our PDEIS comments so these issues can be resolved in the FEIS. Support for Conclusions and Use of Best Available Science: Consistent with comments raised on the PDEIS, in many instances, the DEIS fails to incorporate and consider the best available scientific information to support impact determinations. This results in mischaracterization of both NOAA trust resources and project impacts to those resources. While the DEIS includes some additional discussion of resources, the document is not comprehensive and does not apply those findings to an examination of the proposed action and alternatives. As a result, conclusions in the document related to impact determinations lack supporting rationale. An example of this is the analysis of impacts from oceanographic wake effects and hydrodynamic changes from the presence of structures. The DEIS appears to exclude all existing peer-reviewed literature related to oceanographic wake effects from offshore wind projects, basing the analysis solely on the Johnson et al. 2021 report, which has not been peer reviewed. While the lack of peer review is not necessarily determinative of whether a paper may be considered part of the best available scientific information, our Northeast Fisheries Science Center has reviewed this report and identified several flaws, including poor model skill, weak model validation, an over-emphasis on mean values, and an inappropriate interpretation of model results as they apply to fisheries. Nevertheless, this single source is used in the DEIS as justification to dismiss impacts from oceanographic and atmospheric effects to fisheries and other NOAA trust resources. The recent Synthesis of the Science white paper, a technical report co-led by BOEM, NOAA, and RODA, addresses hydrodynamic impacts and includes the findings of Johnson et al. 2021 alongside peer-reviewed literature. The best available science suggests that wind wakes may have broad-scale effects on biological and physical oceanography with implications for all trophic levels; this contrasts with the conclusion reached by the analysis in the DEIS. The best available science should be incorporated into the FEIS. | Comment noted. BOEM evaluated the analysis structure and level of detail and made updates consistent with revisions to the analysis presented in the EFH document. The analysis considers the framework provided by van Berkel et al. (2020) for evaluating hydrodynamic effects from OSW development, which incorporates the state of the science synthesis that is referenced. BOEM has revised the FEIS to include new scientific information related to hydrodynamic effects from wind farms in Europe. However, as summarized in the FEIS, the bulk of this research is from windfarms located in different oceanographic environments that are more susceptible to hydrodynamic effects on stratification and water column mixing than those present on the mid-Atlantic OCS. |
| BOEM-2022-0045-0110 | 15 | The Draft EIS provides a relatively detailed and accurate assessment of the anticipated impacts to benthic resources, invertebrates, finfish, and essential fish habitat (EFH). In our scoping comments, we recommended that BOEM provide a specific analysis of impacts to Atlantic cod and other species of concern; we appreciate that BOEM has emphasized the impacts to Atlantic cod throughout the Draft EIS.42 | Comment noted. No changes required to EIS. |
| BOEM-2022-0045-0116 | 15 | And once we are -- we don't know about the siltation of when these turbines are placed into the ocean. Where is that going? How is that going to affect the fish? I know there are closed periods. However, we still need to be careful. Right now, we have the bass derby going on. Is that going to affect that, when -- if that is, indeed, when the construction time happens? What about our herring run in the spring? Well, that's the spring and the fall. That leaves the summer and that's when the whales are here. | The WTG and OSS foundations would include scour protection to minimize erosion, therefore little if any suspended sediment generation is expected once the project is operational. The primary suspended sediment generating activities would occur during construction and are seabed preparation and boulder clearance for cable installation and operation of the jet or mechanical |

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| | | | plow during cable installation. The DEIS provides a detailed analysis of potential sediment effects on invertebrates in Section 3.6.2.3.2, with quantification of the area affected by suspended sediments in Table 3.6-8. Section 3.13.2.2.1 provides an assessment of suspended sediment effects on finfish based on this analysis. |
| BOEM-2022-0045-0071 | 16 | Time of year restrictions should be considered to reduce impacts to cod spawning. The DEIS suggests that a glider may be used to detect cod spawning aggregations by listening for cod grunts. This alone is not a protective measure. The detection range of gliders is short, on the order of hundreds of meters, so if cod do not coincide with the glider path in space and time, their presence may be missed. In addition, it is possible that cod will not aggregate due to construction activities, and their vocalizations may therefore be reduced. Research by the Massachusetts Department of Marine Fisheries found that relatively minor disturbances interrupted the development of cod spawning aggregations; it is reasonable to expect construction activities may do so as well. | Time of year restrictions and a variety of technologies are being considered for acoustic monitoring and detection of cod spawning aggregations. These would likely include a combination of methods, including gliders and fixed PAM buoys placed at selected locations to provide suitably representative coverage. |
| BOEM-2022-0045-0069 | 16 | Revolution Wind is located within essential fish habitat for approximately thirty-three (33) species of interest to the region (NOAA 2018), of which require RI/MA WEA habitat at some stage in their life history. This in part attributed to the Revolution Wind Farm lease area intersecting Cox Ledge, an area regionally renowned for its marine biodiversity, and its supporting of commercial and recreational fishing.<br>Of species that are likely to be impacted from development on Cox Ledge is Atlantic cod (Gadus morhua), which spawns in this area. Efforts should be made to avoid turbine placement, and construction in close proximity to Cox Ledge, and any areas of complex benthic habitat in general in an effort to best maintain current complex habitat structures that species such as Atlantic cod rely on. Atlantic cod have supported significant recreational and commercial fisheries that are important to coastal communities, especially in Rhode Island (Serchuk and Wigley 1992; Oviatt et al., 2003). Climate change is anticipated to hinder Atlantic cod stock rebuilding, but recreational angler accounts suggest that abundance of cod south of Rhode Island has increased significantly over the past 15 years (Sheriff 2018). Cox Ledge may be very important for effective stock rebuilding given the unique habitat of the area and potential significance in spawning. Early life history stages of Atlantic cod need complex benthic habitats, specifically boulder, cobble, and pebble substrates, like that of Cox Ledge (NOAA 1999). Moreover, cod exhibit site fidelity (Zemeckis et al. 2017) and spawning aggregations are sensitive to disturbance (Dean et al. 2012). Langan et al. (2019) suggest that eggs and larvae spawned near Cox Ledge may settle in Narragansett Bay based on larval cod observations in the Bay and their estimated hatching dates.<br>• The full spatial and temporal extent of southern New England Atlantic cod spawning is poorly understood, as many long-term scientific surveys do not provide the spatial and temporal resolution needed to properly characterize the distribution of cod spawning activity (DeCelles et al. 2017). As such, all available data to date should be used to best understand the spawning dynamics of the species and inform impact risks. It does not appear in the DEIS that all recent cod data have been considered. Please refer to previous discussions at the New England Fisheries Management Council to better identify other, newer data sources that can be used to inform an impact assessment on cod (https://s3.us-east-1.amazonaws.com/nefmc.org/1.-220412_Staff-presentation.pdf).<br>• Despite long-term spatially resolved information, the presence of spawning aggregations of cod in southern New England waters has been documented through various sources (Zemeckis et al. 2014). Cod have historically been managed as two units: the Gulf of Maine and the Georges Bank management units (McBride and Smedbol 2020), both of which are currently in depleted states (NEFSC 2017a, NEFSC 2017b). Although managed as two broad stocks, the management units are believed to have finer scale structure within that support metapopulations. This metapopulation structure is likely critical in supporting the overall stock. Such metapopulation and heterogeneity characteristics are important to identify, as mismatches between management units and stock structure can reduce the effectiveness of management measures. Further, the connectivity between stocks and metapopulations is important to account for to better understand a stock's resiliency to various natural and fishing mortality pressures. For example, it has been suggested that cod spawning components in the Great South Cannel, Nantucket Shoals, southern New England and the MidAtlantic are more connected (genetically and in terms of larval dispersal) with spawning components in the Gulf of Maine than those on eastern Georges Bank, the unit with which they are currently managed with (Zemeckis et al. 2014).<br>• The Atlantic Cod Stock Structure Working Group (ACSSWG) support the finer scale biological stock structure scenarios, and identified a series of mismatches: 1) phenotypic and genetic heterogeneity suggesting that cod are not mixed within management units, 2) extensive movements between management units, and 3) dispersal of larvae around Cape Cod from the Gulf of Maine unit to the Georges Bank unit (McBride and Smedbol 2020). The ACSSWG concluded that there are likely more than two stocks of Atlantic cod, highlighting the need for improved science on a fine scale spatial structure for this species, particularly in areas that seem to sustain cod such as Cox Ledge. | Comment noted. Revolution Wind will implement a Fisheries Research Monitoring Plan to contribute to better understanding of cod spawning. For example, as part of the FRMP, Revolution Wind will tag up to 100 Atlantic cod with acoustic transmitters to support the ongoing, BOEM-funded Atlantic cod spawning study in southern New England. This was clarified in the EIS. Results from the ongoing, BOEM-funded cod study in this region should help to further elucidate the spatiotemporal dynamics of cod spawning in southern New England, which is not as well understood as other regions (i.e., Georges Bank and Gulf of Main). Preliminary results from this study, as well as an analysis of the evidence supporting the existence of more fine-scale stock structures (i.e., metapopulations) of Atlantic cod in the Northeast are provided in the EFH Assessment for this project and are being considered during the development of appropriate mitigation measures to reduce impacts to this species. |

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| | | • Of these newly proposed management units, a separate southern New England (SNE) stock (represented as NOAA Statistical Areas 537, 538 and 539) is included. Within the SNE region is Cox Ledge, a known spawning site for Atlantic cod (e.g., Kovach et al. 2010; Zemeckis et al. 2014). Spawning is known to occur within the Cox Ledge area between late fall/early winter (Nov-Jan) and late winter/early spring (Feb-Apr), which some suggest represents a single metapopulation unique to this area. As cod return to specific spawning grounds annually in the northwest Atlantic, Cox Ledge may be unique and important to the southern New England Atlantic cod metapopulation.<br>• Currently, the Atlantic Cod Research Track Stock Assessment Working Group is looking to implement the recommendations from the ACSSWG by constructing empirical or analytical stock assessment models for cod. This could result in a separate biologically managed stock for SNE. If Cox Ledge and wind energy areas are significant in supporting a SNE cod stock, development could then have dire impacts on the stock itself, adjacent stocks that may experience some mixing or larval connectivity, and have substantive impacts for fisheries management at this finer scale. | |
| BOEM-2022-0045-0069 | 17 | The construction phase is the most likely to have negative effects on fish and habitat. Of primary concern is construction noise generated by pile driving operations. High sound levels can cause hearing loss (threshold shifts), elicit stress, and alter behavior of fish. Impacts will vary by species, as well as sound exposure (Popper et al. 2003).<br>• For Atlantic cod, noise of frequencies from 100-1000 hertz has been found to reduce reproductive output (Sierra-Flores et al. 2015).<br>• Operational phase noise is not likely to cause permanent damage, but it may mask communication in some fish species (Wahlberg and Westerberg 2005). This remains one of the least studied areas of wind farm noise impacts (Mooney et al. 2020).<br>• In the context of anthropogenic noise, it is important to consider invertebrates separately from vertebrates; invertebrates (e.g., mollusks) hear in a different manner than vertebrates due to their nervous system structure and hearing organs. Their hearing organs, statocysts, work by detecting particle motion instead of sound pressure (Stocker 2002).<br>o There may be negative impacts near the project, as de Soto et al. (2013) suggest that even routine anthropogenic noise can decrease recruitment of scallop larvae in wild stocks (Madsen et al. 2006).<br>o Jones et al. (2020) determined that longfin squid exhibited a startle response to pile driving noise in a lab setting but they habituated quickly in the short term. 24 hours later, the squid were re-sensitized to the noise. | Comment noted. We reviewed the citations you have provided and revised the text/analysis as appropriate. |
| BOEM-2022-0045-0110 | 18 | The Draft EIS recognizes that there is a concern that hydrodynamic impacts could potentially lead to negative population-level effects on the reproductively isolated cod spawning stock on and around Cox Ledge.83 It notes that "[i]n the case of reproductively isolated populations, such as southern New England Atlantic cod, hydrodynamic effects could be more significant should they result in prolonged negative changes in larval survival rates."84 While the Draft EIS concludes that hydrodynamic effects are unlikely to be biologically significant at population scales, it acknowledges that it "did not consider potential effects on fish stocks, such as Atlantic cod, that spawn in specific locations."85 For the final EIS (FEIS), BOEM must provide more detailed analysis of the impacts from hydrodynamic effects on fish stocks that spawn in specific locations, and particularly the reproductively isolated Atlantic cod spawning stock in and around Cox Ledge. | Thank you for your comment. The results from Johnston et al. 2021, a BOEM-funded study that modelled hydrodynamic impacts to representative fish and invertebrate species in the area, indicated that effects would be localized and not biologically significant at population scales. Further, there is limited spatiotemporal understanding of spawning cod dynamics throughout the Southern New England/Georges Bank region. The analysis in the DEIS currently utilizes the best available science for Atlantic cod and hydrodynamic larval transport research to support the impact determination. |
| BOEM-2022-0045-0069 | 18 | Most previous studies on electromagnetic fields have focused on direct current (DC) cables, while the cables proposed in the U.S. have all been alternating current (AC). DC and AC cables should not be considered comparable when determining impacts, as fish may perceive static and alternating magnetic fields differently (Rommel and McCleave 1973a).<br>• Various elasmobranchs (e.g. smooth dogfish and blue sharks) and teleost fish (sea lamprey, American eels, and Atlantic salmon) are all thought to be able to sense electric fields at low levels (Heyer et al. 1981; Kalmijn 1982; Rommel and McCleave 1973b). However, it is presently unknown whether behavioral changes will result from detected AC electromagnetic fields. Behavioral responses of American lobster and little skates have been documented in response to DC electromagnetic fields emitted by two high-voltage DC cables: increased foraging/exploratory behavior in skates, and a subtler exploratory response in lobsters (Hutchison et al. 2018; Hutchison et al. 2020).<br>• The impacts of induced electromagnetic fields are expected to be greater for cartilaginous fish because they use electromagnetic signals to detect their prey (Bailey et al. 2014; Gill 2005; Gill and Kimber 2005; Bergstrom et al. 2014).<br>• Other fish may also be affected by interference with their capacity to orient in relation to the geomagnetic field, potentially disturbing fish migration patterns (Metcalf et al. 2015) and ultimately disturbing their habitat. | Comment noted. We reviewed the citations you have provided and revised the text/analysis as appropriate. |
| BOEM-2022-0045-0110 | 19 | Alternative C would result in reduced impacts to complex benthic habitats, the EFH that overlap with such areas, and finfish, and we urge BOEM to select this alternative to mitigate impacts to benthic resources, finfish, invertebrates, and EFH. BOEM estimates that Alternative C would reduce overall seafloor disturbance associated with the construction of monopiles by up to 35%, and that | Comment noted. No changes required to EIS. |

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| | | Alternative C in combination with Alternative F, would reduce impacts by a further 8%.86 Alternative C would also reduce the impacts to benthic habitats relating to anchoring and emplacement of the interarray cable.87 Under the proposed action, 6,615 acres of benthic habitat would be impacted by construction of the Revolution Wind Export Cable, Offshore Substation-Link Cable, and Inter-Array Cable Installation and Vessel Anchoring, but only 4,440 acres and 4,374 acres would be impacted under Alternatives C1 and C2 respectively.88 Additionally, whereas under the proposed action, seafloor preparation for WTG and offshore substation foundation installation would impact around 734 acres, this would be reduced to approximately 480 acres under Alternatives C1 and C2. Importantly, although approximately 50% of the habitats impacted under the proposed action are classified as large-grained complex or complex habitats, Alternatives C1 and C2 would reduce the total percentage of acres of large-grained complex and complex habitats impacted to between 30-35%.89 BOEM also finds that because Alternative C would reduce the total length of interarray cable, the overall impacts from cable construction and maintenance would decrease under this alternative.90 | |
| BOEM-2022-0045-0071 | 19 | We strongly support all efforts to avoid impacts to SAV and other structured habitats along the cable route, as recommended in the Council policies. The New England Council has designated inshore areas from the coastline to 20 meters depth as habitat areas of particular concern (HAPC) for juvenile Atlantic cod. Structurally complex habitats, including eelgrass, mixed sand and gravel, and rocky habitats (gravel pavements, cobble, and boulder) with and without attached macroalgae and emergent epifauna, are essential habitats for these fish. In inshore waters, young-of-the-year juveniles prefer gravel and cobble habitats and eelgrass beds after settlement, but in the absence of predators also utilize adjacent un-vegetated sandy habitats for feeding. The New England Council recently recommended an HAPC for cod spawning habitat and complex habitats. The designation overlaps the Revolution Wind lease area and other Southern New England lease areas and is pending approval by NOAA Fisheries. The Mid-Atlantic Council has designated all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, as HAPC for summer flounder. In defining this HAPC, the Mid-Atlantic Council also noted that if native species of SAV are eliminated, then exotic species should be protected because of functional value; however, all efforts should be made to restore native species. SAV also provides important habitat for many other species. | Thank you for your comment. Revolution Wind has stated that they will avoid impacts to SAV and structured habitat during RWEC installation to the greatest extent practicable. The RWEC installation corridor overlaps mapped juvenile inshore cod HAPC at selected locations within Narragansett Bay, however, these mapped features are entirely outside of the planned installation footprint and the projected extent of suspended sediment impacts. Revolution Wind has mapped the presence of eelgrass beds in proximity to the RWEC sea-to-shore transition site. These beds are entirely outside of the construction footprint and would not be directly disturbed by sea-to-shore construction, but could be exposed to suspended sediment impacts depending on the construction method selected. Any sediment-related effects would be short-term in duration and are not expected to degrade the functional value of these habitats as EFH. |
| BOEM-2022-0045-0069 | 19 | The development may offer benefits to certain fish and invertebrate species through structure creation (i.e. artificial reefs). The turbine foundations may thus increase hard substrate for recruitment following any disturbance during the construction phase (Petersen and Malm 2006). The reef effect can increase food availability (Degraer et al. 2020) and biodiversity and biomass (Inger et al. 2009; Gill 2005; Linley et al. 2007). However, new habitat created by the turbine foundations may not benefit all species that utilized the local habitat prior to construction, and may serve to attract biomass as opposed to result in increased ecosystem productivity. As such, it is important that these elements be evaluated as possible throughout the project to best understand the long-term effects of the region. | Comment noted. We reviewed the citations you have provided and revised the text/analysis as appropriate. |
| BOEM-2022-0045-0110 | 20 | The DEIS concludes that installing fewer monopile foundations and reducing the length of interarray cable length under Alternative C would "noticeably reduce the extent of long-term to permanent impacts" on benthic habitat, habitat-forming invertebrates, and the finfish whose habitats overlap with the RWF project area."91 The Draft EIS also finds that Alternative C would specifically result in less extensive impacts to large-grained complex and complex habitats. It explains that Alternative C was designed to "avoid and minimize impacts to large-grained complex and complex habitats of value for certain fish species of concern" and that this alternative would "reduce the extent of impacts for species, such as Atlantic cod, that associate with specific complex benthic habitats on Cox Ledge within the proposed RWF footprint."92 The Draft EIS also concludes that the alternative would reduce the extent of hydrodynamic impacts on finfish when compared to the proposed action. However, the DEIS finds that relative to hydrodynamic impacts, "it is not possible to determine if this would result in measurable differences between alternatives in impacts to finfish."93 Alternative C would avoid, minimize, and mitigate impacts to complex habitats from the presence of structures, anchoring, and cable emplacement to a greater extent than the Proposed Action, which in turn would reduce impacts to habitat-forming invertebrates and finfish, including the geographically isolated Atlantic cod spawning stock on Cox Ledge. Through the construction of even fewer WTGs, Alternative F would reduce these impacts further. BOEM should select Alternative C (in combination with Alternative E, and as necessary, Alternative F in order to achieve necessary protection of benthic habitat and tribal cultural resources). | Comment noted. No changes required to EIS. |
| BOEM-2022-0045-0069 | 20 | The RIDEM looks forward to reviewing proposed fisheries resource monitoring survey designs associated with the Revolution Wind Farm. We recommend survey proposals should include a preliminary power analysis demonstrating that the proposed design will achieve a minimum of 80% statistical power (see Cohen 1988). However, higher power levels, with low effect sizes should be targeted. | Thank you for the comment. The fisheries resource monitoring plan is addressed in the EIS as an environmental protection measure, meaning it is a component of the project. Appendix F of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures |

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| | | Both power and effect size should be discussed with the FAB prior to survey implementation. Efforts should also be made to use shared sampling methods and results with other wind development surveys and existing fisheries surveys. | that BOEM could choose to incorporate into the Record of Decision. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. BOEM fully supports regional monitoring and coordination with state and cooperating federal agencies and regional fishery management councils to develop appropriate mitigation measures and will incorporate results in future decisions. |
| BOEM-2022-0045-0110 | 21 | Underwater noise from anthropogenic sources, including from offshore wind development, can have a variety of effects on marine fishes, including behavioral impacts, masking of communication or other biologically-important sounds, physiological changes, hearing loss, and physical injuries.94 Noise impacts to fish vary depending on the type of fish species. The hearing specialist group of fish, which includes Atlantic cod, hake, and black sea bass, rely on sound for communication and other behaviors and, thus, are more susceptible to noise impacts.95 Atlantic cod, in particular, have relatively strong hearing abilities, over a frequency range that overlaps with many forms of anthropogenic noise, including pile-driving, vessels, and wind turbine operation.96 Moreover, as recognized by BOEM, "[n]oise impacts could be greater if they occur in important spawning habitat, occur during peak spawning periods, and/or result in reduced reproductive success in one or more spawning seasons, which could result in long-term effects to populations if one or more year classes suffer suppressed recruitment."97 There are multiple studies pointing to reasons for concern over possible impacts of wind farm-related noise on cod spawning. Experimental work exposing captive adult cod during the spawning period to playback of noise over frequencies typical of shipping and wind turbine operation has shown negative impacts on egg production and fertilization rates in adult cod, reducing viable embryos by 50%.98 Playback of recordings of ship noise has shown impacts on growth and body shape in larval cod as well as increased susceptibility to predators and hence implications for compromised survival.99 Spawning behavior in the wild is known to be generally sensitive to disruption: fishing activity on spawning grounds, for instance, has been shown to disrupt spawning even for those fish not captured.100 In addition to these potential direct impacts on cod spawning-related physiology and behavior, noise could lead to interference of cod acoustic communication. Cod produce vocalizations ("grunts") during spawning that overlap in frequency with anthropogenic noise. Measurements of cod grunts along with shipping and ambient sound levels made during spawning periods in the vicinity of Stellwagen Bank suggest that the distances over which cod can detect grunts might be reduced due to masking by vessel noise.101 Cod grunts are thought to serve a role in courtship and attracting mates, and interference of this communication by wind farm-related noise could potentially compromise spawning success and hence population health.102 Studies relating to European wind farms have suggested that operational noise from wind turbines might be detectable by cod to distances of 4-13 km.103 In one study, tracking of small numbers of tagged cod at a Belgian wind farm during periods when individual wind turbines were out of operation relative to periods before and after suggested no evidence of behavioral avoidance.104 In contrast, another study observed an increase in catchability of cod within 100 m of a wind turbine when it was not operating.105 Overall, impacts within the range of noise detectability might more likely relate to masking of cod calls and reduction of communication ranges than to avoidance or similar behavior.106 The Draft EIS's conclusions on the likely noise impacts on Atlantic cod from the Revolution Wind project are largely consistent with these studies. It finds that species like Atlantic cod may be more sensitive to noise impacts, and that Atlantic cod are "particularly sensitive to noise and other forms of disturbance during spawning, which can lead to longer term and more consequential effects." It emphasizes that Atlantic cod "rely on communication during spawning, using low-frequency grunts to locate potential mates and signal fertility" and that cod may interrupt or abandon spawning altogether under conditions of intense disturbance."107<br>The Draft EIS explains that because "scientific information indicates that the Atlantic cod that occur within in and around the RWF are a reproductively isolated population, . . . the potential for population-level effects from construction related impact pile driving and other noise sources is an issue of particular concern."108 It notes that three years of monitoring have demonstrated that cod display high spawning site fidelity to the areas of Cox Ledge, within and in the vicinity of the RWF.109 The Draft EIS further finds that "[a]lteration of the ambient noise environment could interfere with communication and alter behavior in ways that could disrupt localized cod spawning aggregations" and that if pile driving occurs when maturing and mature spawning cod are present in the RWF work area, the noise impacts "would constitute a moderate to potentially major adverse impact."110 In addition to the noise impacts from construction, BOEM observes that operational noise from WTGs could reduce the ability of hearing specialists like Atlantic cod, haddock, pollock, and hake to communicate effectively within a few hundred feet of a turbine. It notes that "[t]he low-frequency operational noise produced by WTGs overlaps the communication frequencies used by cod and other hearing specialist species like haddock," which "suggests that operational noise exceeding ambient levels could cause masking effects that reduce the effective communication range for these species and reduce reproductive success and future recruitment" for these species. BOEM finds that "these effects could range | Thank you for your comment. BOEM has reviewed the available scientific literature useful for interpreting potential WTG operational noise impacts to finfish, including Atlantic cod. BOEM used this information to refine the impact analysis and provide additional rationale. The impact determinations presented are based on current understanding and the best available science. |

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| | | from minor to moderate adverse depending on how each species uses the affected area during periods when communication is important."111 However, the Draft EIS also acknowledges that "the potential for more significant operational noise effects on EFH species such as cod is uncertain" and that should such effects occur, they could result in long-term population-level effects that could be major in significance."112 | |
| BOEM-2022-0045-0110 | 22 | While BOEM concludes that the noise impact levels under Alternatives C and F would be similar to the proposed action, it anticipates that both Alternatives C and F would reduce the duration and extent of noise impacts from WTG and OSS foundation installations and that the impacts would vary depending on the reduced number of WTGs and/or OSS foundations under each alternative. BOEM also notes that because Alternatives C and F would require fewer WTGs, this would result in fewer construction days, which in turn would result in less noise injuries to finfish.113 BOEM, however, has not conducted a separate analysis on the extent to which Alternative C would reduce noise impacts to Atlantic cod, and specifically spawning cod. In the Final EIS, BOEM should improve its analysis of the extent to which Alternative C would specifically reduce impacts to Atlantic cod spawning stocks in and around Cox Ledge. The research on noise impacts on cod spawning, discussed above, suggest that avoiding the construction and operations of WTGs in Cox Ledge, and the noise associated with such activities, has the potential to significantly reduce impacts to the cod spawning population in that area. | Thank you for your comment. The FEIS has been revised to incorporate additional information and discussion regarding how Alternative C would further reduce noise-related impacts to spawning Atlantic cod in the lease area due to a decrease in construction-related activity (i.e., WTG installations) in the central portion of the lease area (i.e., areas where cod spawning has been documented). |
| BOEM-2022-0045-0086 | 22 | In Table 3.13-11 of the DEIS, there is a proposed mitigation measure stating: "Revolution Wind would be required to use natural rounded stone for cable and scour protection within large-grained complex and complex habitats and avoid use of concrete mattresses where practicable. The selected materials should be designed and placed restore three-dimensional structural complexity." Revolution Wind suggests that this mitigation measure be amended to allow for consideration of technical feasibility. For instance, the scour protection layer must be comprised of materials that allow for structural integrity to protect the foundations, as described in Section 3.3.4.2 of the COP. Revolution Wind is not aware of any currently available science favoring the use of natural rounded stone as scour protection in subtidal habitats. | BOEM reviewed recommended mitigation measures and revised as appropriate . |
| BOEM-2022-0045-0110 | 23 | By reducing the overall number of WTGs and length of interarray cable needed, Alternative C (in combination with Alternative E, and, as needed, Alternative F), would reduce impacts to benthic habitats, EFH, and finfish. BOEM proposes both an Alternative C1 and an Alternative C2. While we do not make a specific recommendation regarding these two sub alternatives, we note that Alternative C2 is likely the preferred sub alternative because it would reduce impacts to spawning Atlantic cod more than Alternative C1.114 In particular, Alternative C (in combination with Alternative F, if needed) would reduce impacts from the presence of structures, anchoring, and cable emplacement, for both construction and operations, on these habitats and species when compared to the proposed action. Moreover, as discussed, complex habitats in the area of the RWF are important for many invertebrates and finfish and overlap with EFH for many NEFMC-managed species. Because Alternative C avoids siting WTGs in large-grained complex and complex habitat areas of Cox Ledge to a greater degree than under the proposed action, it would reduce overall impacts to complex habitats, as well as the isolated spawning cod population that is present in these habitat areas. The fact that complex habitats may take a decade or longer to recover from offshore wind development activities provides additional justification for selecting Alternative C. Further, although BOEM has not studied the extent to which Alternative C would reduce noise impacts to Atlantic cod, research suggests that siting fewer WTGs in the complex habitats that overlap with Cox Ledge would reduce construction and operation noise impacts on spawning cod populations. Accordingly, BOEM should select Alternative C (in combination with Alternative E and, as needed, Alternative F.115 | Comment noted. No changes required to EIS. |
| BOEM-2022-0045-0110 | 25 | The Draft EIS proposes several mitigation and monitoring measures for benthic resources, invertebrates, finfish, and EFH. These include: (1) an anchoring plan; (2) sound field verification; and (3) passive acoustic monitoring.117 More generally, the Draft EIS states that Revolution Wind is planning fisheries and benthic monitoring studies and that it has developed a fisheries and benthic monitoring plan.118 We generally support these measures and propose several additional measures to reduce impacts to benthic habitats, finfish, and EFH. | Comment noted. No changes required to EIS. |
| BOEM-2022-0045-0086 | 25 | EMF values presented in Section 3.13.2.2.2 and Table 3.13-5 as thresholds for potential effects on sharks/skates are derived from low frequency (i.e., below 20 hertz (Hz)) or DC sources. These are not applicable to responses to HVAC transmission cables. The DEIS also compares calculated field strengths for the buried HVAC cable to the ambient geomagnetic field, which is inappropriate, given the differences in frequencies (0 Hz vs. 60 Hz). | The purpose of the comparison is to demonstrate that projected EMF strength is low relative to known detection thresholds and existing exposures. As stated in text, we recognize that EMF from HVAC transmission is not directly comparable to the earth's natural magnetic field and biogenic fields. Text revised to further clarify. |
| BOEM-2022-0045-0086 | 26 | Section 3.13.2.2.3 on cumulative impacts includes the statement: "EMF levels sufficient to cause limited behavioral effects on finfish could occur in highly localized areas". This conclusion, however, is not supported by the available data regarding HVAC magnetic fields. Instead, this conclusion appears to be based on research with HVDC transmission cables that has been included in the DEIS. As this | Thank you for the comment. The concern regarding confusion about HVDC versus HVAC transmission is acknowledged. However, much of the available research on EMF exposure, including some of the more current science, |

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| | | project has been designed and planned to include HVAC cables, it is not appropriate to assess effects for HVDC cables. We strongly recommend that the information and conclusions related to HVDC transmission cables and EMF be removed from the DEIS, as Revolution Wind project incorporates HVAC transmission cables. Thus, it is not appropriate or relevant for conclusions and research related to HVDC EMF be included, since this puts Revolution Wind in the position of assessing potential for adverse effects from cables not specified as part of this project. | considers the effects of HVDC. BOEM revised text to further clarify that findings related to HVDC exposure are not necessarily applicable to HVAC transmission at 60 Hz. |
| BOEM-2022-0045-0110 | 27 | BOEM also proposes sound field verification and passive acoustic monitoring for finfish and EFH.120 The sound field verification would require Revolution Wind to submit an acoustic monitoring and sound field verification plan at least 90 days prior to initiating underwater noise producing construction activities, which would contribute to improving understanding of the nature and duration of noise impacts and provide the information necessary to ensure that effects do not exceed certain levels. Additionally, BOEM proposes that Revolution Wind prepare a passive acoustic monitoring plan to record ambient noise and fish vocalizations within the RWF. The plan will include the deployment of moored or autonomous passive acoustic devices capable of detecting the vocalizations of spawning cod, and potentially other species.121 Passive acoustic monitoring devices would be implemented prior to and during the construction period and continue for at least three years of project operations once construction is completed.122 As these measures will help improve our understanding of the impacts of offshore wind construction and operations on EFH and finfish species, including noise impacts, BOEM should require these monitoring measures. | Comment noted. These measures are part of the Proposed Action. |
| BOEM-2022-0045-0110 | 28 | In addition to these monitoring efforts, BOEM should conduct Atlantic cod spawning surveys in the areas of the Revolution Wind facility and export corridor to further our understanding of the impacts of offshore wind on cod spawning, and inform the development of adaptive management mitigation measures, if needed. | Comment noted. The use of PAM buoys or autonomous PAM devices will be used to monitor cod vocalizations before, during and post-construction. Monitoring would provide info on cod aggregations during spawning periods, and avoid noise impacts in these areas during construction. No changes required to EIS. |
| BOEM-2022-0045-0110 | 29 | BOEM also stated that, based on acoustic monitoring and sound field verification, it could require additional adaptive measures to avoid disrupting spawning aggregations of Atlantic cod. It suggests that based on the acoustic monitoring, it may require Revolution Wind to "restrict pile-driving activity during the cod spawning season to avoid and minimize adverse impacts on Atlantic cod spawning and reduce broader population level-effects," but that this adaptive approach "has not been fully developed and the avoidance and minimization measures have not been implemented and tested."123 If through monitoring BOEM determines that time-of-year restrictions will reduce impacts to cod spawning, BOEM should require Revolution Wind to implement such adaptive restrictions on construction activities. | Comment noted. No changes required to EIS. |
| BOEM-2022-0045-0110 | 30 | More generally, BOEM states that Revolution Wind is committed to preconstruction, construction and installation, and post-construction fisheries and benthic monitoring studies to assess the impacts on fisheries and benthic habitats.124 The Draft EIS provides few details on these monitoring studies. However, at a minimum, BOEM should require Revolution Wind to conduct the necessary pre-construction, construction, and post-construction monitoring of benthic and pelagic habitats and associated flora and fauna to detect any physical changes and impacts to these habitats and species that occur because of construction activities, the presence of WTG structures in the water columns, hydrodynamic effects, and other impacts. | Comment noted. Revolution Wind has prepared a Fisheries Research and Monitoring Plan that is considered part of the project. |
| BOEM-2022-0045-0100 | 60 | Under Noise, insert a discussion of research related to injury and mortality to certain species in close proximity to noise impacts (pile driving), startle behavior that could affect spawning activities and recruitment success in social spawning species such as cod and longfin squid, and bivalve closure response to noise that could affect respiration and feeding (see Roberts and Elliott, 2017 (Good or Bad Vibrations? Impacts of Anthropogenic Vibration on the Marine Epibenthos available at https://reader.elsevier.com/reader/sd/pii/S0048969717306290?token=C441F4E5607842CC831E40C2A78CE074876745A457C83262E689ADE59738 BCC4454808E6ADC95427569999F9C1D5AD6E&originRegion=us-east-1&originCreation=20220308144935). Also, insert justification why noise from all other wind projects occurring for upwards of 10 years within the Regional Fisheries Area and overlapping with the distribution of regionally important fishery species distributions would not result in population-level effects for target species (all species harvested in the region are target species), particularly sensitive populations such as Southern New England cod. Justification for the conclusions reached should reflect the criteria in Table 3.3-2. Cumulative impact of such noise and associated behavior and physiological changes could have measurable impacts on species, which would, in turn, impact fisheries. This is similar to our comment 7 for Section 3.9 during the cooperating agency review. | EIS analysis has been revised to incorporate current scientific information and acknowledge uncertainty. |

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| BOEM-2022-0045-0086 | 84 | Page 3.13-53, Table 3.13-7: The values in Table 3.13-7 are inconsistent and there is no information in the text regarding the calculations. Further explanation on how the values were calculated would be helpful. There are very high acreages provided for habitat conversion related to seabed preparation in large grain and complex habitats, and these do not crosswalk directly to the habitat mapping report. | The table incorrectly conflates impacts from seabed preparation and vessel anchoring. Table and quantities revised. As stated, the COP indicates that anchoring impacts could occur anywhere within a 200-meter impact radius around each foundation, which equates to approximately 3,163 acres of potential overlapping habitat impacts. However, as noted in the text and table footnotes, while vessel anchoring impacts have not been quantified in the COP they are unlikely to affect the entirety of this area. |
| BOEM-2022-0045-0100 | 95 | Global comment: The Finfish and Essential Fish Habitat analyses are flawed and we strongly recommend they be substantially revised prior to publication of the FEIS. In our comments on this section we highlight concerns with the evaluation of impacts to regional resources of significant concern and the approach to the analysis which does not allow for a meaningful evaluation and analysis between the project alternatives. Alternative C would eliminate development in a known cod spawning location and reduce impacts to vulnerable and sensitive EFH by approximately one-third, yet that is not apparent from the analysis. Impacts from Alternative C could be further reduced when combined with Alternative F, but there is no discussion or analysis of this in the document. This project is proposing development in a highly complex, sensitive habitat area; the consequences of that should be transparent to the public and the decision makers. Please see comments specific to the selected geographic analysis area for each resource, and the global comment related to complex habitat and cod spawning below. The analysis approach should be revised to provide a reasonable evaluation of project alternatives and to reflect the extent (both temporal and areal) of adverse impacts that would occur from development in the highly complex habitats of Cox Ledge within the lease area, including a discussion and analysis of the project impacts to Atlantic cod that are likely to occur under the Proposed Action. | Comment noted. BOEM evaluated the analysis structure and level of detail and made updates based on other comments received that were specific to a section, page, text or analysis presented in the DEIS. Analysis has also been updated throughout, consistent with revisions to the analysis presented in the EFH document and other project related documents. |
| BOEM-2022-0045-0100 | 96 | Global comment: Analyses overall are brief and would benefit from consideration of relevant project details in order to better understand the relevant project activities and impacts associated with them. Additionally, impact definitions make it difficult to understand what the actual impact on the species/taxa has been. | Comment noted. BOEM evaluated the analysis structure and level of detail and made updates based on other comments received that were specific to a section, page, text or analysis presented in the DEIS. Analysis has also been updated throughout, consistent with revisions to the analysis presented in the EFH document and other project related documents. |
| BOEM-2022-0045-0100 | 97 | Global comment: We appreciate that you have expanded the DEIS to note the project overlap with cod spawning and Cox Ledge, however the document is still lacking substantive analyses and evaluations of impacts that are likely to occur to cod spawning activity and the highly complex habitats on Cox Ledge. Further, the document relies on the success of unproven mitigation measures to offset the impacts that are identified and analyzed. For example, it is acknowledged that pile driving may adversely affect cod spawning, potentially resulting in a major impact, but the DEIS concludes that this impact can successfully be mitigated through the implementation of an untested monitoring plan. We have significant concerns with such an approach, and the assumptions that are required for such an approach to be successful. Additionally, project activities that are likely to disrupt and adversely affect cod spawning aggregations are either not analyzed at all (e.g., seafloor preparation), or dismissed without any supporting rationale (e.g., vessel noise and HRG surveys). The evaluation and analysis of project activities should be revised to include an evaluation and analysis of all activities that could disrupt spawning activity. Particular emphasis should be placed on activities that will result in benthic disturbance or generate noise as such activities may disrupt aggregations or mask vocalizations. Further, spawning cod exhibit strong site-fidelity to spawning grounds. The potential for abandonment of the spawning grounds within the lease area due to the extensive modification of habitats within the lease area that would occur under the proposed action should be acknowledged and included in the analysis. | Comment noted. BOEM evaluated the analysis structure and level of detail and made updates based on other comments received that were specific to a section, page, text or analysis presented in the DEIS. Analysis has also been updated throughout, consistent with revisions to the analysis presented in the EFH document and other project related documents. |
| BOEM-2022-0045-0100 | 98 | Global comment: We appreciate that additional literature and supporting information is included in the DEIS, including a more thorough evaluation of some impact producing factors (IPFs) for Atlantic cod. However, the provided analysis remains incomplete and does not include pertinent information relevant to the assessment of project impacts in the context of the existing environment and resources on Cox Ledge. We also appreciate that the temporal impacts are defined in a manner consistent with our recommend timeframes, however the timeframes do not appear to be consistently applied. Further, and as noted in comments below, the provided analysis relies heavily on perceived beneficial effects from the construction and installation of artificial structures and materials, as well as unsupported statements and conclusions. Please refer to our prior comments on other OSW NEPA documents to assist you in developing a more accurate analysis of the expected project impacts. | Comment noted. BOEM evaluated the analysis structure and level of detail and made updates based on other comments received that were specific to a section, page, text or analysis presented in the DEIS. Analysis has also been updated throughout, consistent with revisions to the analysis presented in the EFH document and other project related documents. |
| BOEM-2022-0045-0100 | 100 | Global comment: The impact analysis for this section largely ignores the complex benthic habitats present in the lease area and the species that use these habitats. The lease area is on Cox Ledge and supports a highly complex mix of substrates, with more than half of the lease area supporting highly complex natural rocky habitats. The analysis largely ignores the long-term to permanent effects of the | Comment noted. The analysis has been refined to incorporate a more detailed characterization of impacts to complex benthic habitat. However, BOEM does not necessarily agree that those impacts would constitute permanent effects |

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| | | proposed action for both finfish and EFH. For those impacts that are identified, the adverse impacts that are acknowledged are largely minimized based on the potential, perceived beneficial "reef effects" to balance/offset the extensive adverse impacts to important, highly complex natural rocky habitats that would occur under the proposed action. The Proposed Action analysis should include a reasonable analysis of the expected long-term and permanent effects to finfish and EFH, in the context of Cox Ledge. This should include the potential adverse effects that may occur as a result of the expected artificial reef effects that will occur to the highly complex, natural rocky habitats that occur throughout the lease area. | at a regional scale, as those impacts would affect a small percentage of available habitat and would recover with mitigation (i.e., decommissioning at end of project life). These conclusions are not consistent with a major impact per the DEIS criteria. |
| BOEM-2022-0045-0100 | 101 | Global comment: Please check and clarify all presented calculated impact areas. Similar to the Benthic Resources section, the presented calculated areas in the tables and text do not align and the reason is unclear. Specific examples of inconsistencies are provided below. | The impact acreage for each alternative was calculated from GIS using benthic habitat and project configuration data layers provided by the applicant, impact radii and buffer widths for foundation and cable installation from the COP, respectively, and preliminary alternative configurations developed by BOEM. All calculations were reviewed for consistency and revised where needed to reflect refinement of the alternatives in the FEIS. As stated, each of the alternatives would reduce the total acres of impacts in complex habitat types compared to the proposed action. However, while the total impact footprint in those habitat types may decrease, the proportional distribution of impacts could increase as a percent of the total for some alternatives. |
| BOEM-2022-0045-0100 | 102 | Global Comment: As the DEIS is revised, to ensure consistency between documents please refer to the recent comments we have submitted to BOEM<br>on the BA prepared for the ESA section 7 consultation. | Comment noted. BOEM has reviewed updates to the Section 7 consultation and revised the EIS for consistency in multiple places throughout the document. |
| BOEM-2022-0045-0100 | 103 | This section notes that "Geographic Analysis Areas (GAAs) are not used as a basis for analyzing the direct and indirect effects of the Proposed Action, which represent a subset of these broader effects and expressed over a smaller area. These impacts are analyzed specific to each IPF." This language is also used in other sections of the document, but in general, the intent and relevance of this statement are unclear as written, and it should be revised to ensure analysis areas for all impacts are clear. Additionally in this section, on page 3.13-31, the text does seem to use the GAA as a basis for analyzing the effects from the Proposed Action, when it notes that "...2) the loss of individuals would likely be insignificant relative to natural mortality rates for planktonic eggs and larvae across the GAA, which can range..." Please see additional comments on GAAs and scale of impacts in the attached letter. | The geographic analysis areas presented in the DEIS are based on geographic distribution of organisms that could be affected by the cumulative effects of the Proposed Action and other proposed offshore wind projects on the Mid-Atlantic OCS. BOEM has reviewed the discussions of geographic area within the FEIS and deemed it appropriate for analysis. |
| BOEM-2022-0045-0100 | 104 | The geographic analysis area does not match the scale of project activities. The analysis area is the entire OCS from the Gulf of Maine to Cape Hatteras. However, there are no project activities occurring in the Gulf of Maine and project activities (vessels) only travel as far south as Virginia. Further, there is no rationale for the size of the analysis area, which serves to dilute the effects of the project specific impacts to finfish and EFH. Of particular concern is the lack of consideration of regional scale importance of Cox Ledge in supporting finfish and the unique features that provide EFH for managed fish species. A more reasonable geographic analysis that allows for a meaningful evaluation of the impact producing factors (IPFs) of the proposed action, and alternatives, should be selected. | The geographic analysis areas presented in the DEIS are based on geographic distribution of organisms that could be affected by the cumulative effects of the Proposed Action and other proposed offshore wind projects on the Mid-Atlantic OCS. BOEM has reviewed the discussions of geographic area within the FEIS and deemed it appropriate for analysis. |
| BOEM-2022-0045-0100 | 105 | We appreciate that you have included the newly proposed Council HAPC designation for southern New England. However, it appears that the two separate habitats (cod spawning habitat and complex habitats) are being conflated as a single habitat - cod spawning locations within complex habitat. The New England Fishery Management Council approved an HAPC for: 1) cod spawning; and 2) complex habitats that occur anywhere within the defined area (approximately a 10 km buffer surrounding the RI/MA WEA). The description and analysis of impacts to the HAPC should be revised to clearly distinguish the two habitats designated as an HAPC. | HAPC description revised for clarity. |
| BOEM-2022-0045-0100 | 106 | Under Affected Environment, please describe the status of important finfish stocks that are primarily affected by this project. The current status of affected stocks is an important element to include when considering impacts to finfish species and should be integrated into the DEIS. For example, the Georges Bank cod stock, the stock affected by this action, has experienced declining biomass levels for some time and has a long history of low recruitment. Activities that may affect spawning success and future recruitment may exacerbate such trends and result in population-level impacts. A preliminary list of fish stocks affected by this project can be found on our commercial fisheries socioeconomic impact reports on our website (https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports/WIND/WIND_AREA_REPORTS/Revolution_Wind.html#Revenue_by_Port ). Stock status and trends for individual species can be found on our Stock Smart webpage (https://www.st.nmfs.noaa.gov/stocksmart?app=browse-by-stock) or on our FishWatch website (https://www.fishwatch.gov/). | Fish stock status has been provided in Table 3.13-1. |

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| BOEM-2022-0045-0100 | 108 | The use of other environmental review documents to justify impacts for other projects is not appropriate. This section uses other EISs as evidence that species will not be affected without any context or rationale. E.g. "BOEM (2021) has concluded that vessel encounters would have no effect on this species [oceanic whitetips]; therefore, it is not considered further in this EIS." Additionally, documents like BOEM 2021 (SFW BA) should not be used for this purpose. Citations should be reviewed throughout this section to ensure that they provide information that supports the conclusion being made. The rationale/analysis should be carried out in this document, citing primary literature as needed. | References revised and updated for primary sources where appropriate. The SFWF BA reference was removed. |
| BOEM-2022-0045-0100 | 109 | Atlantic sturgeon critical habitat is mentioned but no further analysis included. The document should state whether project activities will occur in critical habitat and evaluate any potential impacts. | EIS revised to clarify that no project activities will occur in Atlantic sturgeon critical habitat, with the exception of construction vessel transits to specific ports. |
| BOEM-2022-0045-0100 | 110 | It appears Shortnose sturgeon and Atlantic sturgeon are mixed up in the first paragraph on this page. Please ensure references to these species are correct and consistent. | Text revised to clarify. The text transitions from Atlantic sturgeon to shortnose sturgeon. The citations are for literature on the migratory patterns and distribution of shortnose sturgeon. |
| BOEM-2022-0045-0100 | 111 | Water withdrawals from DC converter stations, lighting, vessel traffic, and habitat disturbance should be considered as IPFs. | The IPFs evaluated are those that are likely to result in greater than negligible effects. Those IPFS that are likely to result in negligible effects are analyzed in Appendix E. No water withdrawals are proposed for DC to AC conversion. |
| BOEM-2022-0045-0100 | 112 | Under Climate Change, please note that there will be both beneficial and adverse impacts from climate change. Hare et al. (2016 - available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0146756) indicate that while some species are negatively affected by climate change, others are either neutrally or positively affected by climate change. | Text revised to clarify minor beneficial impacts could occur as well. |
| BOEM-2022-0045-0100 | 113 | The bycatch IPF references inverts when it should be on finfish. | Text revised to clarify. |
| BOEM-2022-0045-0100 | 114 | Under EMF, please revise the impact conclusions from "negligible to minor" to "negligible to moderate" because existing information indicates that both HVAC and HVDC cables will be routed through the Geographic Analysis Area from other projects based on existing information. This is consistent with text provided in this section. | To our knowledge no projects using HVDC transmission have been proposed. The EIS states that the "*EMF from planned and potential future activities would have a negligible to minor adverse effect for HVAC, or moderate adverse if HVDC is used.*" No change required to EIS. |
| BOEM-2022-0045-0100 | 115 | It is unclear why Shortnose sturgeon are mentioned in the last sentence of the page. Please review for the FEIS. | Sentence revised to indicate that shortnose sturgeon could be affected by underwater noise in or near Narragansett Bay. |
| BOEM-2022-0045-0100 | 116 | Under Noise, please insert a discussion on impacts to other finfish species beyond just Atlantic sturgeon and the giant manta ray to fully describe potential impacts to finfish species. Startle and flee/avoidance responses should be discussed and noise masking impacts should be discussed for species for which sound is important such as Atlantic cod. Existing research indicates pile driving noise could elicit behavioral responses in certain species as far away as 7.5 km from the source. Given the proximity of adjacent wind projects, such noise could have impacts on species in adjacent projects. If behavioral responses to noise disrupt spawning aggregations or activity, impacts could occur for the duration of such noise. This should be noted in this section. | Comment noted. BOEM evaluated the noise analysis to other finfish species and made revisions where applicable |
| BOEM-2022-0045-0100 | 117 | Under Presence of Structures, please include a more comprehensive discussion of peer reviewed literature on oceanographic wake effects from offshore wind projects, including those from the BOEM/NMFS/RODA Synthesis of the Science white paper (under review for publication) and other European papers discussed by the International Council for the Exploration of the Seas. This will ensure that the analysis in this section is based upon the best scientific information available, which indicates wind wakes may have broad scale effects on biological and physical oceanography with implications for all trophic levels. We are concerned that the impact conclusions are based solely on the Johnson et al. 2021 report, which is not peer reviewed. Our scientists reviewed this paper and have expressed several concerns with the methodology and result interpretation. This section should also include a discussion of the implications of egg/larval transport into unfavorable locations could result in increased mortality and reduced recruitment for certain species, particularly those stocks/species in poor condition such as Atlantic cod. Because this section notes impacts are measurable for at least two species, permanent, and could affect the regional distribution of a species, impacts from the presence of structures should be classified as at least "moderate" and possibly "major" to be consistent with impact definitions in Table 3.3-2. | Comment noted. BOEM evaluated the Presence of Structures analysis and made revisions, where applicable, including discussion of the BOEM/NMFS/RODA white paper . |
| BOEM-2022-0045-0100 | 118 | Similar to the comments in the Benthic Habitat and Invertebrates section, the No Action alternative for Finfish and EFH focuses entirely on the planned development of all other wind lease areas, with the addition of climate change for the evaluation and analysis. However, the conclusions state that OSW, in combination with ongoing activities are expected to result in "moderate adverse impacts and could | The conclusion of both adverse and potential beneficial impacts is based on the understanding that habitat conversion effects resulting from project construction and the presence of structures will benefit some finfish and EFH |

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| | | potentially include moderate beneficial impacts" for finfish and EFH. This statement is predicated by the determination that "moderate" adverse impacts only would occur from other activities that are not discussed or addressed in the analysis, specifically referencing "ongoing fishing activities" in both the finfish and EFH determinations. However, the provided impact assessments and rationale do not include support for these impact determinations. This approach dilutes the project specific effects of the Proposed Action and does not provide any support for the effects determination of non-OSW related impacts. The analysis should be modified to include a meaningful evaluation of the No Action alternative and an analysis for all activities considered in the concluding effects determination. | species at the expense of others depending on their habitat preferences. The best available science indicates that reef effects resulting from the presence of structures clearly benefits some fish and invertebrate species that associate with hard substrates and/or vertical structures in the water column. Related reef effects on food web productivity and changes in predator prey relationships are also likely to benefit some species at the expense of others, but the specific nature of these effects is difficult to predict with certainty. These complex effects will interact with changes in commercial and recreational fishing and other activities, also likely resulting in additional effects that are difficult to predict. These uncertainties are acknowledged in the EIS. The FEIS has been revised to clarify these points and the basis for conclusions where appropriate. |
| BOEM-2022-0045-0100 | 120 | Table 3.13-2, Noise IPF - The determination about Shortnose sturgeon is too vague. If noise producing activities (pile driving, cable installation, vessels...etc) are in nearshore or river environments where the species occurs, then the species may be impacted. This should be revised for the FEIS. | Comment noted. The only significant underwater noise producing activities occurring in the nearshore zone where shortnose sturgeon may occur is UXO detonation, HRG survey activity, and vessel noise associated with RWEC construction in nearshore areas of Rhode Island. The FEIS has been revised to acknowledge the potential for shortnose sturgeon exposure. The FEIS documents that there is no convincing evidence that shortnose sturgeon currently occur in Narragansett Bay, therefore exposure to underwater noise and seabed disturbance from RWEC sea-to-shore transition construction is unlikely to occur. |
| BOEM-2022-0045-0100 | 121 | Revise the description of the acreage of large-grained complex and complex habitat affected by the maximum work area to 2,576 acres based on the information provided in this paragraph (2,576 acres = 49% of 3,163 acres + 44% of 2,333 acres). | Thank you for the comment, calculations have been revised to be accurate with the acreages as currently understood. |
| BOEM-2022-0045-0100 | 122 | The only IPF analyzed for listed fish (sturgeon) is noise and the analysis is cursory. The section is missing IPFs and associated analysis that should be<br>considered for listed fish (i.e., habitat disturbance, cable laying, pollutants/discharges, lighting, EMF, surveys/monitoring, vessels). The ESA Info Needs document and prior EISs should be consulted to see the appropriate IPFs to be analyzed. | Comment noted. BOEM evaluated the ESA Info Needs document and made revisions to the noise analysis for listed fish as applicable. The reader is directed to Table E2-4 (Appendix E1) which summarizes IPFs having negligible impacts on Atlantic sturgeon and giant manta ray. |
| BOEM-2022-0045-0100 | 123 | Please characterize all elements of noise: sound pressure, particle motion, and substrate vibration. | Comment noted. BOEM evaluated the characterization of the various noise elements and made revisions, as applicable, to ensure that that they are accurately characterized. |
| BOEM-2022-0045-0100 | 124 | Citations are needed for text related to auditory masking. | BOEM has reviewed the available science for appropriate citations. |
| BOEM-2022-0045-0100 | 125 | The text states that "As shown in Table 3.13-3, impact pile driving used to install the RWF monopile foundations is the most intense source of noise resulting from the Project and would produce the most significant and extensive noise effects on fish." However, UXO detonations are actually the activity most likely to cause injury-level effects. | Text revised to clarify that impact pile driving is one of the most intense sources of noise, due to the number of WTG and OSS foundations to be installed. |
| BOEM-2022-0045-0100 | 126 | BOEM acknowledges that noise could cause moderate to major adverse impacts on spawning cod and proposes requiring developers to have an acoustic monitoring plan and adaptive approach. What this entails is unclear, so it is not possible to determine whether this is sufficient to mitigate project impacts. Please provide information on the proposed methodology to assess the acoustic monitoring plan and adaptive approach. This should include sufficient details to understand the scientific limitations and assumptions necessary for the plan and adaptive approach to be successful. For example, if PAM glider monitoring is proposed, the glider must be within approximately 0.1 km of cod vocalizations for detection, and the assumption must be made that ongoing activities (e.g., seabed preparation, pile driving, etc) would not result in avoidance behaviors of cod. Details should be included on the proposed monitoring, detectability range, and assumptions made that would directly affect the success of the proposed monitoring, as well as a detailed methodology on the proposed adaptive approach. | Comment noted. PAM is a Mitigation Measure and is not currently proposed as part of the project. It is identified as a Mitigation Measure in Table 3.13-11 and described conceptually. We currently do not have specific information on what the PAM will entail to the level of detail NMFS is requesting in their comment. |
| BOEM-2022-0045-0100 | 127 | Only a small number of species have ever been studied for responses to EMF although there are many species of EMF sensory species living in this ecosystem. NEFSC does not agree that the science on EMF impacts is settled. Please include the best available science in your analysis given that much | Comment noted. BOEM reviewed and incorporated recommended literature related to the effects of EMF on additional species beyond those included in the DEIS, as appropriate. |

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| | | work has been conducted since the BOEM reports cited from 2011 and 2019. Other IPFs in this DEIS are acknowledged to have species specific effects (e.g., noise, hydrodynamics) but in the case of EMF, it is assumed in the DEIS that studies on a limited number of species and life stages is sufficient to address all species. | |
| BOEM-2022-0045-0100 | 128 | Please provide a comparison of the structure size and operational sound emissions between BIWF and those planned for RWF if the BIWF data is used to represent expected operational sound emissions from RWF. | The size of the WTGs (6-MW) and noise levels provided by the BIWF WTGs (110-125 re 1 µPa, occasionally reaching as high as 128 re 1 µPa, mostly at low frequencies ranging from 10 Hz to 8 kHz) is provided in Section 3.13.2.2.2. No changes to the EIS required. |
| BOEM-2022-0045-0100 | 129 | This text should be re-evaluated: “This suggests that operational noise exceeding ambient levels could cause masking effects that reduce the effective communication range for these species and reduce reproductive success and future recruitment for species like cod and haddock. The likelihood of these effects are unclear however they are likely to be species specific.” The analysis on operational noise requires more consideration and a more precise conclusion. Impacts on vital population rates of cod and haddock represent potential major adverse impacts for these species. Of particular concern is the project overlap with identified Atlantic cod spawning grounds. | Comment noted. BOEM revised the text to clarify the potential operational noise effects to finfish, with additional information on cod and haddock and consideration of the overlap with cod spawning grounds. |
| BOEM-2022-0045-0100 | 130 | The entire narrative around artificial reefs is underpinned by the assumption that aggregating fish at structures is only a benefit. Although the potential for adverse or neutral effects of the reef effect are acknowledged (page 451), these effects do not seem to be considered in the overall conclusion. Further, it is suggested that habitat damage from project construction could take a decade or more to recover from but “those impacts could be offset over a shorter period of time by beneficial reef effects to other species” (page 451). This is an apples and oranges comparison and should be removed from the text. | That is not the stated conclusion of the reef effect analysis. The FEIS acknowledges that both adverse and potential beneficial impacts may result from reef effects, varying by species. This conclusion is based on the understanding that habitat conversion effects resulting from project construction and the presence of structures will benefit some finfish and EFH species at the expense of others depending on their habitat preferences. The best available science indicates that reef effects resulting from the presence of structures clearly benefits some fish and invertebrate species that associate with hard substrates and/or vertical structures in the water column. Related reef effects on food web productivity and changes in predator prey relationships are also likely to benefit some species at the expense of others, but the specific nature of these effects is difficult to predict with certainty. These complex effects will interact with changes in commercial and recreational fishing and other activities, also likely resulting in additional effects that are difficult to predict. These uncertainties are acknowledged in the EIS. The FEIS has been revised to clarify these points and the basis for conclusions where appropriate. |
| BOEM-2022-0045-0100 | 131 | The Floeter et al. 2017 citation is not used appropriately. The results of Floeter et al. 2017 do not support the statement that wind farm structures "would be unlikely to negatively affect, and may even strengthen, the stratification patterns that contribute to the cold pool and food web productivity". Floeter et al. 2017 found that the presence of 80 non-operating turbines decreased local water column stratification (i.e., increased vertical mixing). Because turbines were not operational during sampling, this study is not representative of wind wake effects. Rather it focuses on the effects of the structures themselves on hydrodynamics. Furthermore, the work that Floeter et al. 2017 reported was not a long term monitoring program as stated in the DEIS; rather their work was conducted in a single week of July 2014. | BOEM has reviewed the citation and revised the text as appropriate. |
| BOEM-2022-0045-0100 | 132 | The text states that "The Proposed Action could affect the endangered Atlantic sturgeon in the same manner as the No Action Alternative, but no Atlantic sturgeon would be injured or killed" is inconsistent with the determination on pg. 3.13-36 that "effects ranging from short-term behavioral disturbance to short-term or permanent hearing threshold shifts, to barotrauma injury or mortality" are possible. | Text deleted. Inconsistent with previous text, as indicated in comment. |
| BOEM-2022-0045-0100 | 133 | The evaluation of anchoring and new cable placement/maintenance is a good example of how the complexity of the habitat in the lease area, on Cox Ledge, is not fully considered, analyzed, or evaluated. Specifically, the analysis of the impacts to EFH states the anticipated impacts to 3,178 and 3,410 acres of habitat, respectively, would result in "short-term" disturbance and would constitute a "minor" adverse impact. As stated in Table 3.6-7, the interarray cable installation would result in a total of 1,969 acres of impacts (through habitat conversion) to complex habitats (788 acres in large- grained complex and 1181 acres in complex) this represents approximately 58% of IAC impacts occurring within complex habitats. Anchoring and cable installation through complex, natural rocky habitats would | Comment noted. BOEM evaluated the anticipated impacts to respective habitats and habitat conversion and clarified, as appropriate, that the conclusion that the impacts would constitute a minor adverse impact is relative to the overall extent of complex habitat within the lease area and not just the extent of habitat affected by project related disturbance. |

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| | | result in long-term to permanent impacts. As noted in prior comments, please refer to our comments on previous documents to assist you in providing a reasonable, supported analysis of expected project impacts. | |
| BOEM-2022-0045-0100 | 134 | Please clarify, or reconsider the text that states that a reduction in extent but not intensity would reduce the impact determination of the Noise IPF to Atlantic sturgeon and giant manta rays, as the intensity (and thus effect) would be the same. Pile driving and UXO activities that were evaluated to potentially result in mortality in Alt. B will still be occurring. | BOEM has considered this recommendation and revised where appropriate. In the case of manta ray, exposure to UXO detonation is discountable. |

## Environmental Justice

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| BOEM-2022-0045-0075 | 3 | Robust Stakeholder Engagement<br>The FEIS should include information about stakeholder engagement and consultation with environmental justice populations and Native American Tribes. Several of the ports under development to become critical staging areas for offshore wind projects are considered environmental justice communities. The FEIS should include steps that are being taken to ensure these and other environmental justice communities are seeing economic benefits. In addition, long-term planning is necessary to ensure that the economic gains in these communities during offshore wind development are long-lasting. For this to happen effectively, developers and federal, state, and local entities must consult these communities at every step of the planning process.<br>The DEIS references a recent survey of commercial fishing crew members in the northeastern U.S. that indicates that 13% of survey participants identified their race as Black, Asian, American Indian/Alaska Native or Native Hawaiian/Pacific Islander and 7% identified as Hispanic or Latino. BOEM should ensure that all stakeholder engagement and mitigation related to impacts to commercial fishing, including the loss of gear, are conducted with appropriate language access | Thank you for the comment. A reference to Revolution Wind's supportive programs designed to provide craft-entry opportunities for minorities, women, and economically disadvantaged non-minority males has been added to Section 3.12 Environmental Justice. Regarding public outreach, BOEM agrees engagement with environmental justice and underserved communities is important for understanding potential impacts and mitigations related to offshore wind development. For Revolution Wind, opportunities for public input were provided through the NEPA scoping and DEIS public review process. Scoping meetings were held virtually in May 2022, and DEIS public review hearings were held in person at Aquinnah, MA, on October 4, 2022; East Greenwich, RI, on October 5, 2022; and New Bedford, MA, on October 6, 2022; as well as virtually on September 29 and October 11. Transcripts of all meetings and recordings from virtual meetings are available at https://www.boem.gov/renewable-energy/state-activities/revolution-wind.<br>Outreach for meetings included:<br>• email notifications to 110 individuals who signed up during the public scoping for the project;<br>• notifications and advertisements posted in six newspapers: The Standard Times (owned by South Coast Today), Gannet Media Group (MA), The Chronicle (CT), The Newport Daily News (RI), Vineyard Gazette, The Day (CT);<br>• publication of the Notice of Availability in the Federal Register;<br>• BOEM press releases notifying 14 print news media outlets in RI and 8 in MA as well as social media announcements;<br>• notification letters sent to state congressional members<br>BOEM is currently working on developing a targeted approach to advance outreach and engagement with environmental justice and underserved communities on offshore wind, including through a pilot approach for the New York Bight area. BOEM is developing standard operating procedures and will apply lessons learned and tools developed through the pilot approach, including consideration of potential language needs, to enhance engagement for future OSW projects. |
| BOEM-2022-0045-0075 | 4 | Environmental Justice, Community Benefits, and Avoiding Adverse Impacts<br>The DEIS notes that environmental justice populations may experience employment income benefits, but that the benefits would be no greater for environmental justice populations than those experienced by non-environmental justice populations. The FEIS should indicate what actions are planned to ensure that environmental justice populations have equitable access to these jobs and income benefits. For example, Rhode Island launched the Building Futures program in 2007 to leverage the Registered Apprenticeship model of workforce development and prepare diverse, low-income people for success in employment as registered apprentices in the building trades. The FEIS should include any plans to utilize programs such as this to improve access for people in environmental justice populations.<br>The DEIS states that environmental justice and Native American tribes will experience several adverse impacts. Community benefit agreements are one way to mitigate impacts, and BOEM should explore such agreements as an Environmental Protection Measure (EPM). BOEM should also consider all impacts to environmental justice populations and Native American tribes, including but not limited to the cultural resources and ancient submerged landforms that the DEIS notes could be discovered, as well as those that have already been identified. EPMs should include plans to monitor these impacts in the FEIS.<br>Offshore wind power could play a significant role in reducing pollution in our region. Per ISO-New England's analyses, from one-sixth to one-third of New England's old fossil fuel plants will likely retire over the next decade, and it is imperative that we fill any gap with clean energy. In addition to meeting state climate goals, decarbonization would reduce local co-pollutants and lead to improved air quality, which is a significant public health issue. Estimates of the local public health co-benefits of decarbonization are of the same order of | Thank you for the comment. A reference to Revolution Wind's supportive programs designed to provide craft-entry opportunities for minorities, women, and economically disadvantaged non-minority males has been added to Section 3.12 Environmental Justice. As described in the DEIS, during operations, the Project would have an overall long-term minor beneficial health impact on populations in the GAA, including environmental justice populations, by avoiding a portion of the air pollutant emissions generated by fossil fuel–combusting energy facilities. |

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| | | magnitude as the climate-stabilization benefits alone.The cobenefit potential of reduced emissions is especially high for our most vulnerable communities, which are systematically overburdened by fossil energy pollution. In Appendix E2, Assessment of Resources with Minor (or Less) Impact Determinations, Table 3.4-3 reports Estimated Annual Avoided Emissions for the Operation of Future Offshore Wind within the Geographic Analysis Area. The averted pollution and the local co-benefits for public health is substantial (and its value could be estimated using an integrated assessment model). An environmental justice analysis of the averted pollution could specify the cobenefits to environmental justice communities that are now disproportionately affected.<br>Fossil fuel retirements will mean the loss of some high-quality employment in the sector. It is crucial that states ensure a just transition of these power plants and that offshore wind projects foster the creation of high-quality, family-sustaining jobs. Through the use of project labor agreements and community benefits agreements, offshore wind can create job transition opportunities for workers affected by this transition. The FEIS should consider these impacts in its analysis of all alternatives, particularly the "No Action Alternative."<br>Without offshore wind, it is likely that fossil fuel energy facilities would either come online or be kept online to meet future power demand in New England. Therefore, BOEM should reject the "No Action Alternative" because it would drive up pollution, prevent states from achieving mandated climate goals, increase energy costs, and threaten grid reliability by continuing our region's overreliance on fossil fuels for electricity generation. | |
| BOEM-2022-0045-0110 | 7 | We urge BOEM to pursue measures to ensure that any negative impacts to environmental justice communities are mitigated and that the many environmental and economic benefits offshore wind can provide communities are maximized. One way to do this is to ensure that project construction occurs in a manner that does not create a level of pollution at any one port that could have deleterious impacts to that community. | As described in Table F-1 in Appendix F of the EIS, a number of environmental protection measures will be implemented by the proposed project to reduce adverse traffic, water quality, noise, and visibility impacts to environmental justice populations. |
| BOEM-2022-0045-0113 | 8 | Utilizing domestic content in renewables also has equity implications. Data shows that decline in U.S. manufacturing has been devastating to the middle-class, especially for Black and Hispanic workers and other workers of color who disproportionately do not hold college degrees and whom experience discrimination limiting access to better-paying jobs.27 Manufacturing wages are substantially larger for median-wage, non-college-educated employees, with Black workers in manufacturing earning 17.9% more than in non-manufacturing industries; Hispanic workers earning 17.8% more, Asian American Pacific Islander (AAPI) earning 14.3% more; and white workers earning 29% more.28 And finally, requiring use of domestic content can help reduce the overall impact on the environment from offshore wind projects because U.S. energy intensive manufacturers are relatively clean compared to competitors. As one example, "[s]teel exporters to the US emit 50-100+% more CO2 emissions per ton than U.S. producers on average."29 Use of domestic content can also reduce shipping distance, and thus emissions resulting from long-distance maritime transportation. The International Maritime Organization (IMO) estimates that maritime shipping generated 1 billion tons of greenhouse gasses per year from 2007-2012. Another study estimates that maritime shipping emissions are forecasted to rise between 35% and 210% by 2050. | Thank you for the comment. |
| BOEM-2022-0045-0103 | 9 | EPA recognizes the potential community/local air quality benefits from the displacement of regional fossil fuel energy generating units, and economic benefits (realized through jobs in the construction, supply chain and service industries) associated with the clean energy produced by the Revolution Wind project. We encourage BOEM to continue to identify these benefits to communities, including communities with Environmental Justice concerns, in the FEIS. | Thank you for the comment. As described in the DEIS, during operations, the Project would have an overall long-term minor beneficial health impact on populations in the GAA, including environmental justice populations, by avoiding a portion of the air pollutant emissions generated by fossil fuel–combusting energy facilities. BOEM will continue to identify these benefits to environmental Justice populations in the FEIS. |
| BOEM-2022-0045-0103 | 10 | EPA appreciates that the DEIS expanded the Environmental Justice (EJ) analysis in response to our previous input to include the three census block groups adjacent to Sparrows Point in Dundalk, Maryland. As the project is refined and the preferred alternative is further developed, a full range of expected impacts to the affected communities should be thoroughly evaluated and mitigation needs addressed. | Thank you for the comment. As the proposed project is refined and the preferred alternative is further developed, BOEM will evaluate a full range of expected impacts to affected environmental justice populations and address mitigation needs. |
| BOEM-2022-0045-0103 | 11 | The DEIS at page. 3.12-32 states, "Environmental justice and non-environmental justice populations would equally experience any adverse traffic impacts." It is not clear that this will be the case as impacts associated with port development may include traffic, noise, and localized air emissions; these should be considered in light of existing health disparities and exposure burdens. | Text deleted. As described in the DEIS, the block group in which most of the closest residences to the proposed onshore Project infrastructure are located is not a potential environmental justice area of concern based on either minority or low-income population criteria. |
| BOEM-2022-0045-0113 | 11 | As mentioned, employing high labor standards has been proven to result in greater safety, access, and equity. The DEIS states, "offshore wind energy projects would support new employment and economic activity and the manufacturing sector and marine construction and transportation sectors. Some members of the environmental justice populations are expected to experience these employment income | Thank you for the comment. A reference to Revolution Wind's supportive programs designed to provide craft-entry opportunities for minorities, women, |

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| | | benefits, but the benefits would be no greater for environmental justice populations than those experienced by non-environmental justice populations."41 : Christiansen et al. 2022; Dorrell et al. 2022; Daewel et al. 2022; Raghukumar et al. 2022; Floeter et al. 2022;Apprenticeship programs provide paid, on-the-job experience, making it particularly valuable in providing pathways for low-income workers into a higher skill, family-supporting careers. Estimates find that a worker who has completed an apprenticeship program will earn $300,000 more over the course of their career than non-apprenticeship participants.42 The FEIS should consider developers plans to support programs such as Building Futures, which was launched in Rhode Island in 2007 to leverage the Registered Apprenticeship model of workforce development and prepare diverse, low-income people for success in employment as registered apprentices. | and economically disadvantaged non-minority males has been added in Section 3.12 Environmental Justice. |
| BOEM-2022-0045-0113 | 12 | The DEIS also indicates the potential for adverse impacts to environmental justice populations and Native American tribes. Community benefit agreements are one way to mitigate impacts and should be explored as an Environmental Protection Measure (EPM). All impacts to environmental justice populations and Native American tribes should also be monitored, including but not limited to the cultural resources and ancient submerged landforms that the DEIS notes could be discovered, as well as those that have already been identified. EPMs should include plans to monitor these impacts in the FEIS and include outreach to the communities where adverse impacts are anticipated. And, while it may not be required, including in the FEIS information about consultation with environmental justice populations could also support the goals of the federal statues described in the previous section. | Monitoring and treatment plans for cultural resources and submerged landforms important to Native American tribes are discussed in Section 3.10 and Appendix J. Government-to-Government consultations with federally-recognized tribal nations are discussed in Appendix A. Additional mitigation measures to which Revolution Wind has committed, including measures related to impacts on communities, are listed in Appendix F, Table F-1. BOEM agrees engagement with environmental justice and underserved communities is important for understanding potential impacts and mitigations related to offshore wind development. For Revolution Wind, opportunities for public input were provided through the NEPA scoping and DEIS public review process. Scoping meetings were held virtually in May 2022, and DEIS public review hearings were held in person at Aquinnah, MA, on October 4, 2022; East Greenwich, RI, on October 5, 2022; and New Bedford, MA, on October 6, 2022; as well as virtually on September 29 and October 11. Transcripts of all meetings and recordings from virtual meetings are available at https://www.boem.gov/renewable-energy/state-activities/revolution-wind.<br>Outreach for meetings included:<br>• email notifications to 110 individuals who signed up during the public scoping for the project;<br>• notifications and advertisements posted in six newspapers: The Standard Times (owned by South Coast Today), Gannet Media Group (MA), The Chronicle (CT), The Newport Daily News (RI), Vineyard Gazette, The Day (CT);<br>• publication of the Notice of Availability in the Federal Register;<br>• BOEM press releases notifying 14 print news media outlets in RI and 8 in MA as well as social media announcements;<br>• notification letters sent to state congressional members<br>BOEM is currently working on developing a targeted approach to advance outreach and engagement with environmental justice and underserved communities on offshore wind, including through a pilot approach for the New York Bight area. BOEM is developing standard operating procedures and will apply lessons learned and tools developed through the pilot approach, including consideration of potential language needs, to enhance engagement for future OSW projects.<br>BOEM welcomes feedback on our current activities and recommendations on how to improve engagement approaches for future activities. Please contact Jessica Stromberg , BOEM Office of Renewable Energy Programs, 45600 Woodland Road, Sterling, Virginia 20166, (703) 787-1730 or jessica.stromberg@boem.gov to get connected with our team to talk further. |
| BOEM-2022-0045-0103 | 12 | As the project progresses and more information is available regarding port usage and required development, it should be included in the FEIS. Relevant sections including but not limited to traffic, air quality, environmental justice and commercial fisheries should be updated. | Thank you for the comment. Port of Montauk development activities are included in the Proposed Action of the South Fork Wind Farm EIS Project and therefore are not included in the Proposed Action of the RWF Project. The |

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| | | Port development at the Port of Montauk is not currently considered as part of the Proposed Action and may have environmental impacts. | potential usage of the developed Port of Montauk is included in the Proposed Action of the RWF Project. |
| BOEM-2022-0045-0118 | 12 | Also, you talk about social justice. Where is the social justice for all the rare metals that have to be mined for this? | Thank you for the comment. This question is outside the scope of the impact analysis for this project. |
| BOEM-2022-0045-0103 | 13 | As discussed in Section 3.12-8 of the DEIS, on-shore project infrastructure will be located in a community with environmental justice concerns in North Kingstown, RI. EPA recommends focused community engagement in neighborhoods located in the vicinity of the Davisville substation and areas through which export cables will be routed. Based on demographic information in EPA's EJ Screen, there may be linguistically isolated households in the vicinity of the Davisville substation where Spanish is primarily spoken. EPA recommends that information and outreach materials provided to households in North Kingstown, RI, be provided in English and Spanish and that Spanish interpretation be provided at public meetings. | BOEM agrees engagement with environmental justice and underserved communities is important for understanding potential impacts and mitigations related to offshore wind development. For Revolution Wind, opportunities for public input were provided through the NEPA scoping and DEIS public review process. Scoping meetings were held virtually in May 2022, and DEIS public review hearings were held in person at Aquinnah, MA, on October 4, 2022; East Greenwich, RI, on October 5, 2022; and New Bedford, MA, on October 6, 2022; as well as virtually on September 29 and October 11. Transcripts of all meetings and recordings from virtual meetings are available at https://www.boem.gov/renewable-energy/state-activities/revolution-wind.<br>Outreach for meetings included:<br>• email notifications to 110 individuals who signed up during the public scoping for the project;<br>• notifications and advertisements posted in six newspapers: The Standard Times (owned by South Coast Today), Gannet Media Group (MA), The Chronicle (CT), The Newport Daily News (RI), Vineyard Gazette, The Day (CT);<br>• publication of the Notice of Availability in the Federal Register;<br>• BOEM press releases notifying 14 print news media outlets in RI and 8 in MA as well as social media announcements;<br>• notification letters sent to state congressional members<br>BOEM is currently working on developing a targeted approach to advance outreach and engagement with environmental justice and underserved communities on offshore wind, including through a pilot approach for the New York Bight area. BOEM is developing standard operating procedures and will apply lessons learned and tools developed through the pilot approach, including consideration of potential language needs, to enhance engagement for future OSW projects.<br>BOEM welcomes feedback on our current activities and recommendations on how to improve engagement approaches for future activities. Please contact Jessica Stromberg , BOEM Office of Renewable Energy Programs, 45600 Woodland Road, Sterling, Virginia 20166, (703) 787-1730 or jessica.stromberg@boem.gov to get connected with our team to talk further. |
| BOEM-2022-0045-0113 | 13 | Lastly, the DEIS references a recent survey of commercial fishing crewmembers in the northeastern U.S. that indicates that 13% of survey participants identified their race as Black, Asian, American Indian/Alaska Native or Native Hawaiian/Pacific Islander and 7% identified as Hispanic of Latino.44 BOEM should ensure that all mitigation methods related to commercial fishing impacts, including gear loss, are conducted in an accessible manner, including but not limited to language access. | Thank you for your comment. BOEM will consider language accessibility when reviewing fisheries mitigation communications. |
| BOEM-2022-0045-0103 | 14 | EPA also recommends that BOEM prepare a publicly accessible community outreach plan focused on communities with environmental justice concerns impacted by the project. The draft DEIS references a "Fisheries Communications & Outreach Plan," but does not reference something similar for communities with environmental justice concerns. EPA recommends adding a discussion of the outreach activities that BOEM has completed and those under development/planned for affected communities. | BOEM agrees engagement with environmental justice and underserved communities is important for understanding potential impacts and mitigations related to offshore wind development. For Revolution Wind, opportunities for public input were provided through the NEPA scoping and DEIS public review process. Scoping meetings were held virtually in May 2022, and DEIS public review hearings were held in person at Aquinnah, MA, on October 4, 2022; East Greenwich, RI, on October 5, 2022; and New Bedford, MA, on October 6, 2022; as well as virtually on September 29 and October 11. Transcripts of all |

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| | | | meetings and recordings from virtual meetings are available at https://www.boem.gov/renewable-energy/state-activities/revolution-wind. Outreach for meetings included:<br>• email notifications to 110 individuals who signed up during the public scoping for the project;<br>• notifications and advertisements posted in six newspapers: The Standard Times (owned by South Coast Today), Gannet Media Group (MA), The Chronicle (CT), The Newport Daily News (RI), Vineyard Gazette, The Day (CT);<br>• publication of the Notice of Availability in the Federal Register;<br>• BOEM press releases notifying 14 print news media outlets in RI and 8 in MA as well as social media announcements;<br>• notification letters sent to state congressional members<br>BOEM is currently working on developing a targeted approach to advance outreach and engagement with environmental justice and underserved communities on offshore wind, including through a pilot approach for the New York Bight area. BOEM is developing standard operating procedures and will apply lessons learned and tools developed through the pilot approach, including consideration of potential language needs, to enhance engagement for future OSW projects.<br>BOEM welcomes feedback on our current activities and recommendations on how to improve engagement approaches for future activities. Please contact Jessica Stromberg , BOEM Office of Renewable Energy Programs, 45600 Woodland Road, Sterling, Virginia 20166, (703) 787-1730 or jessica.stromberg@boem.gov to get connected with our team to talk further. |
| BOEM-2022-0045-0103 | 15 | EPA recommends that BOEM identify a single point of contact to serve as a community liaison for communities affected by project construction and operation, including those with environmental justice concerns. The point of contact's email address and phone number should be widely advertised. | The Point of Contact for this project is provided in the Federal Register announcements for the project and other communications materials. BOEM welcomes feedback on our current activities and recommendations on how to improve engagement approaches for future activities. Please contact Jessica Stromberg , BOEM Office of Renewable Energy Programs, 45600 Woodland Road, Sterling, Virginia 20166, (703) 787-1730 or jessica.stromberg@boem.gov to get connected with our team to talk further. |
| BOEM-2022-0045-0103 | 16 | The DEIS lists general mitigation measures for EJ concerns in Appendix F. As project details are refined, EPA reiterates the need to obtain community feedback to determine the appropriate mitigation measures for the proposed impacts. | Please see response to FDMS Submission # BOEM-2022-0045-0103, Comment # 13 for information on engagement and outreach for this project. A summary of outreach is also provided in EIA Appendix A. |
| BOEM-2022-0045-0086 | 32 | Revolution Wind appreciates BOEM's efforts to assess the environmental impact of the alternatives on environmental justice populations in the GAA. However, the current assessment fails to fully capture project benefits resulting in the overall cumulative impact to environmental justice communities being "major adverse." We believe, that after fully considering the economic and health benefits, and mitigation efforts to limit harms, both the overall and alternative incremental impact to environmental justice communities for the Proposed Action should be revised. | BOEM maintains that the overall cumulative impact to environmental justice populations is accurately assessed in the EIS. The analysis of impacts of climate change on environmental justice populations is consistent with other offshore wind energy project analyses. |
| BOEM-2022-0045-0086 | 33 | Aside from Native American landform and archaeological concerns, the DEIS seemingly makes the cumulative Major adverse determination for Environmental Justice (EJ) based on the fact that climate change is happening regardless of whether the project gets built and that EJ populations are generally more vulnerable from climate change. Revolution Wind disagrees with assessing cumulative climate change impacts outside the scope of ongoing and reasonably foreseeable projects. | BOEM maintains that the overall cumulative impact to environmental justice populations is accurately assessed in the EIS. The analysis of impacts of climate change on environmental justice populations is consistent with other offshore wind energy project analyses. |
| BOEM-2022-0045-0086 | 34 | The agency should consider the investment in building a clean energy economy and well-paying jobs in its calculation of the Proposed Action's benefits. As explained in Section 219 of Executive Order (EO) 14008 (Tackling the Climate Crisis at Home and Abroad): "To secure an equitable economic future, the United States must ensure that environmental and economic justice are key considerations in how we govern. That means investing and building a clean energy economy that creates well-paying union jobs, turning disadvantaged communities — historically marginalized and overburdened — into healthy, thriving communities, and undertaking robust actions to | Thank you for your comment. A reference to Revolution Wind's supportive programs designed to provide craft-entry opportunities for minorities, women, and economically disadvantaged non-minority males has been added in Section 3.12 Environmental Justice. BOEM maintains that the employment benefits to environmental justice communities are accurately assessed in the |

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| | | mitigate climate change while preparing for the impacts of climate change across rural, urban, and Tribal areas." The Proposed Action would provide just that – well-paying union jobs and stimulating disadvantaged communities. For example, in May 2022, North America's Building Trade Unions (NABTU) announced a Project Labor Agreement (PLA) with Ørsted to construct U.S. offshore wind farms with an American union workforce. The PLA, which applies to the Proposed Action and workers in the GAA, "sets the bar for working conditions and equity, injects hundreds of millions of dollars in middle-class wages into the American economy, creates apprenticeship and career opportunities for communities most impacted by environmental injustice, and ensures projects will be built with the safest and best-trained workers in America." 17 The DEIS states that "Some members of environmental justice populations are expected to experience these employment and income benefits, but the benefits would be no greater for environmental justice populations than those experienced by non-environmental justice populations residing in the GAA." Revolution Wind respectfully feels that this statement is not substantiated. BOEM should further consider the economic benefit to port communities, and members of environmental justice populations within those communities. For example, New London, Connecticut is identified in the GAA as having both a minority and low-income environmental justice populations. The Port of New London is further identified as containing a "major commercial fishing port" and containing or being "adjacent to staging port." The State Pier in the Port of New London is being transformed into a state-of-the-art, heavy- lift terminal that will serve as a wind turbine staging and assembly hub for Revolution Wind,18 And at least two additional wind farms in the region. The redevelopment of the State Pier is already creating jobs, including for Connecticut's building trades: 400+ well-paying construction jobs are anticipated by the project's completion in 2023. As a staging and assembly hub for offshore wind projects, vessel activity will significantly increase at State Pier and generate high-skilled, long-term employment in New London: 80- 120 well-paying offshore wind-related positions are anticipated to be created at the site. And this is but one example of economic development benefiting environmental justice communities in the GAA. | EIS. Benefits identified in EO 14008 apply to Federal investments, not private projects such as Revolution Wind. |
| BOEM-2022-0045-0086 | 35 | In Section 3.12.1.1 Page 3.12-16 the DEIS states that "Therefore, adverse economic impacts to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term moderate." This statement is not consistent with the conclusion of the preceding sentence that offshore wind "...would help ensure that fishing businesses could continue to operate with minimal disruption." In its calculation of economic harm, BOEM should also consider the extent to which any economic impacts of the Proposed Action to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing are offset by fisheries compensation and mitigation funds. | BOEM maintains that an impact rating of moderate as defined in Table 3.3-1 in the EIS is consistent with the statement that mitigation measures would help ensure that most fishing businesses could continue to operate with minimal disruption. |
| BOEM-2022-0045-0086 | 37 | We understand that climate change disproportionately impacts environmental justice communities, and that there will be some short-term greenhouse gas (GHG) emissions during project construction. However, the Proposed Action is a clean energy project with limited emissions during operation. More emphasis should be placed on the fact that the Proposed Action, in combination with other offshore wind energy projects, will reduce long-term impacts of climate change on environmental justice communities. Moreover, the alternatives that would result in infeasible projects smaller than the Project's PPA would have less of a benefit to the environmental justice communities, as fewer fossil fuel emissions would be displaced. | BOEM's analysis of impacts of climate change on environmental justice populations is adequate and consistent with other offshore wind energy project analyses. Refer to EIS Section 3.12 Environmental Justice for discussion of impacts of climate change on environmental justice populations. |
| BOEM-2022-0045-0100 | 91 | Please include findings of Hoagland et al. (2015) which state that displacement of fishing vessels from Point Judith, RI and New Bedford, MA will impact a wider spatial area than would be expected, including communities inland. This study found communities in MA such as Boston, Fall River and Brockton, MA as well as Pawtucket, RI had highest level of impacts per household (see Figure 5 in article). "The figure reveals that five census tracts (colored in dark red) would bear the largest impacts, which, at ≥$140 year−1 would be an order of magnitude larger than those of the next group of impacted census tracts. These tracts (circled in Fig. 5) are located in Pawtucket (RI), Fall River (MA), Brockton (MA), between Boston South End and Fenway/Kenmore (MA), and between Mattapan and Roslindale (MA). Without providing analyses that will ensure all impacted communities are evaluated with the best available science, BOEM is not presenting an analysis that fully considers the impacts to underserved communities (most of the identified communities in this study have high levels of poverty and diversity). https://www.sciencedirect.com/science/article/pii/S0308597X15000871 | BOEM's methodology for associating offshore impacts to commercial fisheries and for-hire recreational fishing to onshore impacts on environmental justice populations involves the use of geospatial data to: 1) identify the location of low-income and minority populations in the geographic analysis area using mapped spatial data obtained from the U.S. Census Bureau or through EJSCREEN, along with state-identified populations if available, 2) assessing the intensity of commercial and recreational fishing engagement or reliance within the same geographic analysis area with mapped spatial data developed by NOAA, and 3) identifying geographic locations in the analysis area where low-income and minority populations are present that also have high levels of commercial or recreational fishing engagement or reliance, to identify specific environmental justice populations that could be vulnerable to offshore impacts on commercial and recreational fishing. In addition, we have identified public fishing sites that are located in proximity to project infrastructure that could be temporarily disrupted during construction and potentially impact subsistence anglers. BOEM believes this methodology is a valid approach to associating offshore impacts to onshore environmental justice populations. |

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| | | | The Hoagland 2015 article analyzed a counterfactual scenario where offshore wind would completely displace commercial fishing and no economic impacts from the offshore wind development were considered. Despite these conservative assumptions about how impacts would be generated and attributed, the initial results found that welfare losses would be progressively distributed, such that mid- to high-income categories would likely bear the most significant impacts, and hence would not result in disproportionately high and adverse effects on low-income populations. The authors "adjusted welfare losses for society's aversion to income inequality", weighting impacts to give low-income groups more influence on the net utility impacts, a methodology untested in EIS applications. Given these issues with the analysis, BOEM has elected not to include this citation in the EIS. |
| BOEM-2022-0045-0100 | 93 | The Marine Recreational Information Program (MRIP) provides a list of publicly accessible fishing sites. Underserved communities often practice subsistence fishing in low income areas. Thank you for including this information in the recreation and tourism section. However, impacts to subsistence fishing is listed in the DEIS as a potential unavoidable adverse impact of the Proposed Action and BOEM should make an effort in this section as well to identify those specific fishing sites that are within areas of environmental justice communities of concern, including a summary of these access sites within these communities. Consider noting which sites will be impacted and overlap with offshore wind infrastructure on land and cable placement during both construction and operation. See the Site Register here: https://www.st.nmfs.noaa.gov/msd/html/siteRegister.jsp | Information regarding public fishing sites that are located in proximity to project infrastructure that could be temporarily disrupted during construction and potentially impact subsistence anglers has been added. |
| BOEM-2022-0045-0100 | 94 | Ensure that the conclusions on the impacts to fishing community members match those in section 3.9 Commercial and For Hire fisheries unless specific mitigation measures are established for limiting the impacts to underserved communities. | Thank you for the comment. Text edits have been made. |

## Marine Mammals

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| BOEM-2022-0045-0005 | 1 | My comment is really a question. When will BOEM be releasing the final report of the study that BOEM commissioned, on Right Whale migration, that should have been released in September of 2018?<br>That study can be found within your organization at this link. https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/Understanding-Whale-Presence-in-the-Virginia-Offshore-Wind-Energy-Area-Using-Passive-Acoustic-Monitoring.pdf<br>Why is the report 4 years late, how much overlap in study area, where do the Right Whales migrate north of the Virginia study area? Inquiring minds want to know. | Thank you for your interest. The study report is now available on the BOEM website. The FEIS relies on the best available data on North Atlantic right whale distribution and abundance to assess potential impacts of the project. Please refer to Section 3.15.1 for information about marine mammal occurrence on the Northwest Atlantic Outer Continental Shelf. |
| BOEM-2022-0045-0097 | 1 | Attached comment submission includes non-codable text. | Attached comment submission includes non-codable text. |
| BOEM-2022-0045-0091 | 2 | As the first offshore wind development to sign a Power Purchase Agreement with Connecticut, we are particularly interested in seeing the project fulfill its promise of delivering clean energy, providing good jobs, and enhancing the local economy. This requires, however, a careful balancing of the need to maximize energy output with minimizing disturbances to marine mammals and the marine environment. Avoiding, Minimizing and Mitigating Impacts to the North Atlantic Right Whale The North Atlantic right whale is a federal and state endangered species that is common within the Revolution Wind lease area and the path of the proposed export cable.5 The population size of this species is less than 350 individuals.6 The COP notes that the proposed Revolution Wind Farm lies within the seasonal North Atlantic right whale speed restriction area, which requires seasonal vessel speed reduction.7 In addition to complying with the seasonal speed restrictions, Revolution Wind has agreed to a number of proposed mitigation measures during the construction and installation phase of the project.8 These include: • Establishment of exclusion and monitoring zones for impact pile driving o Exclusion and monitoring zones for marine mammals and sea turtles will be established for impact and vibratory pile-driving activities. • Impact and vibratory piledriving mitigation measures o The following measures will be implemented for impact and vibratory pile-driving activities: § seasonal restrictions, soft-start measures, shutdown procedures, marine mammal and sea turtle monitoring protocols, the use of qualified and National Oceanic and Atmospheric Administration (NOAA)- approved Protected Species Observers, and noise attenuation systems such as bubble curtains, as appropriate. • MMPA application measures though a comprehensive monitoring and mitigation program, including but not limited to; o Noise attenuation through use of a noise mitigation system; o Seasonal restrictions; o Standard PSO training and equipment requirements; o Visual monitoring; including low visibility monitoring tools; o Passive acoustic monitoring; o Establishment and monitoring of shutdown zones; o Pre-start clearance; Ramp-up (soft-start) procedures; o Operations monitoring; o Operational shutdowns and delay; o Sound source measurements of at least one foundation installation; o Survey sighting coordination; o Vessel strike avoidance procedures; and o Data recording and reporting procedures. The broad descriptions of the mitigation measures above align with the mitigation practices for the North Atlantic right whale set forth in a publicly available agreement between Vineyard Wind and several national, regional, and local environmental organizations.9 We urge the Bureau of Ocean Energy Management (BOEM) to ensure that marine mammal mitigation measures, particularly those for the North Atlantic right whale are applied equally to all offshore wind projects in the northeast lease areas and are implemented consistently across those lease areas. | Thank you for your comment. All future actions would be subject to an independent NEPA analysis and regulatory approvals as the Proposed Action. BOEM would require all projects to incorporate the same types of Environmental Protection Measures included in the Proposed Action to avoid and minimize harmful noise effects. |
| BOEM-2022-0045-0101 | 2 | Without knowing whether these construction projects will be staggered, we continue to be concerned about potential mass beaching events if all construction starts at the same time. The National Oceanic and Atmospheric Administration (NOAA) has indicated that they will follow their current stranding plan if this occurs; however, this feels vague to us. What is the full plan if these whales are beaching? | Thank you for your recommendation. BOEM will continue to coordinate with NMFS to determine appropriate mitigation measures. The applicant will adhere with all mitigation measures required as a condition of MMPA compliance. |
| BOEM-2022-0045-0098 | 3 | Regarding Unexploded Ordinances, Fishing, Fishermen and NARWs<br>Unexploded Ordinances (UXOs) are not a new threat to fishermen, however with the inclusion of boulder plowing and unearthing UXO's from previously buried areas within Southern New England, we do not believe that BOEM has effectively measured in the additional threats to the safety not only of fishermen and their fishing boats, but the overall boating public and safety at sea for those within the area of the Revolution Wind Farm and export cable, including new threats to fish populations in all life stages, and the newest neighbor to Southern New England, the North Atlantic Right Whale, (NARW.) As BOEM is well aware the NARW is now present within the RI-MA-WEA nearly 12 months of the year3 and a most recent 2022 study shows the NARW has returned to repatriate its former grounds in Southern New England4 Mitigation for the NARW during UXO detonation and pile driving via Passive Acoustic Monitors will not be effective NARW, that is known to echolocate far less than other baleen whales, even going so far as to when hearing ships, mother whales then cease their echolocations and in effect whisper to their young. | Thank you for your comment. BOEM will continue to coordinate with state and cooperating federal agencies and regional fishery management councils to develop appropriate mitigation measures for all project impacts. As available, the FEIS has been updated to incorporate current best available information on marine mammal (specifically, NARW) occurrence within the project area. |

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| | | In another 2022 study they confirmed the reduction in acoustic detection as a protection mechanism mothers employ to protect their young from predators "At three nursery sites across three continents in the southern hemisphere, results showed that the depth at which right whales are most commonly sighted has the most limited acoustic detection range for their calls."<br>We believe BOEM must reevaluate the mechanism for mitigation for the NARW in Southern New England Revolution Wind Lease area, and reevaluate and analyze this data, and that it be reanalyzed in the DEIS section specific to North Atlantic right whales. It should also be independently peer reviewed. Also bubble curtains to be used during pile driving and UXO detonation are an ineffective mitigation method for low frequency hearing baleen whales such as the NARW, yet the DEIS uses that as a mitigation method when in fact BOEM acknowledged in a presentation to the Mid Atlantic Fishery Management Council that they do not work to lower impacts. BOEM must analyze and determine effective mitigation measures for this critically endangered species. | |
| BOEM-2022-0045-0102 | 3 | MWT THPO Comments and Concerns<br>· Not enough studies are available to determine how marine mammals such as the critically endangered NARW will be affected. Whales should have the right to live, and government has not adequately accounted for inevitable vessel strike issues. Construction vessels will need to function in the lease area, which entails increased feeder ship/vessel traffic that may put whales in harm's way. | Thank you for your comment. The analysis in the EIS is based on best available science, which includes extensive research on the impacts of offshore wind projects and marine mammal responses. The FEIS incorporated additional information regarding species occurrence and impacts, as available. |
| BOEM-2022-0045-0101 | 4 | What are the expected cumulative effects of multiple and future projects on NARW threshold shift and migration patterns, and what are the potential synergistic effects of structure presence and low-level operational noise on the NARW? | Cumulative effects on marine mammals are addressed in Sections 3.15.1.1.1 and 3.15.2.2.3 of the EIS. Additional information about the projects considered under the cumulative impacts analysis is available in Appendix E3 of the EIS. The analysis concludes that the cumulative impacts of the Proposed Action combined with past, present, and reasonably foreseeable activities would constitute a moderate adverse impact on marine mammals in the geographic action area. The reader is kindly referred to the body of the EIS for additional detail. |
| BOEM-2022-0045-0102 | 4 | The MWT THPO recommends the following:<br>· Determine what long-term studies have been developed or proposed by Ørsted/Eversource and/or the National Marine Fisheries Service (NMFS) to monitor potential long-term adverse impacts on the NARW, such as avoidance behaviors and shifts in distribution due to habitat alteration. | Thank you for your recommendation. BOEM will consider funding additional monitoring efforts and assessment tools as needed to support future planning efforts. |
| BOEM-2022-0045-0119 | 4 | Also the DEIS does not incorporate the newest science on the presence of North Atlantic right whales in<br>the lease area, in two thousand and twenty-one researchers, including some from NOA Fisheries, and had a report published in the peer-reviewed Journal Endangered species Research that show the presence of North Atlantic right whales in the project area year round. This is not referenced or incorporated in the DEIS. So assumptions and assertions made in the DEIS about impacts to North Atlantic right whales, which are critically endangered species protected by the endangered species act, are completely erroneous. Um, The DEIS needs to go back and incorporate all of that information and update its analysis. | Thank you for your comment. The text has been reviewed and revised, as appropriate, to incorporate the most current occurrence information. |
| BOEM-2022-0045-0100 | 5 | The significance criteria definitions remain vague, particularly the distinction between moderate and major impacts. In addition, intensity conclusions rely on elements of mitigation, but fail to provide a thorough analysis of those mitigation measures or an indication as to how and to what extent they will be required. The significance criteria, in combination with the ill-defined area of analysis for each resource, do not appear to adequately consider variations in the intensity or scale of impacts and how these factors may affect resources at the project, regional, or population levels. Consideration of both the scale and intensity of impacts in the definition and application of the significance criteria is necessary to support accurate impact conclusions and provide clear distinctions among action alternatives. We previously coordinated with BOEM to develop agreed upon resource-specific significance criteria for marine mammals; these criteria have not been incorporated but they should be applied in this analysis.<br>Additionally, when applying significance criteria to reach an impact determination, the associated analysis should include sufficient detail to support those impact conclusions. Currently the analysis of effects does not consider the loss of ecosystem functions. While the quantitative loss of environmental elements (e.g., complex habitat) may be presented, overall the analysis does not provide a clear picture of what the effects of those spatial impacts and temporal losses mean for NOAA trust resources and the communities that rely on them. The current approach results in an analysis that makes the benefits and drawbacks among these alternatives indistinguishable. | Thank you for your comment. The NEPA significance criteria have been developed for consistent application across multiple offshore wind energy projects. As such, BOEM has retained these criteria, reviewed supporting information, and considered how those criteria are used to reach impact determinations for each resource as appropriate. |
| BOEM-2022-0045-0091 | 5 | The DEIS describes Alternative 'F"; "Higher Capacity Turbines" as follows: The Higher Capacity Turbine Alternative, would comprise the construction and installation, O&M, and eventual decommissioning of a wind energy facility implementing a higher nameplate capacity WTG (up to 14 MW assumed for the analysis) than what is proposed in the COP (i.e., the Proposed Action). Key assumptions for | Thank you for your comment. The proposed alternatives were considered in light of best available science to appropriately weigh potential differences in |

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| | | bounding this alternative include (1) the higher capacity WTG would fall within the physical design parameters of the PDE and (2) be commercially available to the Project proponent within the time frame for the construction and installation schedule proposed in the COP. BOEM did not identify any commercially viable turbines of a capacity higher than 14 MW that meet both criteria. The number of WTG locations under this alternative would be sufficient to fulfill the minimum existing PPAs (total of 704 MW and 56 WTGs with five “spare” WTG locations included). Using a higher capacity WTG would potentially reduce the number of foundations constructed to meet the purpose and need and thereby potentially reduce impacts to marine habitats and culturally significant resources and potentially reduce navigation risks. Under this alternative, BOEM could select the implementation of a higher capacity turbine in combination with any one alternative or a combination of the alternatives retained for detailed analysis in this EIS. Refer to Section 2.1.2, Section 2.1.3, Section 2.1.4, and Section 2.1.5 for figures. A higher capacity turbine design option would require almost 50% fewer turbine than the proposed action in order to meet the purpose and need of the project. A configuration using 59 12 MW turbines was presented as part of the COP (59 turbines versus 101 turbines), while the “Higher Capacity Turbine” alternative (“Alternative F”) analyzed by BOEM presumed 56 high capacity turbines with a capacity of up to 14 MW. The 12 Id., Table 3.15.4. 5 ability to lessen the project’s footprint and decrease the amount of construction and installation activity, while meeting the energy output goals of the project, should be thoroughly evaluated. While the DEIS identifies sound impacts and underwater impulsive noise is an issue of “particular concern” for marine mammals,13 the alternatives analysis appears to downplay the potential reduction in adverse impacts that would accompany the installation of significantly fewer wind turbines and the lessened pile-driving activity necessary to set the foundations. The DEIS states that Operational noise impacts under Alternatives C through F would be similar to those described for the Proposed Action (negligible to moderate adverse) but reduced in extent. Offshore WTGs produce continuous nonimpulsive underwater noise during operations, mostly in lower frequency bands below 8 kHz. The lowfrequency sounds produced by WTGs are within the range of hearing sensitivity and audible communication frequencies used by many species of marine mammals (NOAA 2018), indicating that this impact mechanism could be a potential source of behavioral and auditory masking effects on marine mammal species. However, the maximum predicted operational noise level would attenuate below the behavioral effects threshold for marine mammals within 120 feet of each turbine foundation, suggesting that behavioral and masking effects would occur within a small radius around each turbine. Vessels used for Project monitoring would produce noise, but the noise levels generated by these smaller Project vessels are below the hearing injury threshold of marine mammals; therefore, vessel noise from Project monitoring activities is not expected to result in injury-level effects. Due to the higher capacity of the turbines, there is potential for greater operational noise impacts around each individual turbine for Alternative F, although specifics of these impacts are not certain. Effects from Alternatives C through F would combine with similar effects resulting from the construction and installation, O&M, and decommissioning of other planned offshore wind projects on the mid-Atlantic OCS. Alternatives C through F would contribute an appreciable increase in underwater noise due to the installation of up to 93 foundations. HRG surveys, vessel engines, and operational noise from the WTGs would also contribute non-impulsive noise that could result in behavioral effects or displacement of marine mammals. On this basis, cumulative adverse effects on marine mammals resulting from underwater noise are likely to be minor to moderate adverse, varying by species.14 We recommend that BOEM give the installation of fewer, but higher capacity, wind turbines serious consideration, as this would demonstrably reduce the number of pile-driven foundations necessary for the project, thus providing, at a minimum, some attenuation of the duration that pile-driving activity would need to occur. Before dismissing such an alternative, BOEM should also seek clarity regarding the impacts of operational noise on marine mammals to determine whether such impacts form larger turbines outweigh the benefits of reduced pile driving activity. Reducing the number of turbines would also allow for consideration of spatial arrangements that might enhance avoidance, minimization, and mitigation opportunities for the benthic and marine habitat, such as those considered in alternative “C”. It is important that the operational plan be flexible enough to be able to take advantage of improvements in technology that can help to avoid or mitigate potential environmental impacts. | impacts. Table 3.15-4 and Section 3.15.2.3 provide information comparing expected impacts under each of the proposed alternatives. |
| BOEM-2022-0045-0101 | 5 | The MPTN finds the lack of information regarding the cumulative impacts of all wind farm projects within the Massachusetts/Rhode Island (MA/RI) wind energy area (WEA)—and other WEAs—on the NARW and other marine mammals concerning and unacceptable. The following proposed and approved MA/RI WEA wind farm applications for incidental harassment authorizations (IHAs) provide the per-project estimated Levels A and B incidental takes of NARWs: • Per Table 52 of the Updated Marine Mammals Density and Take Estimates for the Revolution Wind Offshore Wind Farm (noaa.gov), the RWF-requested Level B take 5-year total is 16.8 percent, with most occurring in Year 1 of construction (13.6 percent). This figure differs from that listed in Table 3.15-8 of the DEIS (9.5 percent). Table 50 of the Sunrise Wind Request for incidental take regs (noaa.gov) lists a requested Level B take 5-year total of 19.3 percent, with most occurring in Year 1 of construction (12.8 percent). • Table ES-1 of the New England Wind LOA Application (noaa.gov) lists Year-1 and Year-2 Level B takes of 23.9 percent and 24.7 percent, respectively. • The approved South Fork Wind Farm (SFWF) and Vineyard | Thank you for your comment. Cumulative effects on marine mammals are addressed in Sections 3.15.1.1.1 and 3.15.2.2.3 of the EIS, which include a discussion of concurrent construction impacts. Additional information about the projects considered under the cumulative impacts analysis is available in Appendix E3 of the EIS. The analysis concludes that the cumulative impacts of the Proposed Action combined with past, present, and reasonably foreseeable activities would constitute a moderate adverse impact on marine mammals in the geographic action area. Please refer to the responses to Comments 11 and 12 in comment submittal BOEM-2022-0045-0101 for additional response on the issue of cumulative impacts. |

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| | | Northeast IHAs allow Level B takes of 13 and 40 NARW (3.5 and 10.8 percent), respectively. These projects, which are in close vicinity, have overlapping construction schedules and will experience concurrent installation activity. | |
| BOEM-2022-0045-0102 | 5 | The MWT THPO recommends the following:<br>· Develop mitigations for long-term and unanticipated impacts to the NARW caused by offshore wind farms. | Thank you for your comment. BOEM will continue to coordinate with state and cooperating federal agencies and regional fishery management councils to develop appropriate mitigation measures for all project impacts. |
| BOEM-2022-0045-0059 | 6 | It is both curious and unacceptable that BOEM has not included the newest and most accurate scientific analysis of critically endangered North Atlantic right whales' presence in the project area in the DEIS. We have attached the document, "Residency, demographics, and movement patterns of North Atlantic right whales Eubalaena glacialis in an offshore wind energy development area in southern New England, USA" by Quintana-Rizzo et al, published July 29, 2021 in Endangered Species Research along with our comments and request that its analysis be incorporated into BOEM's DEIS analysis regarding impacts to marine mammals. Surprisingly, a document search of the DEIS yields only a 2006 study by Quintana-Rizzo regarding bottlenose dolphins, while yielding no search results for the 2021 North Atlantic right whale article which is specific to the lease area being analyzed in the DEIS. Due to the fact that out of all marine mammals to be impacted by the Proposed Action, the North Atlantic right whale is the only critically endangered species, we request that it be given its own impacts section with specific and related analysis and alternatives.<br>A NOAA press release dating from July 29, 2021 announcing the release of the Quintana-Rizzo et al. study states "Right whales are increasing their use of southern New England waters, including regions slated for offshore wind energy development, according to aerial survey data collected during the last decade. Offshore wind energy installations are proposed in waters off the south coasts of Massachusetts and Rhode Island…. "We found that right whale use of the region increased during the last decade, and since 2017 whales have been sighted there nearly every month, with large aggregations occurring during the winter and spring," said Tim Cole, lead of the whale aerial survey team at the Northeast Fisheries Science Center and a co-author of the study." 32<br>The study itself states, "Since 2017, whales have been sighted in the area nearly every month, with peak sighting rates between late winter and spring. Model outputs suggest that 23% of the species population is present from December through May, and the mean residence time has tripled to an average of 13 d during these months."33 According to study results, 87% of the current population had been sighted in the study area by the end of 2019, including mothers and calves, and conceptive and reproductive females important to the population.34 This is directly contradictory to the assertions of the Revolution Wind DEIS that "Due to the low relative densities of those species vulnerable to collisions compared to where the majority of the population is, there is a low risk of marine mammal vessel encounter" for the 1,936 round trips over the 2-year construction and installation period for the Proposed Action alone, never mind the cumulative impacts of adjacent and nearby projects.35 If an average of 23% of the North Atlantic right whale population, the population of a critically endangered species, is resident in the MA/RI Wind Energy Area for a good portion of the year, and the species is now present in the area year round, this is not an accurate assumption on BOEM's part.<br>Neither would be an assertion that North Atlantic right whales are not vulnerable to vessel strikes. In fact, North Atlantic right whales are so vulnerable to vessel strikes that NOAA maintains both Seasonal Management Areas as well as Dynamic Management Areas (frequently implemented in the MA/RI Wind Energy Area where the Proposed Action is located) requiring vessels to travel at 10 kts or less.36 These restrictions have been for larger vessels in the past, but proposals to extend the mandatory speed restrictions to smaller vessels 35-65 feet in length are now underway due to the fact that vessel strikes are one of the primary causes of death and injury to the species.37 The DEIS estimates a maximum of 249 vessels on a daily basis during offshore wind construction in 2024, and 301 vessels in 2025.38 This is a high vessel strike hazard probability given the presence of whales in the area.<br>In fact, the MA/RI Wind Energy Area, including the Proposed Action area, is the most densely populated area for North Atlantic right whales in the entire region. See the results of the Right Whale Density Model chart below, and included on page 4 of the attached NOAA Fisheries presentation to BOEM's Gulf of Maine Task Force on May 19, 2022, which we have attached with this comment: (see figure) BOEM must correct these inaccurate assumptions and related analysis related to North Atlantic right whales in the DEIS. We request that this information also be included in a Cumulative Impacts analysis.<br>The DEIS relies heavily on passive acoustic monitoring (PAM) as a mitigation measure to downplay construction and vessel strike impacts on marine mammals, as well as UXO impacts, discussed below. However, specific to North Atlantic Right whales, this also falls short of necessary protections. According to peer reviewed scientific data, North Atlantic Right whale mother and calves in particular exhibit "acoustic crypsis", i.e. they exhibit reduced calling rates and reduced call amplitude compared to other whales as a way to minimize the attention of predators.39 PAM will therefore be an ineffective means of identifying and avoiding mothers and calves in the area. We have attached this data as part of our comment and request that it be included in analysis of a DEIS section specific to North Atlantic right whales as part of a Final EIS. | Thank you for your comment. The text has been revised to incorporate the current information and understanding about North Atlantic Right Whale (NARW) occurrence within the project area and potential impacts associated with noise and vessel traffic. Additionally, the discussion of mitigation measures has been reviewed and revised, as necessary, to appropriately characterize anticipated protections for NARW. |

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| | | The 2021 Quintana-Rizzo et al paper clearly details that mother and calf pairs are found in the project area. No takes of this species are allowable under the Endangered Species Act. It is not reasonable to assume that PAM will be an adequate mitigation measure specific to critically endangered North Atlantic right whales considering the attached science. BOEM must include mitigation measures that will address impacts specific to right whales, which should be analyzed in its own section of the DEIS.<br>The DEIS similarly relies heavily on bubble curtains to mitigate the effects of pile driving and UXO detonation. For example, the DEIS concludes that bubble curtains will be effective at minimizing effects to marine mammals and ESA listed species from UXO detonation on page 3.15-11. Appendix F, "Environmental Protection Measures, Mitigation and Monitoring" lists bubble curtains on pages F-7 and F-8 as the mitigation measure for marine mammals related to construction and installation's impact and vibratory pile driving. However, BOEM already knows that bubble curtains do not protect North Atlantic right whales from impacts. Bubble curtains were designed to mitigate effects for high frequency marine mammals. At its Renewable Energy Program Update Briefing for the Mid Atlantic Fisheries Management Council on February 11, 2021, attached, BOEM's presentation openly stated "Low frequency sound ( <200Hz) is not reduced by the bubble curtain".40 Therefore, as low frequency species- and noted as such in the DEIS- North Atlantic right whales will not benefit from bubble curtains. Right whales' acoustic signals and acoustic sensitivity are below 200 Hz.41 As such, North Atlantic right whales are at a risk of hearing loss and other permanent impacts despite the use of bubble curtains during pile driving and UXO detonation activities. This is not acceptable, particularly for an ESA listed species. BOEM must demonstrate effective mitigation measures specific to low frequency marine mammals, and specifically the critically endangered North Atlantic right whale.<br>BOEM already divides marine mammals into low frequency, mid frequency and high frequency cetacean categories in the DEIS, for example in Table 3.15-2 on page 3.15-7. It lists North Atlantic right whales in the low frequency category. BOEM already acknowledges that there are differences between the species. Therefore, it cannot apply the same mitigation measures to all species when it knows that mitigation measures such as bubble curtains designed for high frequency mammals will not work for low frequency mammals. This is unreasonable, arbitrary and capricious, especially considering that BOEM already possesses the information and analysis to make this connection and distinction.<br>Footnote 32: See https://www.fisheries.noaa.gov/feature-story/right-whale-use-southern-new-england-wind-energy-areas-increasing.<br>Footnote 33: Quintana-Rizzo et al., "Residency, demographics, and movement patterns of North Atlantic right whales Eubalaena glacialis in an offshore wind energy development area in southern New England, USA", Endangered Species Research, Vol. 45: 251-268, July 29, 2021.<br>Footnote 34: Quintana-Rizzo et al., "Residency, demographics, and movement patterns of North Atlantic right whales Eubalaena glacialis in an offshore wind energy development area in southern New England, USA", Endangered Species Research, Vol. 45: 251-268, July 29, 2021, p. 257, 251.<br>Footnote 35: DEIS, p. 3.15-38.<br>Footnote 36: See https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-vessel-strikes-north-atlantic-right-whales.<br>Footnote 37: See https://www.noaa.gov/news-release/noaa-proposes-new-vessel-speed-regulations-to-protect-north-atlantic-right-whales.<br>Footnote 38: DEIS, p. 3.16-8.<br>Footnote 39: Parks et al., "Acoustic crypsis in communication by North Atlantic right whale mother-calf pairs on calving grounds", Biology Letters, 16 September 2019, also attached with our comment.<br>Footnote 40: See https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/602d7bbd49ee2d06d9db12c4/1613593539206/05a_BOEM+Renewables+Program+Update+2021-02.pdf, p. 21 of 23. Also attached as part of this comment.<br>Footnote 41: Quintana-Rizzo et al., "Residency, demographics, and movement patterns of North Atlantic right whales Eubalaena glacialis in an offshore wind energy development area in southern New England, USA", Endangered Species Research, Vol. 45: 251-268, July 29, 2021, p. 253. | |
| BOEM-2022-0045-0101 | 6 | Recommended Action Items<br>The MP-THPO recommends the following:<br>• Determine how developers across all projects under construction will manage and coordinate installation activities (e.g., pile driving) to avoid or reduce the cumulative impacts to whales and other marine mammals. | Thank you for your comment. Please refer to the responses to Comments 11 and 12 in FDMS Submission # BOEM-2022-0045-0101 for a discussion of the assessment of cumulative impacts and coordination of developers. |

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| BOEM-2022-0045-0102 | 6 | The MWT THPO recommends the following:<br>· Determine how developers across all projects under construction will manage and coordinate installation activities (e.g., pile driving) to avoid or reduce impacts to whales and other marine mammals. | Thank you for your comment. All future actions would be subject to an independent NEPA analysis and regulatory approvals as the Proposed Action. BOEM would require all projects to incorporate the same types of Environmental Protection Measures included in the Proposed Action to avoid and minimize harmful noise effects. |
| BOEM-2022-0045-0119 | 6 | i'm going to concur with the the last speaker specifically about the North American right right whale, which is listed critically endangered. There's no efforts in the DEIS specifically for the North American right whale. All that is termed under there is marine mammals, which is uh it that uh makes uh very little sense when um this is a critically endangered marine mammal one of the most critically endangered species in the world has been since the one thousand nine hundred and seventys.<br>There's only three hundred and fifty individuals left on earth, and hundred of only a hundred are females, so uh, this should have it a a separate heading of what the damage um are there Takings not. Nothing is under there. Uh, this is. This is the<br>the biggest issue with these windmills number. That's uh, not even addressed specifically. So i'm. I was really upset to see that that wasn't in there, and just the stating of how critical the this animal is, and once they're gone, they're gone forever. Extinction is the end, and that is our main problem. | Thank you for your comment. While the EIS does not include a section specific to the North Atlantic right whale, the document appropriately considers the current status of the population in the analysis (including noise impact modeling) and conclusions. The reader is kindly referred to the Conclusions sections within Section 3.15, specifically Section 3.15.2.2.4, for a discussion of specific conclusions for North Atlantic right whale. |
| BOEM-2022-0045-0059 | 7 | According to the DEIS, “Orsted anticipates that up to 13 UXOs, ranging from 5 to 1,000 pounds in size, may need to be detonated in place.”42 This is an astonishing statement considering the consistent numbers of a critically endangered species inhabiting the project area. However, the estimated detonation number may in reality be higher. As noticed by Orsted in its most recent Mariners Briefing email, attached, there are now 17 UXO that have been identified by Orsted in conjunction with its Revolution Wind activities (despite the title of the email, attached, being identified as “South Fork Wind Seabed Preparation”).<br>It is also astonishing that in Table 3.15-7 on page 3.15-30 of the DEIS, entitled “Estimated Number of Marine Mammals Experiencing a Permanent Threshold Shift from Worst-Case Scenarios for Construction-Related Impact Pile Driving and Unexploded Ordinance Detonation Exposure” that BOEM expects impacts from UXO detonation and pile driving activities only to non-ESA listed species. For example, BOEM expects 8 humpback whales to be impacted. However, humpback whales are only transitory through the project area and not present year-round, as are North Atlantic right whales. Yet BOEM expects no impacts to North Atlantic right whales from these activities? How can a species not present consistently in the area be impacted, while a species present year around with some of its highest density levels in and around the project area not be impacted?<br>Not surprisingly, BOEM’s only source for its DEIS analysis of these impacts is a single document, prepared by the developer, entitled “Petition for Incidental Take Regulations for the Construction and Operation of the Revolution Wind Offshore Wind Farm”.43 It is not surprising that the developer analysis will omit impacts to ESA listed species, as to acknowledge them would be to risk approval of the project. However, BOEM has a legal duty to fully and independently analyze impacts, which it has not done.<br>BOEM cannot simply cite one source- the developer’s petition for an incidental take permit- as its only analysis for impacts to or takes of marine mammals as a result of UXO detonation as well as construction activities. This is obviously a conflict of interest. Additionally, BOEM cannot ignore and/or omit peer reviewed science which shows high concentrations of North Atlantic right whales year-round in the project area, i.e. the Quintana-Rizzo paper attached with this comment, in favor of non-peer reviewed science submitted by the developer. We request that this entire section of the DEIS be re-analyzed with independent and peer reviewed information.<br>According to page 3.15-27 of the DEIS, the UXO detonation distance to peak injury threshold for low frequency marine mammals such as North Atlantic right whales is up to half a mile away from the detonation site.44 The distance to cumulative injury threshold for low frequency marine mammals is up to 2.65 miles away, and the distance to behavioral or cumulative temporary hearing threshold shift (TTS) effect threshold is up to 8.3 miles away from the detonation site.45 The document notes 13 detonation sites, however, based on the current 17 UXOs discovered by the Revolution Wind survey vessels, this may in fact be inaccurate. An 8.3 mile radius is a large area to monitor for every UXO detonation. However, a temporary hearing threshold shift for North Atlantic right whales could easily make these whales vulnerable to vessel strikes and other hazards while impaired. We request that BOEM explain how it proposes to monitor the entire 8.3 mile radius for right whale presence during detonation, what mitigation measures other than PAM and bubble curtains (which as discussed previously are ineffective mitigation for low frequency marine mammals such as right whales according to BOEM’s own data) it plans to require during detonation so as to protect right whales, and/or how BOEM proposes to ensure that no vessel traffic occurs in the area until any potential UXO- induced TTS has subsided for the animals.<br>We also note that the above distances of half a mile, 2.65 miles and 8.3 miles detailed by BOEM’s chart in the DEIS as distances from detonation site for peak and cumulative permanent and temporary hearing threshold shift (PTS and TTS) for marine mammals are calculated solely by a document paid for and prepared by the developer, entitled “Underwater Acoustic Modeling of Detonations of | Thank you for your comment. The FEIS has been reviewed and revised to incorporate the most current information on marine mammal occurrence within the project area and potential risk from UXOs. BOEM will continue to coordinate with state and cooperating federal agencies and regional fishery management councils to develop appropriate mitigation measures for all project impacts. The applicant will adhere with all required mitigation measures as a condition of MMPA compliance. |

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| | | Unexploded Ordinance (UXO) for Orsted Wind Farm Construction, US East Coast."46 Again BOEM utilizes only developer data as the primary source of impacts, when such data clearly is being prepared by an entity possessing a conflict of interest. As a mere footnote to the quoted developer data included in the DEIS, BOEM states, "NOAA uses the larger cumulative threshold distance to assess potential PTS and TTS exposure resulting from UXO detonation…PTS injury and TTS exposure acreages could occur within a 46,139 to 567,221-acre zone of potential exposure within and around the maximum work area for the RWF and RWEC, varying by hearing group and type of exposure."47 This is a tremendous statement to relegate to a footnote.<br>According to the data used by NOAA, the cumulative threshold distance for PTS and TTS from the UXO detonation site is up to 886 square miles (567,221 acres)! BOEM does not explain why it has chosen to use developer generated data to assess impacts to marine mammals, including critically endangered species, rather than NOAA data. This is particularly surprising given the fact that NOAA is the agency federally charged with protecting marine mammals. We request that BOEM explain its rationale for this decision. It is unclear how BOEM can effectively mitigate impacts over an area of this size, as it will be impossible to visually monitor and PAM/bubble curtains will be ineffective for low frequency marine mammals. We request that BOEM conduct a further analysis in the DEIS utilizing the NOAA distances and associated necessary mitigations and monitoring for marine mammals, particularly endangered North Atlantic right whales, for UXO detonation.<br>Additionally, the DEIS states that, "UXO detonation may also result in non-auditory injury (i.e. lung and gastrointestinal tract compression injuries)."48 These impacts should be treated differently than hearing threshold impacts and contain detailed analysis, particularly for critically endangered North Atlantic right whales. The Revolution Wind DEIS, following this statement regarding lung and intestinal tract compression injuries, notes, "A detailed discussion of noise impacts on marine mammals is provided in Vineyard Wind final EIS Section 3.4.1.1.1 (BOEM 2021b)."49 However, neither the Vineyard Wind Final EIS Section 3.4.1.1.1, "Marine Mammals", nor anywhere else in the Final EIS mentions UXO detonation. A word search of the Vineyard Wind Final EIS for the term "UXO" yields the result, "No matches were found". Therefore, the Vineyard Wind FEIS, upon which the ROD is based, did not analyze UXO detonation at all. This would seem to be arbitrary and capricious on behalf of BOEM for that project, considering that the Vineyard Wind COP Easement Approval Letter contains a section on surveying for UXO, meaning that BOEM expected UXO discovery to be reasonably foreseeable as a result of construction activities.50 It is particularly concerning considering that Vineyard Wind has in fact unearthed a 1000 lb UXO, which is discussed below in more detail.<br>For the Revolution Wind DEIS, BOEM cannot reference the Vineyard Wind FEIS relative to impacts of UXO detonation on marine mammals when the Vineyard Wind FEIS did not analyze these impacts. We request that BOEM conduct a full analysis of non-auditory injury impacts to marine mammals from UXO detonation, with a separate section for North Atlantic right whales, and include this in an updated and revised DEIS for Revolution Wind.<br>Footnote 42: DEIS, p. 3.6-40.<br>Footnote 43: See reference in Table 3.15-7 to "LGL (2022)" and corresponding reference on DEIS page B-19, "LGL Ecological Research Associates (LGL). 2022. Petition for Incidental Take Regulations for the Construction and Operation of the Revolution Wind Offshore Wind Farm. Prepared for Revolution Wind LLC, Orsted, and Eversource. Bryan, Texas: LGL Ecological Research Associates."<br>Footnote 44: DEIS, p. 3.15-27; the chart states 2,776 feet which is 0.52 miles.<br>Footnote 45: DEIS, p. 3.15-27; the chart states 14,009 feet and 44,291 feet, which are 2.65 and 8.3 miles, respectively.<br>Footnote 46: Hannay, D., and M. Zykov. 2021. Underwater Acoustic Modeling of Detonations of Unexploded<br>Ordnance (UXO) for Ørsted Wind Farm Construction, US East Coast. Silver Spring, Maryland:<br>JASCO Applied Sciences.<br>Footnote 47: DEIS, p. 3.15-27, footnote #.<br>Footnote 48: DEIS, p. 3.15-28.<br>Footnote 49: DEIS, p. 3.15-28.<br>Footnote 50: See Section 2, p. 3-6 of the Vineyard Wind COP and Project Easement Approval Letter at https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/VW1-COP-Project-Easement-Approval-Letter_0.pdf | |
| BOEM-2022-0045-0101 | 7 | • Investigate how NARW exposure to underwater construction noise can be further reduced. | Thank you for your comment. Given the population status, NARW is a species of concern and impacts from underwater construction noise will be minimized to the extent practicable and in coordination with NMFS. The final list of Environmental Protection Measures (EPMs) and additional mitigation measures was presented in Appendix F of the FEIS. |

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| BOEM-2022-0045-0102 | 7 | Additionally, Appendix C of the DEIS states that "BOEM determined that the overall costs of obtaining the missing information for or addressing uncertainty of the above topics for marine mammals are exorbitant or that the means to obtain it are not known." BOEM, therefore, "extrapolated or drew assumptions from known information for similar species and/or situations, as presented in Section 3.15 of the EIS." Because of the cultural and spiritual importance of the NARW, the MWT THPO does not accept this resolution and thus recommends the following:<br>· Quantitatively determine the anticipated cumulative effects of multiple and future projects on NARW threshold shift and migration patterns as well as the potential synergistic effects of structure presence on the NARW. (Per DEIS Appendix C, the geographic analysis area may contain up to 3,110 new structures (WTGs and offshore substations (OSSs)) in a worst-case, cumulative impact scenario.) | Thank you for your comment. The FEIS considers the best available data and information for the cumulative effects, consistent with NEPA requirements. |
| BOEM-2022-0045-0069 | 7 | Minimize impacts to birds, sea turtles, and marine mammals, especially the critically endangered North Atlantic right whale (Eubalaena glacialis).<br>o Southern New England has been identified as a significant foraging ground for right whales during their migrations. Significant measures have been taken to improve their population status via commercial lobster fishing restrictions. Additional commercial fishing measures are being evaluated by the Atlantic Large Whale Take Reduction Team, in addition to vessel speed requirement, to meet additional risk reduction targets. As such, the project should take the necessary actions to ensure it does not counteract these efforts.<br>o Impact minimization could occur through, but is not limited to, construction time of year restrictions and exclusion zones, vessel speed restrictions (applied to all vessels associated with the wind farm), and noise mitigation measures. Sound scientific data collection and monitoring of the wind energy area is also essential to evaluating potential effects in real-time to enable implementation of adaptive management measures. | Thank you for your comment. The proposed Environmental Protection Measures (EPMs) and additional mitigation measures are intended to avoid and minimize impacts to species, including NARW, to the extent practicable. The reader is kindly referred to Appendix F of the EIS for a full list of the proposed EPMs and additional mitigation measures. |
| BOEM-2022-0045-0091 | 8 | Save the Sound appreciates that special attention has been paid to develop recommendations to protect the North Atlantic right whale, one of the world's most endangered species, from the risk of excessive underwater sound and collision with vessels. It appears, however, that much work is yet to be done with respect to the impact of underwater sound on this species16, and we recommend ongoing research into these impacts to inform this and other projects. | Thank you for the comment. The field of underwater sound and impacts to marine mammals continues to evolve (e.g., Ruppel et al. 2022) and ongoing research is expected to continue to inform other offshore wind projects. |
| BOEM-2022-0045-0101 | 8 | • Develop a response plan for assisting beaching whales and other large mammals in returning to and remaining in open waters. | Thank you for your recommendation. BOEM will continue to coordinate with NMFS to determine appropriate mitigation measures. |
| BOEM-2022-0045-0102 | 8 | · Determine the impacts of reef effect and hydrodynamics on prey and forage availability as well as predator-prey interactions. | The potential implications of the presence of structures with regards to reef effects and hydrodynamics has been assessed under the Presence of Structures IPF. Additional information is available within Sections 3.6.1.1.1 (on invertebrates) and 3.13.1.1.1 (on finfish) of the EIS. |
| BOEM-2022-0045-0101 | 9 | • Determine the likelihood of long-term, WTG-generated noise producing avoidance behaviors in low-frequency cetaceans such as the NARW. | Thank you for your comment. The EIS relies on best available science to assess potential impacts of operational noise on marine mammals like NARW. The reader is kindly referred to the Noise IPF subsection in Section 3.15.2.2.2 for a discussion of available information regarding operational noise impacts on marine mammals. |
| BOEM-2022-0045-0102 | 9 | NARWs and other whales are so reliant on sound. What effect will project construction noise such as that created by pile driving have on them? | The noise impacts on marine mammals associated with project construction are fully assessed and described in the Noise IPF subsections within Sections 3.15.2.1, 3.15.2.2, and 3.15.2.3. The reader is kindly referred to these sections. |
| BOEM-2022-0045-0101 | 10 | • Determine the potential for a long-term shift in large whale distribution in the geographic analysis area (GAA) due to habitat alteration. | The potential for long-term shifts in habitat use within the geographic analysis area is complex and dependent on a wide range of factors. The text has been revised to incorporate additional information about shifting habitat use, as available. Given the complexity of the issue, the EIS does not speculate about specific expected habitat shifts within the analysis area. The analysis is based on the best publicly-available science. |
| BOEM-2022-0045-0102 | 10 | Determine how developers across all projects under construction will manage and coordinate installation activities (e.g., pile driving) to avoid or reduce the cumulative impacts to whales and other marine mammals. | Thank you for your comment. All future actions would be subject to an independent NEPA analysis and regulatory approvals as the Proposed Action. BOEM would require all projects to incorporate the same types of |

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| | | | Environmental Protection Measures included in the Proposed Action to avoid and minimize harmful noise effects. |
| BOEM-2022-0045-0101 | 11 | • Quantitatively determine the anticipated cumulative effects of multiple and future projects on NARW threshold shift as well as the potential synergistic effects of low-level operational noise on the NARW.<br>o Appendix C of the DEIS states that "BOEM determined that the overall costs of obtaining the missing information for or addressing uncertainty of the above topics for marine mammals are exorbitant or that the means to obtain it are not known." BOEM, therefore, "extrapolated or drew assumptions from known information for similar species and/or situations, as presented in Section 3.15 of the EIS." Because of the cultural and spiritual importance of the NARW, the MP-THPO does not accept this resolution.<br>o Per DEIS Appendix C, the geographic analysis area may contain up to 3,110 new structures (WTGs and OSSs) in a worst-case, cumulative impact scenario. | Thank you for your comment. The FEIS considers the best available data and information for the cumulative effects, consistent with NEPA requirements. |
| BOEM-2022-0045-0102 | 11 | Investigate how NARW exposure to underwater construction noise can be further reduced. | Thank you for your comment. Given the population status, NARW is a species of concern and impacts from underwater construction noise will be minimized to the extent practicable. The final list of Environmental Protection Measures (EPMs) and additional mitigation measures is presented in Appendix F of the FEIS. |
| BOEM-2022-0045-0119 | 11 | So uh, addressing this impact to uh the North Atlantic right whale, um will likely um change some of the outcomes of the uh the alternative analysis. Um, you know, we'll note uh the Vineyard Wind Project um, which actually entered into a uh agreement with the number of national environmental organizations to minimize impacts with the North Atlantic right whales um change their proposal based upon advances in technology um to increase their turbine size uh from the original nine and a half megawatts um to twelve to thirteen megawatts. Uh we're able to shrink the number of proposed turbines from eighty-four to sixty-two um and that's going to require a lot less pile driving um, and a lot less sonic. | Thank you for your comment. As per ESA/MMPA consultations, this project proposes a number of specific avoidance and minimization measures designed to limit impacts to the North Atlantic right whale (NARW). As described in Appendix F of the EIS, Environmental Protection Measures (EPMs) and additional mitigation measures specifically related to NARW include, but are not limited to: noise attenuation, visual monitoring, passive acoustic monitoring, soft-start procedures, reporting of all sightings, and seasonal restrictions for pile driving. |
| BOEM-2022-0045-0101 | 12 | • Determine the cumulative impacts of the following to the NARW population:<br>o The RWF/RWEC, SFWF, Sunrise Wind, and Vineyard Northeast projects, each of which are scheduled to commence in 2023.<br>o Additional proposed offshore wind projects. | Thank you for your comment. The FEIS considers the best available data and information for the cumulative effects, consistent with NEPA requirements. Please refer specifically to Appendix E for information regarding the scope of activities considered in the cumulative impacts assessment. |
| BOEM-2022-0045-0102 | 12 | Collect data on the following:<br>o Long-term movement or acoustic exposure of low-frequency cetaceans (e.g., whales) in or around offshore wind farms.<br>o The long-term effects of habitat alteration due to the installation of an offshore wind farm.<br>o The responses of large whale species to the presence of offshore wind farms. | Thank you. Please refer to the response to Comment 4 in FDMS Submission # BOEM-2022-0045-0102 for information about proposed monitoring and research efforts on NARW and other marine mammals. |
| BOEM-2022-0045-0102 | 13 | Develop contingency plans if research concludes that wind farm construction and operations activities will have greater short- and/or long-term effects on marine mammals, especially the critically endangered NARW. | Thank you for your recommendation. BOEM will consider funding additional monitoring efforts and assessment tools as needed to support future planning efforts. |
| BOEM-2022-0045-0102 | 14 | Quantitatively determine the anticipated cumulative effects of multiple and future projects on NARW threshold shift as well as the potential synergistic effects of low-level operational noise on the NARW.<br>o Appendix C of the DEIS states that "BOEM determined that the overall costs of obtaining the missing information for or addressing uncertainty of the above topics for marine mammals are exorbitant or that the means to obtain it are not known." BOEM, therefore, "extrapolated or drew assumptions from known information for similar species and/or situations, as presented in Section 3.15 of the EIS." Because of the cultural and spiritual importance of the NARW, the MWT THPO does not accept this resolution.<br>o Per DEIS Appendix C, the geographic analysis area may contain up to 3,110 new structures (WTGs and OSSs) in a worst-case, cumulative impact scenario. | Thank you for your comment. The FEIS considers the best available data and information for the cumulative effects, consistent with NEPA requirements. |
| BOEM-2022-0045-0102 | 15 | Determine the cumulative impacts of the following to the NARW population:<br>o The RWF/RWEC, SFWF, Sunrise Wind, and Vineyard Northeast projects, each of which are scheduled to commence in 2023.<br>o Additional proposed offshore wind projects | Thank you for your comment. The cumulative impacts analysis in the FEIS relies on the best available data and information for the cumulative effects, consistent with NEPA requirements. The potential for concurrent pile driving |

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| | | | under currently available construction schedules for proposed projects is considered. |
| BOEM-2022-0045-0110 | 31 | Beyond the monitoring measures already contemplated, BOEM, in consultation with Rhode Island and Massachusetts fishery managers and NMFS, should determine whether other monitoring measures are needed to document and determine impacts to benthic habitat, invertebrates, finfish, and EFH from the Revolution Wind project. | Thank you for your comment. Appendix F of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. BOEM fully supports regional monitoring and coordination with state and cooperating federal agencies and regional fishery management councils to develop appropriate mitigation measures and will incorporate results in future decisions. |
| BOEM-2022-0045-0110 | 32 | Many marine mammal and sea turtle species are under extreme stress due to climate change, vessel traffic and collisions, entanglement with fishing gear, underwater noise pollution, and other changes in the marine environment. It is critical to the health of many of these species that we not only transition away from climate warming fossil fuels to renewable resources such as offshore wind, but also that we develop offshore wind resources in a way that does not add additional stress or exacerbate other existing environmental stressors. To comply with the 2005 amendments to the Outer Continental Shelf Lands Act (OCSLA), BOEM must ensure that all activities related to renewable energy development on the OCS are "carried out in a manner that provides for…protection of the environment."125 BOEM's regulations under those amendments require Revolution Wind to plan and conduct the project in a manner that does not cause "undue harm or damage" to natural resources or wildlife.126 The project must comply with the federal Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA), including the MMPA least practicable adverse impact standard for all marine mammal species, before any activities are undertaken.127 BOEM is also obligated by NEPA to consider the full range of potential impacts on all marine mammal and sea turtle species. We recommend BOEM review the mitigation measures we provide in Attachment 1 and incorporate them into the requirements for Revolution Wind 1's development. | Thank you for your comment and recommendation. BOEM is working closely with NMFS to determine appropriate mitigation measures, including vessel speed reductions, and the use of real-time PAM and PSOs. The final mitigation measures that are determined to be most effective will be developed through the ESA and MMPA processes and will be identified in the ROD and required of the developer. |
| BOEM-2022-0045-0110 | 33 | There are several important issues with the occurrence data and designations ("rare", "common", "regular") as well as with the literature and research used by the developer and BOEM to support conclusions about occurrence in the Project Area, seasonal occurrence, and abundance and density of species. In particular, we note a number of errors below within Table 3.15-1: Frequency of Marine Mammal Species Occurrence in Northwest Atlantic Outer Continental Shelf and Likelihood of Occurrence in the Revolution Wind Farm and Revolution Wind Farm Export Cable131 where site-specific data derived from site assessments and geological and geophysical surveys are missing from BOEM's occurrence analysis. | Thank you for your comment. Table 3.15-1 incorporates best available science on species occurrence within the Project Area. Available site-specific data has been reviewed and information updated, as necessary. |
| BOEM-2022-0045-0110 | 34 | Additionally, BOEM does not provide a detailed assessment of marine mammal species occurrence in the Project Area but instead refers the reader to the COP Appendix Z (CSA Ocean Associates 2021) and NOAA's 2020 stock assessment report (Hayes et al. 2021) for detailed information on marine mammals in the entire geographic analysis area. The only Project Area-specific occurrence info provided is a "Yes" or "No" designation in Table 3.15-1 on pages 3.15-5 and 3.15-6. | For the sake of brevity and clarity of the analysis, the EIS provides a single designation of occurrence for each species and refers the reader to additional available data. Presented information is based on best available science and is intended to sufficiently support the EIS analysis. |
| BOEM-2022-0045-0110 | 35 | Further, for estimations of the number of marine mammals expected to experience hearing loss as a permanent threshold shift (PTS) or temporary threshold shift (TTS) (Tables 3.15-7 and 3.15-8), BOEM references the Petition for Incidental Take Regulations for the Construction and Operation of the Revolution Wind Offshore Wind Farm, but does not provide a description of how these estimates were derived. The reader must review the Petition to find out that the estimates were derived from the older Roberts et al. models.132 | Thank you for your comment. The text has been revised to provide a high-level description of how the estimates were derived. However, for the sake of brevity, the EIS refers the reader to the Petition for Incidental Take Regulations for additional detail. |
| BOEM-2022-0045-0110 | 36 | Descriptions of species-specific occurrence in the Project Area should be provided in the FEIS and supported by primary sources and peer-reviewed literature, and Tables 3.15-1, 3.15-2, and 3-19.1 should be edited to incorporate more accurate and well-defined designations of occurrence and project-specific abundance estimates based on the latest Roberts et al. models.133 | Thank you for the comment. Additional occurrence data has been incorporated into the information presented in Tables 3.15-1 and 3.15-2, as appropriate. For the sake of brevity, the EIS refers the reader to other project documentation for additional details on species-specific occurrence. |
| BOEM-2022-0045-0110 | 37 | Specific concerns with Table 3.15-1 include the following:<br>Occurrence in the Northwest Atlantic OCS: BOEM cites Kenney and Vigness-Raposa (2010)134 for this information. However, this study was specific to the Rhode Island Study Area and does not include occurrence designations for all marine mammal species along the entire Northwest Atlantic OCS. As this is not an appropriate reference, it is unclear how BOEM then derived the "common", "regular", and "rare" occurrence definitions from this study.135 Additionally, for some species the references provided are incomplete: the | The occurrence information presented in the EIS is based on the best publicly available science and has been updated with the most current data. The EIS additionally incorporates available information on the potential for habitats to shift in the future due to climate change. This approach relies on best available data, reduces speculation, and meets the purpose and need of the EIS. |

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| | | Northeast Fisheries Science Center (NEFSC) and Southeast Fisheries Science Center (SEFSC) (2018)136 only includes Atlantic Marine Assessment Program for Protected Species (AMAPPS) sightings data from 2010-2017, Davis et al. (2020)137 does not include sightings data, and CSA Ocean Sciences Inc. (2021)138 is not a primary source for occurrence information. BOEM must use relevant primary sources to support its analysis, rather than the secondary sources cited throughout the DEIS. We recommend that BOEM use occurrence designations that are based on known habitat associations, confirmed sightings, and the potential for occurrence regardless of how abundant or common a species is. This conservative method of designated occurrence ensures that occurrence is not based solely on sightings data which may be lacking for some species due to less survey effort during poor weather conditions and times of year when some species may be more prevalent off Rhode Island. | |
| BOEM-2022-0045-0110 | 38 | Specific concerns with Table 3.15-1 include the following:<br>Annual (Peak) Occurrence: BOEM's categorization of annual peak occurrence of marine mammal species is unclear and confusing and lacks a coherent explanation. With no definitions included for the designations it is not possible to determine whether the Northeast Atlantic or the Project Area is provided. The seasons (months/ dates) are also unexplained. BOEM references data from NEFSC and SEFSC (2018)55 and Davis et al. (2020)56 for this information, but it remains confusing as to what region the occurrence designations are for since they are not consistent with Project Area-specific information. For example, occurrence for humpback whales is listed as year-round with a peak in winter and spring. Humpback whales are known to occur on the Northwest Atlantic OCS year-round, but peak occurrences are variable throughout the OCS. For instance, peak acoustic detections of humpbacks have been noted off Virginia in January-May and off North Carolina in October-January (Davis et al. 2020)56, and peak abundances based on AMAPPS 2010-2017 sightings data vary across wind energy areas with a peak Rhode Island/Massachusetts presence in March-May and a peak off North Carolina in December-February (NEFSC and SEFSC 2018).55 AMAPPS 2010-2017 surveys recorded humpback whales in or near the Rhode Island/Massachusetts wind energy areas (WEAs) during all seasons except winter (NEFSC and SEFSC 2018).55 Additionally, the peak density for humpbacks in the lease area is in September, based on estimates derived for the older Roberts et al. models (see Table 12 in LGL 2022).139 We recommend that BOEM provide annual and peak occurrence information for the Project Area using the most comprehensive set of data (e.g., the new Roberts et al. models). | Thank you for the comment. The footnotes associated with Table 3.15-1 have been revised to define the designations and seasons presented. Additionally, the designations made in the table have been updated to be consistent with the most current information on species occurrence. |
| BOEM-2022-0045-0110 | 39 | Specific concerns with Table 3.15-1 include the following:<br>Species Occurrence in RWF and RWEC:<br>BOEM includes the long-finned pilot whale but not short-finned pilot whale as occurring in the Project Area. However, due to the uncertainty of the exact ranges of these species, the potential for range shifts due to climate change, and the difficulty distinguishing between these species in the field, both species should be included as expected to occur in the Project Area. In general, pilot whales sighted south of Cape Hatteras are expected to be short-finned pilot whales, while those sighted north of approximately 42°N are expected to be long-finned pilot whales (Garrison and Rosel 2017)140; however, long-finned pilot whales are known to strand as far south as Florida, and short-finned pilot whales have stranded as far north as MA (Pugliares et al. 2016).141 Tagged short-finned pilot whales have ranged along the shelf break as far north as Nantucket Shoals and Georges Bank (Thorne et al. 2017).142 During recent surveys in the nearby New York Bight, short-finned pilot whales were sighted in August (NYSERDA 2020).143<br>Blue whales are listed as occurring in the Project Area; however, blue whales are only occasional visitors to the OCS (Hayes et al. 2020)144 and have not been sighted in or near the Rhode Island/Massachusetts WEAs during area-specific surveys (e.g., Kraus et al. 2016).145 Also, note that monthly average densities of this species in the lease area were all zero (see LGL 2022).58<br>Atlantic spotted dolphins are listed as not expected to occur in the Project Area; however, BOEM should consider this species as expected to occur based on known sightings information in this region. For example, this species has been sighted in the New York Bight in November and April/May (NYSERDA 2020)62, and density estimates (although low) have been generated for the lease area for all months except January-March (see LGL 2022).58<br>Harp and hooded seals are listed as expected to occur in the Project Area. BOEM needs to provide information to support their inclusion of these extralimital seal species. | Thank you for the comment. The designations for short-finned pilot whale, blue whale, Atlantic spotted dolphin, harp seal, and hooded seal have been reviewed and revised, as necessary, to be consistent with the most current occurrence information. |
| BOEM-2022-0045-0086 | 39 | There are species listed in Table 3.15-1 which are either listed as likely to occur or not likely to occur in the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) which is inconsistent with the analysis from the Revolution Wind COP. First, Table 3.15.1 says that Atlantic spotted dolphins are not likely to occur in the RWF/RWEC. The COP assessment indicates they may occur (though sightings would be uncommon) based on recent Protected Species Observer (PSO) sightings for the Revolution Wind Farm Lease Area. This is further supported by the Underwater Acoustic Modeling of Construction Sound and Animal Exposure Modeling (Küsel et al., 2021)19 which includes them in the exposure modeling assessment. Second, both harp seals and hooded seals are considered likely to occur in the RWF/RWEC in Table 3.15- 1 which is inconsistent with the COP analysis. Both are considered rare in the COP analysis, but only harp | Thank you for the comment. The text has been reviewed and revised, as necessary, to be consistent with the COP analysis and Letter of Authorization application. Where the information differs, a clear description of the reasoning has been added. |

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| | | seals are included in the exposure modeling conducted by Küsel et al. (2021). Therefore, Revolution Wind respectfully requests that the species considered likely to occur in the Project Area be reviewed and updated so they are consistent with the COP analysis and Letter of Authorization (LOA) application, or a definitive reason as to why the analysis in the DEIS differs from these documents is clearly stated. | |
| BOEM-2022-0045-0110 | 40 | Specific concerns with Table 3.15-1 include the following:<br>Additional Primary Sources to Be Considered: As we have highlighted previously, BOEM should rely upon peer-reviewed primary sources for its analysis of occurrence and habitat use in and near the Project Area. Given the proximity to the New York Bight, additional relevant146 data sources would be appropriate to incorporate into the FEIS. | Thank you for your comment. Additional primary sources have been incorporated into Table 3.15-1, as available. |
| BOEM-2022-0045-0086 | 40 | In Section 3.15.2.2.2, Page 3.15-40, the final determination for marine mammals resulting from noise produced by operating WTG during the O&M phase is described as follows: "On balance, operational noise effects from the RWF are likely to be of low intensity and localized to around each foundation. Jansen and de Jong (2016) and Tougaard et al. (2009) concluded that marine mammals would be able to detect operational noise within a few thousand feet of WTGs, but the effects would have no significant impacts on individual survival, population viability, distribution, or behavior. The findings provided above indicate that operational noise effects would attenuate to ambient levels within a few hundred to a few thousand feet of each foundation, but operational noise would be at levels that could cause behavioral reactions in marine mammals within 120 feet of each turbine. There is the potential for a reduction in effective communication space within the wind farm environment for marine mammals that communicate primarily in frequency bands below 8 kHz (i.e., low-frequency cetaceans). This localized, long-term impact would constitute a moderate adverse effect on marine mammals belonging to the low-frequency cetacean hearing group. Operational noise effects on marine mammals in other hearing groups would be negligible to minor adverse because operational noise overlaps the sound frequencies used for hearing and communication by these species to a lesser degree. It is unknown if operational noise would contribute to displacement effects to marine mammals." Revolution Wind requests the effects determination be reviewed to consider a minor determination for all marine mammal species regardless of hearing group. All available information suggests that WTG noise would be detectable by all marine mammals, but no biologically relevant/long-term effects would be expected to occur. Recent studies from Tougaard et al. (2020)20 and Stöber and Thomsen (2021)21 concur with the findings presented in the DEIS (i.e., that operational noise would be detectable within a few thousand feet of the WTG but would have no significant impacts on marine mammals) and also show that underwater noise measured from operational WTG was approximately 10 – 20 dB lower than that measured from commercial vessel traffic at the same distances (Stöber and Thomsen, 2021). Section 3.15.2.2.1 of the DEIS determined that Project vessel noise would result in only minor adverse effects on all marine mammals, regardless of hearing group, and due to the similarities in noise produced by WTG and large vessels, the impact determinations should likewise be similar. Additionally, Section 3.15.1.1.1 of the DEIS determined that noise from operational WTG for all Future Offshore Wind Activities without the Proposed Action would result in minor impacts for all marine mammals. BOEM estimated up to 3,008 new offshore wind structures would be installed and begin operating between 2022 and 2030 within the GAA, compared to the up to 100 structures that would be installed under the Proposed Action. Studies indicate that the overall noise produced would incrementally increase with additional turbines (Tougaard et al., 2020), so it would follow that a greater number of turbines would result in higher noise levels. Therefore, Revolution Wind respectfully disagrees with the finding that impacts from noise produced by a single offshore wind project would be less than that produced by all future potential projects within the marine mammal GAA and recommends a minor adverse impact determination for all marine mammals. In addition to being inconsistent with the aforementioned information, a finding of moderate impact would have illogical results. The definition of a moderate impact states that "[a] notable and measurable adverse impact on the affected resource(s) could occur AND the affected resource would recover completely when remedial or mitigating action is taken." As noted, the available information indicates that there would be no notable impact; and there are no identified mitigation measures for noise produced by operational WTGs, nor remedial activities have been described in the COP. Therefore, with a moderate determination, the DEIS could be read as concluding that the resource (e.g., NARW) is not expected to recover completely because there would mitigating or remediating actions in place for this IPF, despite the fact that the available information indicates that no biologically relevant/long-term effects would be expected to occur. | Thank you for the comment. The text has been reviewed and revised, as necessary, to ensure consistency and logic of the impact determination. |
| BOEM-2022-0045-0110 | 41 | Specific concerns with Table 3.15-2 include the following:<br>Abundance Estimates for the North Atlantic Right Whale: The NARW remains one of the most endangered large whale species, with the best population estimate at just 336 individuals based on data through September 7, 2021.147 The DEIS uses an outdated population estimate for the right whale of 368 individuals148, and we encourage the use of the 336 estimate to more accurately reflect the species' status and subsequent risk assessment. | Thank you. The FEIS has been revised to reflect the most current population information for North Atlantic right whale. |

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| BOEM-2022-0045-0086 | 41 | Page 3.15-29 of the DEIS states: "Nighttime pile driving may occur under certain conditions" and a footnote that further describes those conditions as "... specific circumstances where foundation installation takes longer than anticipated and delaying installation until daylight could present risks to safety and/or structural stability." We believe that this characterization of potential nighttime pile driving activity is not necessarily consistent with intended activities. Although this description may indeed reflect one circumstance under which nighttime pile driving may occur, the Project is also working to develop and define the effectiveness of nighttime monitoring methods such as IR sensors and advance PAM systems that would provide sufficient monitoring of pre-start clearance and shutdown zones at night, so that nighttime pile driving may be initiated at night. As described in the Incidental Take Regulation (ITR) application and Protected Species Monitoring and Mitigation Plan (PSMMP), the specific monitoring methods used to conduct monitoring and allow the safe initiation of pile driving at night will be described in a subsequent monitoring plan to be submitted to NMFS and BOEM for review and approval prior to the beginning of installation activities. Furthermore, the Ocean Wind DEIS includes language in which nighttime pile driving may occur to allow for schedule adherence. Whereas the Revolution Wind DEIS omits the language surrounding schedule adherence. We request that the language and analysis in the EIS reflect this broader scope of potential nighttime pile driving to account for the forthcoming PSMMP and similarly include the possibility of nighttime piling to facilitate schedule adherence. | With regards to nighttime pile driving, the text has been revised to describe the intended activities as currently described in the COP. |
| BOEM-2022-0045-0110 | 42 | Specific concerns with Table 3.15-2 include the following:<br>Project-Area Abundance Estimates: BOEM does not provide Project-Area-specific abundance estimates for marine mammal species in this table or elsewhere in the DEIS. The Roberts et al. models have recently been updated as of 2022, and BOEM should include abundance estimates derived from these models before the FEIS is published to fully assess risk and impacts to species in the Project Area. | Thank you for your comment. Updated information has been incorporated into Table 3.15-2 of the FEIS, as available, to reflect the current understanding of the abundance of marine mammal species within the project area. |
| BOEM-2022-0045-0086 | 42 | Page 3.15-38 of the DEIS states: “The densities of most common species of marine mammals likely to occur in the RWF Lease Area and RWEC route are low based on monthly mean density estimates developed by Roberts et al. (2016, 2017, Revolution Wind Farm and Revolution Wind Export Cable Project Draft Environmental Impact Statement 3.15-38 2018, 2020, 2021). Project construction of the maximum case scenario under the Proposed Action would require an estimated maximum of 1,936 round trips for all vessel classes combined over the 2-year construction and installation period. Due to the low relative densities of those species vulnerable to collisions compared to where the majority of the population is, there is a low risk of a marine mammal vessel encounter. Although this would likely be an increase in vessel traffic in and around the maximum work area of approximately 2% a year, the operational conditions combined with planned EPMs, and additional mitigation measures agreed upon through agency consultation (see Appendix F for all vessel strike avoidance measures) would minimize collision risk during construction and installation. During periods of low visibility, trained crew would use increased vigilance to avoid marine mammals. Because vessel strikes are not an anticipated outcome given the relatively low number of vessel trips and EPMs to avoid encountering marine mammals, BOEM concludes vessel strikes are unlikely to occur. Therefore, there is no anticipated effect on marine mammals and collision effects would be negligible adverse during the construction phase of the Project.” A single encounter (strike) could have population-level impacts to the NARW due to its <1 potential biological removal (PBR; Hayes et al., 2022)22. Although the risk for a NARW encounter is low, Revolution Wind acknowledges that the risk is notably not zero. Therefore, it must be made clear why collision effects are considered negligible for the NARW. Revolution Wind respectfully requests that a detailed discussion specific to NARW strike risk, including how mitigation measures will effectively eliminate strike risk to the species, is included within this section or consider a minor effect. | Thank you for the comment. The text has been reviewed with respect to the discussion of strike risk for NARW. Where appropriate, details have been added to support the impact determination stated. |
| BOEM-2022-0045-0086 | 43 | Page F-19 of Appendix F in the DEIS states in Mitigation Number 1: “BOEM, BSEE, and USACE would ensure that PSO coverage is sufficient to reliably detect marine mammals and sea turtles at the surface in clearance and shutdown zones to execute any pile driving delays or shutdown requirements. If, at any point prior to or during construction, the PSO coverage that is included as part of the proposed action is determined not to be sufficient to reliably detect ESA-listed whales and sea turtles within the clearance and shutdown zones, additional PSOs and/or platforms would be deployed. Determinations prior to construction would be based on review of the Pile Driving Monitoring Plan. Determinations during construction would be based on review of the weekly pile driving reports and other information, as appropriate.” There is no definition of what constitutes insufficient PSO coverage described in this mitigation measure. This measure, as written, provides no specifications regarding what information will be evaluated or how information would be obtained to lead to a determination that initiates more PSO or Platform coverage. Therefore, Revolution Wind requests that the actual conditions, evaluation metrics, and evaluation process be clearly defined in order to implement this mitigation condition effectively during Project construction. | The Endangered Species Act of 1973 (ESA, 16 U.S.C. §§ 1531 et seq.), as amended, establishes a national policy designed to protect and conserve threatened and endangered species and the ecosystems upon which they depend. Section 7(a) (2) of the ESA requires each Federal agency to ensure that any action that they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the adverse modification of designated critical habitat. With respect to PSOs, minimum requirements have and will continue to be assessed within the processes of these laws and as related to these mitigations without be overly prescriptive. As new information becomes available and if warranted, adaptive management practices are in place. |
| BOEM-2022-0045-0086 | 44 | Page F-19 of Appendix F in the DEIS includes a description of distances for required additional monitoring platforms. Revolution Wind is currently undertaking several efforts to better define the effective distance of various monitoring methods for detecting marine | Thank you. The specifics of the mitigation measures presented in the FEIS are consistent with the LOA. |

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| | | mammals. We are actively engaged with National Marine Fisheries Service (NMFS) and BOEM in sharing these results and they will be incorporated into a final monitoring plan approved by NMFS as part of the LOA processes. Since that process is not yet complete, we request that BOEM remove this description of a specific distance at which additional monitoring platforms will be used and instead include a reference to the final monitoring plan to be approved by NMFS and BOEM. | |
| BOEM-2022-0045-0110 | 45 | BOEM anticipates that the Proposed Action would result in "negligible to moderate adverse" impacts for most marine mammal species with "major adverse" impacts noted for North Atlantic right whales due to underwater noise from impact pile driving. This overall impact is lowered to "moderate adverse" based on timing restrictions and other environmental protection measures (EPMs) specifically intended to avoid adverse effects on North Atlantic right whales. BOEM further postulates that beneficial impacts are expected from "reef effects" of the structures.157<br>Recognizing that, instead, "major" impacts may result from the Action Alternatives is especially important for developing appropriate avoidance, minimization, and mitigation measures to reduce risk to the NARW. BOEM concludes that the No Action Alternative may result in "moderate" adverse impacts to marine mammals mostly due to underwater noise and exposure to collision risk associated with vessel traffic, and fishing gear interactions.158 While we agree with BOEM that entanglement risk would constitute a "major" adverse effect on North Atlantic right whales because of the low population numbers and that exposure to vessel and operational noise would constitute a "moderate" adverse effect,159 vessel strikes represent the other primary cause of the right whale's decline and are of serious concern during offshore wind development. Vessel strike impact should also be considered to be "major" under any of the Action Alternatives. In fact, BOEM acknowledges that vessel strike impacts of Alternative B on marine mammals would range from "negligible" to "major" adverse depending on the species affected and the severity of the strike.160 | Thank you for your comment. The FEIS has been updated with respect to vessel strike risk to reflect current information. The impact determinations for each of the alternatives have been reviewed and revised, as necessary, to reflect the current information. |
| BOEM-2022-0045-0086 | 45 | Revolution Wind commends the DEIS for how it referenced LOA conditions when describing detailed information in the mitigation measures; however, there are inconsistencies between the proposed monitoring plan and the DEIS language. Where details are required, the mitigation conditions in the DEIS should defer to or reference the other regulatory documents as appropriate to ensure consistency when all documents are finalized. | Thank you for the comment. The text has been revised to reference other regulatory documents, where appropriate. |
| BOEM-2022-0045-0110 | 46 | The impacts to the North Atlantic right whale should be parsed out in the impact determination for each of the Action Alternatives, the same way as has been done for the No Action Alternative, and be considered to be "major." | Thank you for your comment. The O&M and cumulative impact sections for the Action Alternatives have been reviewed and revised, as appropriate, to provide clarity on the impact determination for North Atlantic right whales. |
| BOEM-2022-0045-0086 | 46 | Section 3.15.2.2.1 of the DEIS does not include (1) a discussion of what animal movement modeling is and how/why it was applied to the acoustic analysis, (2) an explanation of the difference between acoustic ranges and exposure ranges, (3) clarification of which project activities included this type of modeling, and (4) the distinction between which exposure estimates were informed by animal movement modeling. Unlike the traditional method whereby acoustic modeling is used to estimate the marine mammal threshold exceedance zones assuming that animals are stationary for the duration of activity within a 24-hr period, animal movement modeling is used to simulate realistic animal movement through a sound field to estimate the closest point of approach by which 95% of simulated animals (animats) exceed a given impact threshold. These species-specific distances are considered exposure ranges and are used to inform mitigation and monitoring zones (Küsel et al. 202223, LGL 202224). There is no distinction between acoustic and exposure ranges in Table 3.15-6 and surrounding text. Revolution Wind suggests adding clarification to this table and surrounding text to describe the difference between these ranges. | Thank you for the comment. The text has been revised to clarify the difference between acoustic and exposure ranges. |
| BOEM-2022-0045-0086 | 47 | The footnotes of Tables 3.15-7, 3.15-8, and 3.15-9 and surrounding text appear to imply that the exposure estimates for all construction activities (i.e., WTG and OSS monopile installation, temporary cofferdam installation, HRG surveys, and UXO detonations) were informed by animal movement modeling; however, animal movement modeling was only conducted for impact pile driving of WTG and OSS monopiles (Küsel et al. 2022). The exposure estimates for all other activities were not informed by animal movement modeling. | The text has been revised accordingly. |
| BOEM-2022-0045-0110 | 48 | Within the DEIS, BOEM asserts that pile-driving activities will likely exceed PTS and TTS for all marine mammal functional hearing groups.162 Nevertheless, BOEM assumes that mid-frequency cetaceans, high-frequency cetaceans, and pinnipeds will avoid the noise caused by pile driving and will therefore be less exposed to underwater noise to the degree that they would not experience PTS and TTS. We do not believe there is enough evidence to support this assumption and note that while noise may be a deterrent that may cause avoidance behavior, other offshore wind development activities could also attract species to the area. BOEM should endeavor to avoid, minimize, and mitigate impacts to all marine mammal hearing groups in a manner that does not assume reduced impact through avoidance. We encourage BOEM to support research aimed at better understanding how sound exposure relates to avoidance behaviors for various taxa, so that more information on this point can be factored into future impact analysis. | Thank you for your comment and the additional information. The text has been revised to incorporate this and other available sources related to behavioral impacts and avoidance. The discussion of behavioral impacts is based on best available science and recognizes the uncertainty with regards to this issue. |

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| | | We note that behavioral impacts resulting from noise exposure can be significant, and the best available scientific information on this matter is not incorporated into the DEIS. For example, there are data available beyond the Southall et al. (2021) risk assessment that BOEM should consider. For example, scientific information on NARW functional ecology shows that the species employs a "high-drag" foraging strategy that enables them to selectively target high-density prey patches but is energetically expensive.163 Thus if access to prey is limited in any way, the ability of the whale to offset its energy expenditure during foraging is jeopardized. In fact, researchers have concluded: "right whales acquire their energy in a relatively short period of intense foraging; even moderate changes in their feeding behavior or prey energy density are likely to negatively impact their yearly energy budgets and therefore reduce fitness substantially."164 NARWs are already experiencing significant food stress: juveniles, adults and lactating females have significantly poorer body condition relative to southern right whales and the poor condition of lactating females may cause a reduction in calf growth.165 A recent study confirmed that larger females do, indeed, have more calves.166 These studies provide an indication of the significant impact disturbance during foraging may have on a marine mammal species. For this DEIS and others that are forthcoming, BOEM must fully assess the impacts associated with disturbance of marine mammals during foraging, at the spatial and temporal scale those impacts are expected to occur, for individual projects and cumulatively across projects. As the energetic requirements of many marine mammal species are not yet known, we recommend BOEM proceed with this analysis in a precautionary manner, and support research aimed at addressing these knowledge gaps. | |
| BOEM-2022-0045-0086 | 48 | In Section 3.15.2.2.1 of the DEIS under the "Noise" IPF for the Environmental Consequences of the Proposed Action, the discussion of noise produced by impact pile driving does not indicate whether these are the acoustic or exposure ranges modeled by JASCO (Küsel et al., 202125). This is a key point for discussing potential impact on marine mammals because the exposure ranges take animal movement into account to estimate the threshold distances whereas the acoustic ranges do not. For example, the DEIS states: "The resulting values based on summer modeling conditions, presented in Table 3.15-6, represent a radius extending around each noise source where potential injurious-level effects could occur. The single strike injury distances apply only to impact pile driving and represent how close a marine mammal would have to be to the source to be instantly injured by a single pile strike. The cumulative injury distances consider total estimated exposure within a 24-hour period, meaning a marine mammal would have to remain within that threshold distance over an entire day of exposure to experience hearing injury. The behavioral and TTS values are instantaneous exposure distances, meaning that any animal within the effect radius is assumed to have experienced a temporary to short-term adverse effect." Revolution Wind recommends that this text be revised for the following reasons: 1. The first underlined statement only indicates that the summer modeling scenario was used, without any reference to whether these are acoustic or exposure ranges. 2. If the exposure ranges are being referenced here, they already account for animal movement, meaning the duration of exposure is already considered with the range and the second underlined statement ("total estimated exposure within a 24-hour period") is somewhat confusing as it may imply non-exposure range assessment where the range assumes a 24-hour exposure period rather than the animal movement exposure period. The exposure ranges are ranges that represent a potential PTS event when an animal is detected at that distance (i.e., the exposure period is already considered in the animal movement). 3. There is a typo with the TTS values (third underlined statement), these should be cumulative not instantaneous. This discrepancy is also carried forward in the text following Table 3.15-6 where the DEIS states: "a lowfrequency cetacean would have to remain within 8,727 feet of a 12-meter monopile installation for 24 hours to experience permanent cumulative hearing injury, referred to as PTS" when discussing the impact determination for marine mammals. As discussed above, the duration of the accumulation is already accounted for in the exposure ranges, so this statement should also be revised and checked against the modeling report to ensure the current ranges are being used and referenced in the DEIS. | Thank you for the comment. The text has been revised accordingly. |
| BOEM-2022-0045-0110 | 49 | Vessel strikes are one of the main factors driving the North Atlantic right whale to extinction.167 Vessel strikes also pose a significant risk to other large whale species currently experiencing UMEs, such as humpback whales and minke whales, as well as endangered fin whales and sei whales.168<br>Reducing speeds to no more than 10 knots for all vessels is one of the most effective ways to prevent serious injury and mortality to marine mammals and sea turtles from vessel strikes.169 We urge BOEM to require all offshore wind vessels operating where right whales are or are expected to occur, including within and transiting to and from the project site, to travel at 10 knots or less.<br>The amount of vessel activity associated with the development of Revolution Wind is significant. The DEIS notes that in 2025, the project year assumed to contain the greatest number of vessels, there will be an average of 159 daily offshore wind vessels and a maximum number of 301 daily vessels.170 The vessel strike avoidance measures set forth in Appendix F of the DEIS are inadequate. First, any interaction between a vessel and a whale poses a risk of serious injury or mortality, particularly for vessels traveling at speeds of more than 10 knots. Second, the dire conservation status of the North Atlantic right whale means that even a single vessel strike poses an unacceptable risk as it will have population-level consequences.171 Third, while near real-time monitoring technologies may hold | Thank you for your comment. Appendix F of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. BOEM fully supports regional monitoring and coordination with state and cooperating federal agencies and regional fishery management councils to develop appropriate mitigation measures and will incorporate results in future decisions. |

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| | | promise for improving detection probability of North Atlantic right whales, their effectiveness relative to a 10-knot speed restriction is as yet unproven. Fourth, the proposed 24-hr pile driving will likely increase vessel activity at night when detectability of whales from moving vessels is even further limited. Pending technological advancements,172 BOEM must implement a year-round 10-knot speed restriction on all vessels, regardless of size, associated with the Revolution Wind project to minimize the risk of any lethal vessel strikes of North Atlantic right whales or other vulnerable species. | |
| BOEM-2022-0045-0086 | 49 | Revolution Wind has provided a revised Vessel Strike Avoidance Plan (June 2022) that differs from the vessel speed restriction measures included in Table 3.15-13 (page 3.15-57) of the DEIS. The DEIS states “All vessels, regardless of size, would comply with a 10-knot speed restriction in any Seasonal Management Areas (SMAs), Dynamic Management Areas (DMAs), or Slow Zones.” The DEIS also states “the applicant will adhere to speed restrictions 10 knots or less for all vessels at all times between November 1 and April 30 in all DMAs, and use of a PAM system to alert vessels to potential marine mammal presence in real time” (page 3.15-37). In the current Vessel Strike Avoidance Plan, the transit corridor and Wind Development Area (WDA) will be divided into detection action areas that will be monitored acoustically in real time and visually when vessels are present. Revolution Wind has proposed that when passive acoustic monitoring (PAM) systems are operational, all underway vessels (regardless of size) be permitted to travel at speeds greater than 10 knots in DMAs except within an active action area triggered by the detection and localization of a NARW with the action area using visual or acoustic methods. Revolution Wind’s Vessel Strike Avoidance Plan (revised June 2022) does not address Slow Zones; however, Revolution Wind has committed to an analogous, but more area-specific, action zone system as outlined above and described in-depth within the Vessel Strike Avoidance Plan. | Thank you for your comment. BOEM is working closely with NMFS to determine appropriate mitigation measures, including vessel speed reductions. The final mitigation measures that are determined to be most effective will be developed through the ESA and MMPA processes and will be required of the developer. |
| BOEM-2022-0045-0110 | 50 | Protection of North Atlantic right whales during foraging, and the protection of their core foraging habitat, must be one of BOEM’s utmost priorities. North Atlantic right whale distribution and habitat has shifted since 2010 in response to climate change-driven shifts in prey availability. The best available scientific information, including aerial surveys,173 acoustic detections,174 photo-identification data,175 stranding data,176 a series of DMAs declared by NMFS pursuant to the 2008 VSR rule,177 and prey data,178 indicate that North Atlantic right whales now rely heavily on the waters off Southern New England year-round. These waters represented important pre-whaling era habitat for the species, and it appears that North Atlantic right whales are repatriating the area.179 NMFS’ scientists identified the area as a year-round core foraging habitat in 2020,180 and a recently published synthesis of aerial survey data found that right whale abundance has significantly increased in the area over the past decade.181 North Atlantic right whales have also been observed foraging and socializing in the area year-round, making this the only known location where these behaviors have been observed across the year.182<br>Habitat off Southern New England is clearly key for survival of the species. In January 2019, an aggregation representing more than a quarter of North Atlantic right whales alive at the time—100 whales—was seen south of Nantucket engaged in both foraging and social activities.183 The area is also important to all life history stages. Of 196 individual whales identified in the area between January 1, 2010, and June 30, 2015, 35 percent were females, 58 percent were males, and the remainder were of unknown sex. Of the 188 individuals that were assigned an age class, almost two thirds were adults and one third juveniles. Six individuals were classified as calves at the time of their sighting.184 There were 34 different reproductive females identified, eight of which have only been documented off the coast of Southern New England since 2010.185 Further, 11 out of 15 whales newly catalogued in 2020 that were identified south of Cape Cod have never been sighted further north in the Bay of Fundy or the Gulf of St Lawrence,186 suggesting this area may represent an end-point of the northern migration for some portion of the population.<br>BOEM should use the above best available scientific information on presence and abundance of North Atlantic right whales when considering seasonal restrictions to protect the species and minimize impacts to other marine mammal species in the Revolution Wind development area off Rhode Island. Revolution Wind proposes seasonal restrictions187 but does not specify the dates188, and the Petition for Incidental Take Regulations states that if they are limited to daylight hours only for pile-driving operations, they would need to conduct operations during the currently excluded January - April timeframe (when right whales would occur in higher numbers) to “create a sufficient buffer between required installation time and available installation time”.189 The current seasonal restriction dates do not reflect the best available scientific information on right whale distribution in this area of year-round importance.190 BOEM needs to clarify their requests and potential plans for pile-driving outside of the seasonal restrictions for North Atlantic right whales. | Thank you. This and other available information on the presence and abundance of North Atlantic right whales has been incorporated into the FEIS to provide a current understanding of the distribution of the species. BOEM will continue to coordinate with state and cooperating federal agencies and regional fishery management councils to develop appropriate mitigation measures for all project impacts. |
| BOEM-2022-0045-0086 | 50 | Revolution Wind would also like to clarify that it proposes to adhere to Plan A of the Vessel Strike Avoidance Plan reverting to Plan B only in situations where real-time marine mammal detection systems are not operational. Additionally, Revolution Wind will comply with the Ship Strike Reduction Rule; as such, vessels 65 feet (20 m) and greater subject to the jurisdiction of the U.S. will comply with the 10-knot speed restriction in SMAs. Finally, Revolution Wind would like to point out that SMA and DMA regulations under the North | Thank you for the comment. The text has been revised accordingly. |

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| | | Atlantic Right Whale Vessel Strike Reduction Rule (50 CFR Part 224) are currently under review. Modifications may result in a reduction of vessel length to which the SMA rules apply as well as the possibility that all waters along the east coast will be subject to SMA rules. | |
| BOEM-2022-0045-0110 | 51 | BOEM also must consider how the proposed seasonal restrictions may affect impacts to other marine mammals and minimize existing and potential stressors to those protected species. It is therefore imperative that BOEM fully account for the consequences of any proposed North Atlantic right whale seasonal restriction on other protected species and evaluate alternative risk reduction strategies sufficiently protective of multiple species. Requiring a robust and scientifically proven near real-time monitoring and mitigation system for North Atlantic right whales and other endangered and protected species for use during impact pile driving and potentially other noise-generating activities would support the development of alternatives. | Thank you for the comment. Please refer to the responses to Comments 31 and 32 in comment submittal BOEM-2022-0045-0110 for a discussion of proposed mitigation measures and their protectiveness for marine mammals. As appropriate, the text has been reviewed and revised to address the potential impact of seasonal restrictions for North Atlantic Right Whale and on other marine mammals. |
| BOEM-2022-0045-0086 | 51 | Within the Vessel Traffic IPF discussed for O&M and Decommissioning in Section 3.15.2.2.2, the DEIS states: "In the event of an unanticipated vessel strike of a marine mammal, project vessels must immediately cease activities until BOEM is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with all applicable laws (e.g., ESA, MMPA) and COP approval conditions." Revolution Wind supports this measure. However, there is no comparable statement within the discussion for the Vessel Traffic IPF for Construction and Installation in Section 3.15.2.2.1. Because the mitigation applied for vessel traffic would be applied throughout project activities regardless of project phase, Revolution Wind respectfully requests this statement from O&M and decommissioning also be added to the construction and installation Vessel Traffic IPF section as well. | Thank you for the comment. The text has been revised accordingly. |
| BOEM-2022-0045-0110 | 52 | Noise impacts pose a serious risk to many marine mammal species, and this risk is exacerbated by the developer's plan to employ 24-hour pile driving (i.e., the commencement of pile driving after dark) for monopile foundations–the most noise intensive technological option as opposed to quiet foundations–for both the WTGs and OSS.<br>As noted previously, following the mitigation hierarchy, we believe BOEM should prioritize impact avoidance and consider alternatives that use quiet foundation technologies that avoid pile driving noise entirely and significantly reduce noise impacts to marine mammals and other marine life overall. BOEM and the developer should provide detailed analysis to support the elimination of these technologies from consideration.191 Quiet foundation types can afford developers significant flexibility in the construction schedule, including potentially year-round and 24-hour construction in some areas. In our view, these incentives should be fully explored by BOEM and industry. | Thank you for your comment. "Quiet" foundation design types like the monopod suction caisson, suction caisson jacket, and gravity base structure foundations were evaluated during project development. These options were eliminated in favor of the monopile foundation due to their larger footprints (leading to more extensive seabed and navigation impacts), unsuitability for site-specific conditions, and supply chain issues. Regarding nighttime pile driving, NMFS' ITA would require sufficient demonstration of the effectiveness of proposed monitoring and mitigation protocols in the form of an Alternative Monitoring Plan prior to initiating any nighttime pile driving. |
| BOEM-2022-0045-0110 | 53 | As previously expressed to the National Marine Fisheries Service regarding Ocean Wind 1's request for a Letter of Authorization (LOA), and for all forthcoming LOA applications for future offshore wind projects (see Attachment 2),192 we are extremely concerned that Revolution Wind is proposing to commence pile driving at night and that nighttime pile driving is not included in the DEIS and has not been factored into the impact determinations.193 As the acoustic models for the project demonstrate, impact pile driving generates levels of noise harmful to marine mammals over large distances.194 The developer has indicated that they will employ night vision equipment and infrared/thermal technology in addition to passive acoustic monitoring during nighttime pile driving operations.195 However, the efficacy of these technologies is limited to certain distances and particular species or animal groups.196 For example, reliable detections made via handheld, light-enhancing devices are generally limited to distances of <200 m for cetaceans and <100 m for pinnipeds and sea turtles.197 Meanwhile, based on Revolution Wind's request for a Letter of Authorization, shutdown zones during impact pile driving will be as large as 4,400 m for large whales.198 Based on the known limitations of currently available night-time monitoring methods and technologies, particularly over distances commensurate with those of the clearance and exclusion zones, it is likely that the detection probability of NARWs and other protected species during darkness and periods of poor visibility (i.e., rain, fog, etc.) will be reduced relative to clear visibility conditions.199<br>It is imperative that no right whale, or other marine mammal species, is present in the applicable Clearance Zone when pile driving starts. BOEM must require Revolution Wind to commence pile driving only during periods of good visibility (i.e., daylight and clear weather conditions). Impact pile driving started during good visibility conditions can continue after dark, as necessary, providing passive acoustic monitoring and the best available infrared technologies200 are used to support visual monitoring of the clearance and exclusion zones during periods of darkness (see Attachment 1). Despite the developer's assertion that nighttime pile driving would have positive benefits towards reducing impact to North Atlantic right whales and other marine mammals if they can complete installation within a single season because extending to multiple seasons would result in an increase in vessel traffic,201 additional evidence is needed to show that these benefits outweigh the risks of using unproven nighttime monitoring techniques, especially in such a critical year-round foraging area where right whales must not be disturbed. BOEM should also consider that vessels operating at night may be more likely to strike a right whale or other large whale species due to a lack of detectability. | Thank you. The possibility of nighttime pile driving is still in consideration and will require sufficient demonstration of the effectiveness of proposed monitoring and mitigation protocols prior to approval. Incorporation of nighttime pile driving will include submittal and approval by BOEM of a Nighttime Monitoring Plan. Appendix F of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. |

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| BOEM-2022-0045-0110 | 54 | NMFS's, and thus BOEM's, reliance on a 160 dB (re 1 µPa2s) threshold for behavioral harassment is not supported by the best available scientific information and such reliance grossly underestimates Level B take.202 As previously noted, behavioral disturbance of right whales must be minimized to the greatest extent possible if the species is to be adequately protected. For impact pile driving with a minimum noise reduction/attenuation level of 10-12 dB (re 1 µPa2s), the following minimum Clearance and Exclusion Zone distances should be required for the Revolution Wind project for pile-driven foundations:<br>1. A visual Clearance Zone and Exclusion Zone must extend at minimum 5,000 m in all directions from the location of the driven pile.<br>2. An acoustic Clearance Zone must extend at minimum 5,000 m in all directions from the location of the driven pile.<br>3. An acoustic Exclusion Zone must extend at minimum 2,000 m in all directions from the location of the driven pile.<br>In addition, Clearance and Exclusion Zone distances for other large whale species must be designed in a manner that eliminates Level A take and minimizes behavioral harassment to the fullest extent possible. | Thank you for your comment. BOEM and NMFS will work together to determine appropriate clearance and exclusion zones. Appendix F of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. |
| BOEM-2022-0045-0110 | 55 | To reduce impacts from noise produced by impact pile driving, BOEM proposes to require a minimum of 10 dB (re: 1 µPa2s) reduction of Sound Exposure Level (SEL).203 This level of noise reduction and attenuation falls below what can now be achieved with best available noise control technology, and we recommend BOEM strengthen its requirements to maximize the level of noise reduction during construction. As described in Bellman et al. (2020) and Bellman et al. (2022),204 noise reduction levels achieved in Europe through the combined use of two noise abatement systems (NAS); one positioned in the near-field and one in the far-field) have reached a 20 dB (re: 1 µPa2s) reduction in SEL, or greater.205 A combination of the IHC Noise Mitigation Screen (IHC-NMS) and an optimized big bubble curtain (BBC) has proven among the most effective to date, with a minimum, average, and maximum reduction in sound exposure level (ΔSEL) of 17, 19, and 23 dB, respectively.206 The deployment of a combination NAS (i.e., two different systems) is considered by those authors to be "state of the art"207 in terms of SEL reduction and is also important for attenuating sound across a range of frequencies208 and maximizing transmission loss.209<br>We recognize that there are differences between the European offshore wind context and that of the U.S., making the direct transference of findings difficult. The monopiles included in the data set examined by Bellman et al. (2020, 2022) were approximately 8 meters or less in diameter, compared with the approximately 10-meter diameter monopiles planned for the U.S. Larger diameter monopiles generate greater noise levels at the source. The noise reduction standard the NAS were compared against in Europe was also specifically designed to protect harbor porpoises in German waters (i.e., SEL less than or equal to 160 dB (re: 1 µPa2s) at 750 meters from the monopile installation site), and not tailored to the low-frequency cetaceans that are a priority in the U.S. That said, the water depths are, in some cases, comparable across both regions (up to 40 meters), and the European findings can be directly applied to the installation of smaller diameter pin-piles in the U.S. The limited evidence that is available from U.S. offshore wind projects also indicate alignment with Bellman et al. (2020, 2022). For example, the limitations of using a single NAS have been demonstrated. Measurements of sound pressure recorded during the installation of an unmitigated and mitigated monopile for the Coastal Virginia Offshore Wind (CVOW) pilot project indicate that a double bubble curtain (i.e., a single NAS) was most effective at higher frequencies (>200 Hz) and did not attenuate sound as effectively at lower frequencies.210 This indicates that the deployment of a second NAS designed to attenuate noise at lower frequencies would have further reduced noise impacts.<br>Given these developments, BOEM should require the developer to implement the best commercially available combined NAS technology to achieve the greatest level of noise reduction and attenuation possible, in line with the mitigation hierarchy. Based on the findings of Bellman et al. (2020, 2022), which indicate a reduction of 20 dB SEL is feasible for monopiles 8 meters in diameter, we recommend that the minimum requirement of a 10 dB (re: 1 µPa2s) reduction of SEL be viewed as a floor only. BOEM should require developers to deploy technologies proven in Europe to be capable of a 15 dB (re: 1 µPa2s) reduction in SEL, or greater. The noise reduction requirement should apply to all aspects of pile driving operations, including pile strikes, compressors, and operations vessels engaged in construction. Field measurements must be conducted on the first pile installed and data must be collected from a random sample of piles throughout the construction period. We do not support field testing using unmitigated piles. Sound source validation reports of field measurements must be evaluated by both BOEM and NOAA Fisheries prior to additional piles being installed and be made publicly available. | Thank you for your comment. BOEM considered and refined requirements presented in the FEIS, as appropriate. |
| BOEM-2022-0045-0110 | 56 | We encourage BOEM to pursue activities that could lead to greater levels of noise reduction during impact pile driving for future projects, as noise minimizing approaches during discrete phases of development have been identified by experts as the most promising solution to overcoming noise challenges associated with offshore wind development.211 Such activities may include the development of a noise reduction standard212 (akin to the German standard for harbor porpoise) that is tailored to protect species of concern in U.S. waters, and designed to account for the larger diameter monopiles planned to be installed, as well as other project- and site-specific conditions in the U.S. BOEM should also incorporate into its decision-making all information on noise, and noise reduction levels | Thank you for your comment. "Quiet" foundation types were considered for this project but eliminated due to the larger footprint, incompatibility with site-specific conditions, and supply chain issues. Please refer to the responses to Comments 31 and 32 in comment submittal BOEM-2022-0045-0110 for a discussion of minimization and mitigation measures for construction-related noise. |

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| | | resulting from the use of NAS technologies, produced during the installation first commercial-scale offshore wind projects in the U.S., as well as continually emerging evidence from Europe. By far the most effective way to reduce noise during construction is to install quieter foundation types, and we encourage BOEM to do more to bring gravity-based foundations and suction caissons online in the U.S. This evolution may provide developers with more flexibility (e.g., wider construction schedules, the possibility of commencing pile driving at night), at least in some areas. | |
| BOEM-2022-0045-0110 | 57 | Additionally, the FEIS should consider the operational noise generated by turbines. Alternative F inaccurately notes, "The potential use of larger capacity WTGs under Alternative F could result in more extensive operational noise impacts than the Proposed Action, but insufficient information is available to characterize differences in effect."213 A wealth of research exists which details the impacts of continuous noise on marine life, and the importance of reducing this impact. Moreover, best available scientific information indicates that, during the operation phase, offshore wind turbines may generate noise audible and potentially impactful to large whales and other marine species over significant distances.214 Pending further study, we recommend the use of direct-drive turbines as opposed to turbines with a gear box, as direct drive turbines may emit lower noise levels and reduce risk of behavioral disturbance or habitat displacement of North Atlantic right whales and other marine mammal species, and also impacts to key marine mammal prey species, during the operation phase of development.<br>As offshore wind rapidly advances in the U.S., more stringent noise reduction requirements will form an important means of reducing the cumulative impacts on species and ecosystems that the industry poses. It would also be beneficial at the project-level by reducing the size of necessary monitoring areas and increasing the probability that a protected species is detected prior to the start of pile driving activity. | Thank you for the comment. Operational noise is considered within the EIS and is recognized as potentially impactful to marine mammals. The insufficient information noted under Alternative F is related to the difference in operational noise associated with turbines of greater nameplate capacity. Please refer to the Noise IPF in Section 3.15.2.3.2 of the EIS for a discussion of operational noise effects under the Proposed Action. |
| BOEM-2022-0045-0110 | 58 | We have profound concerns regarding the recent informal consultation for marine site characterization activities for offshore wind energy development off the U.S. Atlantic Coast,215 and its failure to rely on the best available scientific data, particularly with respect to the critically endangered North Atlantic right whale. In a letter submitted to BOEM and NMFS on January 20, 2022,216 a number of our organizations urged both agencies to immediately reinitiate consultation under the ESA based on the best available scientific data and new NARW population number, to ensure the mitigation measures on which BOEM is relying for site characterization and assessment activities are protective enough to reduce risk to right whales. BOEM must update the analyses now in order to comply with the ESA on this and all future Atlantic coast leases. In the interim while consultation is ongoing, our groups reinforce the importance of incorporating clear, strong environmental measures directly into the NEPA documents and lease stipulations for existing projects on a project-by-project basis. In particular, based on the significant information we are already aware of and have presented in this and other letters, we urge the agency to incorporate the mitigation measures found in Attachment 1 into upcoming environmental analyses and lease terms. | Thank you for your comment and recommendation. BOEM is working closely with NMFS to determine appropriate mitigation measures, including vessel speed reductions, and the use of real-time PAM and PSOs. The final mitigation measures that are determined to be most effective will be developed through the ESA and MMPA processes and will be required of the developer. |
| BOEM-2022-0045-0110 | 59 | Unexploded ordnance (UXO) may be encountered on the seabed in the process of developing the Project in the lease area and/or along the export cable routes. UXOs may require removal through explosive detonation, which could cause disturbance and injury to marine mammals and sea turtles. BOEM's EPMs for Revolution Wind do not include monitoring or mitigation measures to be implemented during UXO detonations.217 BOEM intends to employ reticle binoculars for aerial observations, and we do not believe these will be effective for visual observations from the plane. Instead, observers should use inclinometers to record the angle of the sighting from the plane and then calculate the distance of the sighting from the plane. In addition to requiring two dedicated visual observers, a data recorder will also be necessary on the plane, especially if Mysticetus software is employed. This is especially important given that fast flight speeds will make it impossible for Protected Species Observers to adequately observe the water and enter data simultaneously. | Thank you for the comment. Please refer to the response to Comment 32 in comment submittal BOEM-2022-0045-0110 for a discussion of proposed EPMs and additional mitigation measures. |
| BOEM-2022-0045-0110 | 60 | Specific EPMs are not provided in the main text or in Appendix F. General references are not enough to assess the effectiveness of proposed monitoring and mitigation measures to minimize impacts. For example, missing details include, but are not limited to, the following: the Protected Species Monitoring and Mitigation Plan, specific exclusion/clearance zones for any marine mammals and sea turtles, number of PSOs218 and PAM operators that will be required, dates of seasonal restrictions, Nighttime Pile Driving Monitoring Plan (based on request for 24-hour operations included in Petition for Incidental Take Regulations), and Marine Debris Mitigation Plan. Entanglement in abandoned fishing gear contributes significantly to mortality and serious injury of marine mammals and sea turtles, particularly the NARW. In fact, for right whales, mortality due to fishing gear entanglement is estimated to be approximately three times higher than observed due to cryptic mortality.219 We encourage BOEM and the developer to create a marine debris mitigation plan in addition to the requirement that vessel operators, employees, and contractors complete marine debris awareness training as required by the National Marine Fisheries Service Biological Assessment.220 | Thank you. Appendix F does include an Environmental Protection Measure specific to marine debris awareness training, including compliance with United States Coast Guard and EPA regulations. BOEM will continue to coordinate with state and cooperating federal agencies and regional fishery management councils to develop appropriate mitigation measures for all project impacts. |

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| BOEM-2022-0045-0086 | 85 | Page 3.15-21, Table 3.15-4: The text in Table 3.15-4 causes confusion. In the second to last paragraph, it states "...Given these uncertainties, the potential for displacement effect is unknown, but there is currently no basis to conclude these impacts would result in moderate to major adverse long-term effects on species." The last sentence implies that these impacts wouldn't result in moderate-major impacts for cumulative effects of this IPF, but the main text for this IPF outlines the impacts as moderate to major as the effects determination (depending on species). | The text has been revised to clarify. |
| BOEM-2022-0045-0086 | 86 | Page 3.15-49, Section 3.15.2.2.3: Recommend clarifying the following sentence to be explicit about the impact determinations, especially with regards to NARWs: "BOEM has concluded that these measures would effectively avoid all but minor adverse impacts on sensitive species such as NARW but may not eliminate risks of moderate adverse impacts to other marine mammal species." Clarity on how measures would avoid all but minor impacts on NARWs, but still pose a moderate impact risk to other marine mammals, appears inconsistent. | Thank you. The text has been revised to clarify the impact determination and how the proposed measures are incorporated. |
| BOEM-2022-0045-0086 | 95 | Throughout the DEIS, Hayes et al. 2021 is outdated as referenced. Replace with Hayes et al. 2022 anywhere it may occur, and update population estimates accordingly. | The text has been revised accordingly. |
| BOEM-2022-0045-0086 | 97 | In various locations throughout the DEIS, take estimates should be updated in accordance with the Updated Marine Mammal Density and Take Estimates for the Revolution Wind Offshore Wind Farm memo dated August 2022 | The text has been revised to be consistent with the Updated Marine Mammal Density and Take Estimates document. |
| BOEM-2022-0045-0086 | 98 | In various locations throughout the DEIS, please update the 6,500 strike count for WTG monopiles to 10,740, and the 11,500 strike count for OSS monopiles to 11,563 based on the updated Underwater Acoustic Analysis and Exposure Modeling, Revolution Wind: Impact Pile Driving During Foundation Installation from August 25, 2022. | The text has been revised accordingly. |
| BOEM-2022-0045-0086 | 99 | Various footnotes throughout the DEIS describe animal movement modeling as informing various calculated numbers. This description may be incorrect in various instances. Animal movement modeling was only used to estimate exposures from impact pile driving of the WTG and OSS monopiles, not for UXO detonations, HRG surveys, or other activities listed herein. | Thank you. The text has been reviewed and revised accordingly. |
| BOEM-2022-0045-0110 | 124 | Submitter provided additional attachment as follows:<br>Strong Mitigation Measures Are Essential to Protect Large Whales and Sea Turtles During All Phases of Offshore Wind Energy Development | Thank you for the comment. Please refer to the response to Comment 32 in comment submittal BOEM-2022-0045-0100 for a discussion of the incorporation of additional mitigation measures. |
| BOEM-2022-0045-0100 | 135 | Section 3.15 is missing IPFs and subsequent analysis that should be considered for marine mammals (i.e. habitat disturbance, dredging, lighting, EMF, fisheries surveys/monitoring, etc.). The ESA Info Needs document and prior EISs should be consulted for guidance on the appropriate IPFs to be analyzed. | Thank you for your comment. The IPFs included in the comment have been determined to have a negligible impact on marine mammals and are therefore discussed in Table E2-5 within Appendix E1. IPFs that were determined to either be not applicable or to have negligible impacts do not warrant detailed analysis in the EIS pursuant to 40 CFR 1502.15. |
| BOEM-2022-0045-0100 | 136 | The DEIS lacks an analysis on the potential effects from Revolution Wind's request to pile driving during nighttime and impaired visibility conditions. Please be clear on BOEM's intent to limit or approve nighttime/poor vis conditions and an analysis of impacts from that decision. | Thank you for the comment. The discussion and analysis of nighttime pile driving has been updated to be consistent with the most current information. |
| BOEM-2022-0045-0100 | 137 | Please obtain the most recent exposure/take estimates for the Revolution Wind project from Orsted, and revise table values in the EIS accordingly. | The table has been revised accordingly. |
| BOEM-2022-0045-0100 | 138 | As the DEIS is revised, to ensure consistency between documents please refer to the recent comments we have submitted to BOEM on the BA prepared for the ESA section 7 consultation. | Thank you for the comment. The DEIS has been revised to be consistent with the Section 7 consultation documents and recent comments therein. |
| BOEM-2022-0045-0100 | 139 | It is unclear why the document references Orsted (2022) when talking about the incidental harassment authorization. The reference would be appropriate if discussing the application. Please revise to say "incidental harassment authorization for the Project, if issued by NMFS, will differ." | Text has been revised accordingly. |
| BOEM-2022-0045-0100 | 140 | The population estimate for right whales should be based on Hayes et al. (2022). Please change to Nbest=368 (Nmin=364). Please revise. The EIS can also cite the most recent NARW card population estimate. | Text has been revised accordingly. |
| BOEM-2022-0045-0100 | 141 | Table 3.15-2 includes hooded and harp seals as species likely to occur in the project area. However, these species are not included in Tables 3.15-7 and 3.15-8. Please include rational for omitting these animals as potentially impacted from the project given their "likely" occurrence. NMFS notes Revolution Wind did not request incidental take of these species in their MMPA authorization. | Thank you for the comment. The text and table have been updated to clarify the expected occurrence of hooded and harp seals. |

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| BOEM-2022-0045-0100 | 142 | Please include UXO detonations in the list of activities in the noise section on this page. | Text has been revised accordingly. |
| BOEM-2022-0045-0100 | 143 | Please specify the type of injury (PTS) in this phrase "marine mammals would have to remain close to the sound source for extended periods of time to experience injury." | Text has been revised to clarify. |
| BOEM-2022-0045-0100 | 144 | Given the uncertainty expressed in this phrase "This suggests that operational noise effects on marine mammals could be more intense and extensive than those considered herein," it seems determining that "operational noise effects from other future actions would likely be minor adverse..." is premature. Please revise the last sentence in this paragraph to express the uncertainty included in the first phrase included here. | Text has been revised accordingly. |
| BOEM-2022-0045-0100 | 145 | Please include the possibility that helicopters will also be used for crew transfers (as an alternative to using vessels). | Text has been updated to acknowledge the potential use of helicopters for crew transport. |
| BOEM-2022-0045-0100 | 146 | Discussion of potential oceanographic effects should include mention of multiple references instead of solely relying on the Johnson et al. (2021) report. This topic is unsettled and should reflect a diversity of potential outcomes reflected in the literature. | Thank you for the comment. The text has been updated accordingly. |
| BOEM-2022-0045-0100 | 147 | Please discuss entanglement with regards to ghost gear in addition to the potential displacement of fishing effort that is provided. | Thank you for the comment. The discussion of potential entanglement in fishing gear has been expanded to include possible interactions with ghost gear. |
| BOEM-2022-0045-0100 | 148 | Please provide supporting evidence that any adverse impacts on marine mammals are limited to "minor" given the "considerable uncertainty" and that the "significance [of these effects] is unknown" as stated in the paragraph. | Thank you for the comment. The text has been revised to incorporate additional support or acknowledge uncertainty, as appropriate. |
| BOEM-2022-0045-0100 | 149 | There is no Table E2-5 in Appendix E, Attachment E2. The Tables in this attachment are not numbered E2-1, E2-2, etc. Please revise either the tables numbering in the attachment or the references to table numbers in the text to provide clear directions for the reader. | Table numbers have been reviewed and revised to be consistent. |
| BOEM-2022-0045-0100 | 150 | Noise/Alternatives C-F cell: Please quantify the anticipated reduction in impact pile driving noise and estimated take should fewer piles be installed per Alternatives C-F. | Section 3.15.2.4 (Alternatives C, D, E, and F) provides tables comparing the scale of anticipated pile driving noise impacts amongst the alternatives (including the proposed action). |
| BOEM-2022-0045-0100 | 151 | Noise/Alternatives C-F cells: Please change "behavioral effects threshold" to "behavioral harassment threshold." | Text has been revised accordingly. |
| BOEM-2022-0045-0100 | 152 | Presence of structures/Alternative B: When discussing potential displacement, the EIS states "cumulative effects are likely to range from minor to moderate adverse varying by species" in one paragraph, but then goes on to say "but there is currently no basis to conclude that these impacts would result in moderate to major adverse long-term effects on any species." Please either correct or explain this inconsistency between these two statements. | Thank you for the comment. We've reviewed the text and believe it accurately describes the effects. |
| BOEM-2022-0045-0100 | 153 | Vessel traffic/Alternatives B-F: Please include Slow Zones, in addition to SMAs. Slow Zones, by definition, include both DMAs (triggered by visual detection of right whales) and acoustically-triggered slow zones (triggered by acoustic detections of right whales). | The text has been revised accordingly. |
| BOEM-2022-0045-0100 | 154 | No Action Alternative/Presence of Structures cell: Please provide supporting evidence that any adverse impacts on marine mammals from existing baseline and future conditions are limited to "minor" given the "considerable uncertainty" and that the "significance [of these effects] is unknown" as stated in the paragraph and the fact that existing baseline impacts to North Atlantic right whales are not currently minor. | Thank you for the comment. The text has been revised to clarify the available data supporting the conclusion and appropriately acknowledge the uncertainty around potential impacts of the presence of structures under the No Action Alternative. |
| BOEM-2022-0045-0100 | 155 | The text states that "Impact hammer installation of the RWF WTG and OSS foundations would produce the most intense underwater noise impacts with the greatest potential to cause injury-level effects on marine mammals." However, UXO detonations are actually the activity most likely to cause injury-level effects. Also need to clarify the potential for auditory injury (i.e., PTS) vs. non-auditory injury (e.g., lung injury, gastrointestinal injury) and mortality. While pile driving would occur more often than UXO detonations and therefore it could be said that the magnitude (i.e., amount of exposures) to pile driving is greater, as stated this is not an accurate statement. Please correct this in the text, and throughout where appropriate. | Thank you for the comment. Text has been updated to clarify. |
| BOEM-2022-0045-0100 | 156 | While it is true that explosive thresholds for mortality, GI tract injury and slight lung injury are influenced by mass and depth, we suggest including the relevant threshold equations. Please also include the thresholds for PTS, TTS, and sub-TTS behavior specific to UXO detonations (but noting the latter of which is not likely to occur given Revolution Wind would not detonate more than 1 UXO per day). Include a description of the potential for all impacts from explosives and then please distinguish those impacts that are likely to occur from those that are not, based on modeling results and specific proposed mitigation and monitoring measures. | The text has been updated to expand the discussion on impacts associated with explosives, as appropriate. For the sake of brevity and clarity, the text contains only a narrative description of the explosive threshold equations. |

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| BOEM-2022-0045-0100 | 157 | Please fully describe the As Low as Reasonably Practicable (ALARP) approach described by Rev Wind. There are other alternatives to 1) safely relocating UXOs or 2) detonation. For example, Revolution Wind may attempt deflagration prior to resorting to high-order detonation. Please include this in the text at the top of pdf p. 503 and throughout, as appropriate. | Thank you for the comment. Additional detail regarding the treatment of UXOs has been added, as available. |
| BOEM-2022-0045-0100 | 158 | Please specify in the Table heading whether these are acoustic ranges (R95%) or exposure range (ER95%) values. | Text has been revised accordingly. |
| BOEM-2022-0045-0100 | 159 | Please change the number of strikes required to install a 12-m monopile from 6,500 to 10,740 per Revolution Wind here and throughout the document, as appropriate. The strike count in the ITA application correctly specified this, but the acoustic modeling report did not and has now been revised to do so. | Text has been revised accordingly. |
| BOEM-2022-0045-0100 | 160 | The 120dBrms threshold is NMFS' behavioral harassment threshold. Please change the word "effects" to "harassment" in the following phrase: "120 dB re 1 µPa threshold (NMFS 2019) for behavioral effects from continuous noise sources," | Text has been revised accordingly. |
| BOEM-2022-0045-0100 | 161 | Within the Noise section, among pile driving, UXO detonation, and HRG surveys, the latter was assigned an activity-specific impact level. We recommended identifying an impact level for all noise combined and not segment each noise source as this segments projects impacts for an individual IPF. | Thank you for your comment. In addition to impact determinations for specific activities, the Noise IPF subsection combines those determinations into one overall determination towards the end of the subsection. |
| BOEM-2022-0045-0100 | 162 | As mentioned in a previous comment, the 120dBrms threshold is NMFS' behavioral harassment threshold. Disturbance not rising to the level of harassment, as defined in the MMPA, can happen below this threshold. Moreover, there is no harassment threshold specifically for "auditory masking". Please replace "disturbance" with "harassment, as defined in the MMPA " and remove "auditory masking". Please do this wherever else there is incorrect references to an auditory masking threshold. | Text has been revised to clarify. |
| BOEM-2022-0045-0100 | 163 | Footnote: Please specify in this footnote that "takes longer than necessary" refers to a single foundation installation, rather than that the broader project schedule. If this is not BOEM's intention, please revise the language in the footnote to provide clarity so that BOEM's intention is clear to the public. | Text has been revised to clarify. |
| BOEM-2022-0045-0100 | 164 | Please clarify whether "the [UXO] devices are distributed such that the exposure areas would not overlap" means that the overlap would not occur in time, in space, or both. Please also clarify that BOEM would condition the permit such that UXO detonation noise would not overlap with noise from other sources (e.g., impact pile driving). Also discuss how noise from UXO is instantaneous and limited to 1 UXO detonation per day so if there is overlap (should BOEM not condition it to be allowed), any impacts would not likely be different than individual exposure from any one source. Also discuss the likely distance between any two noise generating sources as justification for any impact assessment on overlapping noise. | Thank you. Discussion of the potential effects from UXO detonation has been revised accordingly and to be consistent with updated information. |
| BOEM-2022-0045-0100 | 165 | It is not correct to say "The take request associated with UXO detonation includes the potential for non-auditory injury." It is correct to say that the exposure analysis addressed the potential for non-auditory injury. Revolution Wind did not request take for non-auditory injury. Please correct. | Text has been revised to clarify. |
| BOEM-2022-0045-0100 | 166 | The values in this table should be updated to include the following number of PTS exposures incidental to UXO detonations: harbor porpoise (49), harbor seal (5), and gray seal (3) These updates resulted from Revolution updating the animal densities used in exposure estimation. | Thank you for the comment. The table has been updated to be consistent with the most current information on exposure estimates for marine mammals. |
| BOEM-2022-0045-0100 | 167 | Revolution Wind did not specifically estimate TTS exposures. The values in this table (which don't align with Revolution Wind's most recent exposure estimates, and should be revised) are related to behavioral harassment thresholds Please remove "a Temporary Threshold Shift or" from the title, and request the most recent exposure modeling results from Revolution Wind to update the table values. | Text has been revised to clarify and to be consistent with current information. |
| BOEM-2022-0045-0100 | 168 | The beginning of this paragraph introduces vessel noise, and the distance within which a marine mammal would have to remain for 24 hours to incur PTS (400 ft), but the paragraph goes on (three sentences later) to state that a marine mammal could clear the zone of potential noise exposure in 4 hours. Please revise the text to create logical connections between the presented ideas. Also, identify how unrealistic it is for PTS to occur based on the assessment (i.e., animals would have to remain within 400 ft of vessel for 24 hours for the potential for PTS to occur). | Text has been revised to clarify. |
| BOEM-2022-0045-0100 | 169 | It is not clear what the following means: "and 3) construction timing along with development and adoption of an adaptive acoustic monitoring plan for sensitive species that would be intended to avoid noise impacts in areas with sensitive species during spawning periods." Please revise for clarity. What is an adaptive acoustic monitoring plan in this context, and to which species does this refer? How does construction timing avoid impacts to spawning behavior? | Text has been revised to clarify. |

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| BOEM-2022-0045-0100 | 170 | The discussion in this paragraph requires substantial revisions. Please provide a more robust, well supported review of potential impacts of the presence of structures on marine mammals. Please refer to the NEFSC's memo to BOEM as a starting point. | Thank you for your comment. Additional information has been incorporated into the Presence of Structures IPF section, as available, relying on the information in the May 13, 2022 memo from NEFSC to BOEM for guidance. |
| BOEM-2022-0045-0100 | 171 | Please include Robert et. al (2022) as a reference. Revolution Wind has revised densities and take estimates using the most recent Robert et al. (2022) data. Update the DEIS with this information. | Thank you. The FEIS has been revised to incorporate the most current information on marine mammal abundance and distribution within the project area. |
| BOEM-2022-0045-0100 | 172 | "Due to the low relative densities of those species vulnerable to collisions compared to where the majority of the population is, there is a low risk of marine mammal vessel encounter." This statement still needs to be revised to address the fact that densities fluctuate by season and by species and needs support (note NMFS does not necessarily agree with this statement as is). For example, peaks in humpback whale presence and those for right whale presence in the project area do not occur at the same time of year. | Text has been revised to clarify. |
| BOEM-2022-0045-0100 | 173 | It is more appropriate to say that mid-frequency cetaceans are more likely than low-frequency cetaceans to be able to adapt to operational noise effects, rather than saying than mid-frequency cetaceans are "likely to" adapt. Identify the mechanisms by which marine mammals can adapt. Also, there are also strains associated with having to shift the frequency range in which a marine mammal communicates, so characterizing this ability as a benefit is not accurate. | Thank you for the comment. Text has been revised to clarify and address the potential costs of adapting communication. |
| BOEM-2022-0045-0100 | 174 | The EIS states that "localized impacts on zooplankton and fish abundance and distribution are not likely to be biologically significant for marine mammals," but then goes on to say that "hydrodynamic effects on prey distribution could contribute to displacement effects and increased interaction with fisheries for some marine mammal species; however, the likelihood and potential significance of such effects is unknown." Given this uncertainty, it is contradictory and illogical to say that impacts are not likely to be biologically significant. Please revise using the best available science, site specific analysis, and recognition of uncertainty. | Text has been revised to clarify. |
| BOEM-2022-0045-0100 | 175 | Please identify what constitutes a "Project monitoring vessel". | Text has been revised to clarify. |
| BOEM-2022-0045-0100 | 176 | The text states that the Proposed Action combined with all existing and planned future action "would place over 3,000 noise generating structures in the RI/MA and MA WEAs"," but then goes on to say that "3,008 foundations...[would be placed] on the OCS between North Carolina and Maine." Check numbers, spatial distribution, and revise. | Text has been revised to clarify. |
| BOEM-2022-0045-0100 | 177 | As mentioned in a previous comment, Revolution Wind did not evaluate distances to specific TTS thresholds, so the values in this table are distance to the behavioral harassment threshold (160 dB re 1 micropascal). Please remove TTS under "Noise Exposure Type." In addition, please update the number of strikes in the footnote to 10,740. | Thank you for the comment. Text has been revised accordingly. |
| BOEM-2022-0045-0100 | 178 | NMFS must approve any modification to the size of the clearance and shutdown zones. Neither BOEM nor BSEE has the authority to do so without NMFS. Please revise Table 3.15-13 to reflect this. | Text has been revised accordingly. |
| BOEM-2022-0045-0100 | 204 | The document states that gray and harbor seals have no PBR estimate, which is incorrect. Please revise. | Text has been revised accordingly. |

## Mitigation and Monitoring

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| BOEM-2022-0045-0115 | 1 | Thank you for the opportunity to comment today. My name is Heidi Ricci. I'm director of policy and advocacy at Mass; Audubon for a State based um organization founded in one thousand eight hundred and ninety-six. We have one hundred and sixty thousand um members and supporters, and we've been reviewing offshore wind for a number of years. Now. Um, along with many other environmental organizations. Um, that's all about, is united in our for responsibly developed offshore wind. This is an important component of the overall strategy for decarbonizing our energy systems and provides a tremendous opportunity to fight climate change, reduce air pollution and grow a new industry that's going to support thousands of well-paying jobs. Um We are our focus is on responsible development of offshore wind that avoids, minimize, mitigates, and monitors adverse impacts on green and coastal habitats, and the wildlife that relies on them, as well as uh reducing and minimizing effects on other ocean users uh, including robust consultation with all interested stakeholders, because there is considerable uncertainty about exactly what the impacts will be on wildlife um mass of one also supports development of advanced compensatory mitigation programs that are based on the best available science and that are transparent and accountable. So, for example, the area off the southeast of New England is an important habitat for the Federally and State endangered Rosia turn along with other coastal waterbird species, so there is considerable uncertainty about the effects of these projects on those birds. However, we know that they are also vulnerable to the impacts of climate change, since they nest on coastal beaches that are subject to impacts from sea level rise and from um storms as well as effects on their food, which is changing as conditions in the ocean are changing. So we support the development of compensatory mitigation programs that would fund ah coastal waterbird nesting, habitat, monitoring restoration and enhancement as one example of um potential mitigation programs for offshore wind, and we'll be submitting more detailed comments on the project along with our colleagues from other organizations. So I think i'll conclude with that. Not get into anything more specific here, and thank you for this opportunity. | The Avian and Bat Post-Construction Monitoring Framework is an attachment to COP Appendix AA, which is publicly available on BOEM's website. Additional mitigation and monitoring measures, including adaptive management, may arise from consultations and coordination with Federal and State resource agencies. These additional monitoring requirements would be considered by decision makers and incorporated into the terms and conditions for COP approval. BOEM fully supports regional monitoring and sharing data with the public as offshore wind development progresses and will incorporate results in future decisions. |
| BOEM-2022-0045-0110 | 2 | As recognized by the United Nations Environment Program Convention on the Conservation of Migratory Species of Wild Animals, migratory species, such as migratory marine species, are particularly vulnerable to climate change impacts.10 Similarly, a report by National Audubon Society found that bird species, already facing threats from habitat loss and other stressors, face significant impacts from climate change that can be ameliorated if we prevent warming from reaching higher levels.11 Against this backdrop of unprecedented climate change risks threatening species extinction and shifts in distribution, it is imperative that all offshore wind development activities move forward with strong protections in place for coastal and marine habitat and wildlife, using science-based measures to avoid, minimize, mitigate, and monitor impacts on valuable and vulnerable wildlife and ecosystems. BOEM must consider sufficient measures to protect our most vulnerable threatened and endangered species and a robust plan for pre-, during, and post-construction monitoring that can enable effective adaptive management strategies. | Thank you for the comment. The EIS evaluates climate change and threatened and endangered species in Chapters 3.5 Bats, 3.7 Birds, 3.8 Coastal Habitats and Fauna, 3.13 Finfish and Essential Fish Habitat, 3.15 Marine Mammals, 3.19 Sea Turtles, Appendix E Planned Activities Scenario and Reasonably Foreseeable Future Activities and Projects, Appendix F Environmental Protection Measures, Mitigation, and Monitoring, and Appendix G Environmental and Physical Settings and Supplemental Information. Section 7.6.1.4 of the *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf* (Minerals Management Service [MMS] 2007), which informs this EIS, describes global climate change with respect to assessing renewable energy development. Additionally, BOEM's 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), incorporated by reference into the EIS, evaluated potential impacts from climate change to vulnerable wildlife and ecosystems. The content of these BOEM assessments have been re-evaluated in Appendix E1 to determine the relevance of each IPF to each resource analyzed in this EIS. |
| BOEM-2022-0045-0091 | 3 | In addition to the marine mammal protection measures, Revolution Wind has agreed to a number of environmental protection measures designed to mitigate impacts to air and water quality, benthic habitat and invertebrates, finfish and essential fish habitat, sea turtles, birds, and bats.10 BOEM has further identified a number of potential additional environmental mitigation measures for the project.11 Many of these additional measures are designed to enhance accountability and to provide concrete implementation standards. Save the Sound generally approves of the full suite of environmental protection measures identified by both Revolution Wind and BOEM. As with the discrete set of recommendations designed to mitigate impacts to the North Atlantic right whale, we urge BOEM to apply rigorous environmental protection measures to all OSW projects and to ensure that they are implemented consistently across the lease areas to ensure their effectiveness. | Thank you for your comment. BOEM continues to work closely with NOAA NMFS, BSEE, and other agencies as appropriate to monitor and ensure committed environmental protection measures are implemented across all OSW projects. |
| BOEM-2022-0045-0078 | 3 | Rapid Construction Monitoring Analyses and Adjustments It will be important to closely monitor, and rapidly report-out on, successes and challenges of construction and early operation. Information gained via monitoring of early projects should be used to assist other | There are a number of monitoring reports that will be required such as weekly reporting of pile driving activity, sound source measurements, PSO data, and |

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| | | future offshore wind projects in selecting the least impactful and most beneficial methods of project design and operation. We urge BOEM to develop a proposed methodology and aggressive timeline for the public, BOEM, and its consultive federal agencies to review this information and apply it to support an adaptive management approach. Developers (or others given the responsibility for monitoring) should be required (as a permit condition, or contractual funding agreement) to analyze and report publicly on construction and operations monitoring data at least every six months for the first three years of the project. | reporting all sightings of North Atlantic right whales. Appendix F of the EIS has also been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. BOEM fully supports regional monitoring and sharing data with the public as offshore wind development progresses and will incorporate results in future decisions. |
| BOEM-2022-0045-0072 | 3 | The mitigation measures outlined in Appendix F of the DEIS should be required in the final Record of Decision for the RWF. CZM highlights the following measures that are of heightened importance to threatened and endangered marine mammals and avian species in the area: restrictions on pile driving, the use of Protected Species Observers, vessel avoidance measures, speed restrictions, and noise reduction technologies to protect marine mammals; and deterrent devices, a robust monitoring framework, installation of VHF telemetry stations, reporting of dead and injured birds, and installation of appropriate lighting to protect avifauna. CZM supports the proposed post construction monitoring framework for birds and bats that would be developed with the U.S. Fish and Wildlife Service. The proponent should continue to coordinate with Massachusetts agencies on mitigation opportunities for potential avifauna impacts, including establishing baseline monitoring and identifying opportunities for habitat enhancement. In addition, any cable protection implemented to remediate inadequately buried or uncovered cables should be matched with adjacent native sediments rather than the use of concrete mattresses in order to minimize benthic habitat impacts and conversion and navigation hazards to fishing gear. | Appendix F of the EIS has updated the comprehensive list of monitoring and mitigation being considered and evaluated. Many of these measures require evaluation of the effectiveness of a mitigation measure or to identify if resources are responding as predicted to impacts from the approved activities. Monitoring programs are developed in coordination with agencies with jurisdiction over the resource to be monitored. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. |
| BOEM-2022-0045-0110 | 4 | As previously noted, offshore wind remains a relatively nascent technology in the United States and, as such, BOEM must closely monitor the impact of offshore wind construction and operations on marine wildlife and the ocean ecosystem to guide its adaptive management and future development. It is necessary to understand baseline environmental conditions prior to large-scale offshore wind development in the United States, so offshore wind impacts can be clearly understood with relation to pre-development environments. Additionally, as discussed further below, it is imperative that BOEM require robust, long-term monitoring (ideally coordinated regionally) to understand the impacts of offshore wind development on natural resources and that this monitoring data be made available to stakeholders and the public.<br>As BOEM well knows, the Regional Wildlife Science Collaborative for Offshore Wind (RWSC)22 has been established to ensure the long-term success of offshore wind. RWSC is a multi-sector collective created and defined by federal agencies, states, conservation organizations, and offshore wind developers to ensure the responsible and efficient development of offshore wind. RWSC works to facilitate the development of science plans, data standards, research methods, and data management to ensure that offshore wind is developed successfully with minimal impact to marine wildlife and habitat. We urge that BOEM continue to participate in and fund RWSC to support science plan development and to implement the monitoring and research activities identified in the science plan. | Thank you for the comment. BOEM has engaged in, currently engages in, and will continue to engage in monitoring of the potential impacts of offshore wind construction and operations on marine wildlife and the ocean ecosystem to guide its adaptive management and future development. |
| BOEM-2022-0045-0110 | 5 | BOEM, through RWSC and individually, must also continue to collaborate with state efforts, scientists, NGOs, the wind industry, and other stakeholders to use information from monitoring and other research, and evolving practices and technology to inform cumulative impact analyses moving forward. Best management practices must evolve as monitoring informs impacts and the adaptive management practices needed to account for unanticipated impacts associated with this new industry. Likewise, analyses should include more specific information related to impacts of offshore wind development and operation on wildlife as it becomes available and management practices advance. As monitoring informs management practices, BOEM must require continued monitoring and employment of adaptive management practices by offshore wind projects. This will ensure that BOEM can swiftly minimize damages of unintended or unanticipated impacts to coastal ecosystems or wildlife and inform strategies for future wind projects to avoid potential impacts. | Thank you for the comment. BOEM has engaged in, currently engages in, and will continue to engage in collaboration with stakeholders to share information from monitoring and other research. |
| BOEM-2022-0045-0091 | 6 | While the development of offshore wind presents an exciting new opportunity to expand our portfolio of clean renewable energy resources, we emphasize that such opportunities must be taken advantage of in a manner that minimizes potential harm to the ecosystems and wildlife that may be impacted. Offshore wind is a new industry operating in areas that present logistical challenges and about which there may be imperfect information. With that in mind, we commend the effort being undertaken to ensure that the project proceeds with a minimal environmental footprint. Fundamental criteria necessary to ensure a strong framework to help mitigate potential environmental and ecological impacts include the need for flexibility through an adaptive operational plan approach that can meet changing circumstances,15 (2) robust and continuing stakeholder engagement, and (3) a robust data gathering, sharing, and management plan. Given the relative novelty offshore wind installations along the northeast coast of the United States, there is likely | Appendix F of the FEIS has updated the comprehensive list of monitoring and mitigation being considered and evaluated. Many of these measures require evaluation of the effectiveness of a mitigation measure or to identify if resources are responding as predicted to impacts from the approved activities. Monitoring programs are developed in coordination with agencies with jurisdiction over the resource to be monitored. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. |

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| | | much we don't know about the potential long-term impacts of these projects. Accordingly a sustained monitoring and research effort that informs necessary course-corrections to the operation of the project and environmental mitigation efforts is essential. We also support the need for robust stakeholder engagement and input throughout each stage of the project. Any and all mitigation plans developed must be transparent and subject to independent review. Any proposed changes to established mitigation plan should be made publicly available and subject to stakeholder input prior to adoption. Likewise, all research and results of ongoing monitoring efforts should be published to ensure adequate transparency and to inform the development and operation of other offshore wind installations. | The information generated by monitoring may be used to 1) modify how a mitigation measure identified in the COP or ROD is being implemented, 2) develop measures for future projects, and/or 3) contribute to regional efforts for better understanding the impacts and benefits resulting from offshore wind energy projects in the Atlantic (e.g., a potential cumulative impact assessment tool). |
| BOEM-2022-0045-0078 | 6 | Scientific Research and Monitoring<br>We appreciate ongoing efforts by BOEM and developers to conduct ecological monitoring in the lease areas, and to contribute funds to both regional fisheries research and long-term regional monitoring of wildlife impacts. Conducting scientific research and pre-construction, during construction, and post-construction monitoring to advance our collective understanding of the effects of offshore wind development on marine and coastal resources and ocean uses is essential. Science should be conducted in a collaborative and transparent manner, utilizing recognized marine experts, engaging relevant stakeholders, and making results publicly available and timely shared, as appropriate on the Northeast and Mid-Atlantic Ocean Data Portals and other public platforms. Regional groups like the Responsible Offshore Science Aliance (ROSA) and the Regional Wildlife Science Collaborative (RWSC) have created multi-sectoral expert groups who could be engaged to enhance these cross-project collaborations. Also, we recognize that evaluating cumulative impacts is a challenging and emerging science, but it also an opportunity to guide offshore wind development and project design over the next decade. We reference again here a few relevant papers describing the challenges and possible approaches to offshore wind cumulative impact analyses. | Thank you for your comment and recommended literature. BOEM fully supports regional monitoring, research and sharing data with the public as offshore wind development progresses and will incorporate results in analysis supporting future decisions. |
| BOEM-2022-0045-0069 | 6 | Support NOAA's efforts to minimize impacts to, or adapt, fish, invertebrate, and marine mammal monitoring surveys in and around the wind energy area, as well as along the cable route. These surveys provide some of the primary data used for informed fisheries and wildlife management decisions, and disruptions to such long-term monitoring efforts will introduce additional uncertainty into stock assessments and population monitoring. These assessments are the primary tools used to manage and protect the resources, of which have directly effects on commercial and recreational fishing. | The Revolution Wind COP includes a Fisheries and Benthic Monitoring Plan which has been incorporated into the EIS as part of the proposed action. The results of the surveys and monitoring efforts outlined in this plan will be distributed to researchers through participation in regional telemetry networks such as the Ocean Tracking Network or the Mid-Atlantic Acoustic Telemetry Network (MATOS), and provide valuable long-term data on fish populations and behavior in the project area. Revolution Wind will also disseminate the annual monitoring results through a webinar or an in-person meeting which will also offer an open forum for federal, state, and academic scientists to ask questions or provide feedback on the data collection protocols. Likewise, following each year of monitoring Revolution Wind will coordinate with the Contractor(s) to host an industry workshop to disseminate the results of the monitoring activities to local fishing industry members. Although all interested stakeholders will be invited to the industry workshops, concerted efforts will be made to ensure that members of the Rhode Island Fishermen's Advisory Board (FAB) and the Massachusetts Fisheries Working group attend.<br><br>Specifics on the implementation of proposed mitigation measures is found in Appendix F, which has been updated with additional details based on public comments on the Draft EIS, consultations with NMFS, *Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR 585* (BOEM 2022), and the recently published *NOAA Fisheries and BOEM Federal Survey Mitigation Implementation Strategy* (NOAA 2022). Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. |
| BOEM-2022-0045-0091 | 7 | Among the additional qualitative factors to be considered in evaluating the relative merits and strengths of any plans and practices to avoid, minimize, and mitigate current known and future discovered impacts to wildlife, natural resources, ecosystems and traditional or existing water-dependent uses, including, but not limited to, commercial fishing. Essential elements to be evaluated within the scope of a proposed project should include: • The establishment of an ecological mitigation fund to guarantee the ability to successfully mitigate environmental harm and economic impact to commercial fisheries. • Plans for assessing alternatives to, and alternative approaches for, | See response to comment 2022-0045-0091-6 for more on monitoring and adaptive management.<br><br>BOEM incorporates fishing industry recommendations into the leasing process by: issuing guidelines to leaseholders or including lease stipulations to develop |

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| | | decommissioning the project. The impact of decommissioning on the surrounding ecosystem should be the first and highest consideration. • A commitment to habitat restoration, and a requirement for funding such restoration through an environmental mitigation and restoration fund, if needed to return the area to pre-built ecological function. • Plans for a cumulative impact analysis that considers the impacts of the project in conjunction with pending and anticipated projects in other offshore lease areas. | and implement a fisheries communication plan, developing a fishing industry webpage, and working closely with state partners to address regional fisheries monitoring associated with potential impacts from offshore wind development. BOEM has proposed guidance to lessees for mitigating impacts on commercial and recreational fisheries related to project siting, design, navigation, access, safety measures, and financial compensation (BOEM 2022). Together with implementation of the Federal Survey Mitigation Implementation Strategy (Hare et. al. 2022), the proposed mitigation measures would reduce adverse impacts on commercial fisheries and for-hire recreational fishing. The proposed mitigation measures are listed in Appendix F, Table F-2 and Table F-3.<br><br>Conceptual decommissioning plans in the COP must include broad coverage of not only deconstruction and site clearance activities, but also potential impacts to the surrounding environment and potential mitigation measures. For a complete list of BOEM's conceptual decommissioning plan requirements for a COP, see BOEM's Information Guidelines for a Renewable Energy COP at: https://www.boem.gov/COP-Guidelines/. At the end of the Project's operational life (20 to 35 years), Revolution Wind would be required to submit a detailed project decommissioning application. As described in Section 2.1.2.5 of the FEIS, Revolution Wind would be required to remove or decommission all installations and clear the seabed of all obstructions created by the proposed Project in compliance with applicable laws, regulations, and best management practices at that time, which would be subject to BOEM review and approval. At that time BOEM would also conduct a NEPA sufficiency review of the proposed decommissioning activities. See BOEM's technical report for information on the decommissioning process and requirements for offshore wind projects: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Decommissioning%20White%20Paper.pdf.<br><br>The No Action Alternative provides a current baseline for analysis of impacts from the action alternatives. A separate analysis of the No Action Alternative when combined with future planned activities (i.e., cumulative actions) provides the future baseline as a basis for comparison of the cumulative impacts of the action alternatives. The EIS analyzes cumulative impacts of the Proposed Action and action alternatives in combination with ongoing and planned activities (including other non-offshore wind and offshore-wind activities) as described in Appendix E, Planned Activities Scenario. |
| BOEM-2022-0045-0100 | 9 | As we have highlighted in past comments, the evaluation and implementation of mitigation measures is a critical component of the analysis in any NEPA document. We recommend the FEIS analyze and describe the anticipated impacts of the proposed action, mitigation measures considered to be part of that action, the effectiveness of these measures, and the expected impacts if mitigation methods are applied. This structure is necessary to support the final impact determinations. An important element of that analysis is the likelihood (or not) that such measures will be committed to, adopted, and implemented. The mitigation and monitoring measures for the proposed action as well as additional measures are only briefly referenced in the document with little analysis of their effectiveness. There are several instances where assumptions about the success of mitigation measures are made despite the lack of evidence or necessary associated actions. This is the case for mitigation for cod spawning impacts, as described above, for fisheries impacts, and for impacts on NOAA fisheries scientific surveys. Specifically, the document unreasonably relies on the anticipated success of fisheries mitigation guidance that has not yet been finalized or implemented by BOEM. Moreover, the draft NMFS/BOEM Federal Survey Mitigation Implementation Strategy has neither resulted in developed mitigation plans for any affected federal survey, nor acquired the | Revolution Wind's committed mitigation measures (i.e., Environmental Protection Measures [EPMs]) are outlined in the COP and analyzed as part of the Proposed Action, and as such contribute to the impact level conclusions. BOEM evaluates proposed mitigation measures (i.e., not EPMs) for each resource in Chapter 3, and describes whether implementation of the measure would result in reduced impacts. Specifics on the implementation of proposed mitigation measures is found in Appendix F, which has been updated with additional details based on pubic comments on the Draft EIS, consultations with NMFS, and the recently published *NOAA Fisheries and BOEM Federal Survey Mitigation Implementation Strategy* (NOAA 2022). |

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| | | necessary funding to support such efforts. Therefore, the anticipated success of these mitigation strategies is premature and unreasonably optimistic. | |
| BOEM-2022-0045-0100 | 10 | The DEIS also still contains sections where BOEM is relying on mitigation measures to reduce impacts but does not specify which of these measures, if any, are factored into the impact determination. For example, in the analysis of impacts to marine mammals from nighttime pile driving (an activity that is part of the developer's proposed action), it is unclear in the document whether BOEM's impact determination considered only those mitigation measures proposed by the developer as part of the COP, additional time-of-day pile driving restrictions that may be imposed by BOEM as a condition of COP approval, or any additional mitigation measures. While we understand that a final commitment to additional measures cannot be made until the ROD and COP approval decision stage, the FEIS should be explicit as to what additional mitigation measures beyond the applicant's proposed measures are anticipated to be required and which measures were relied on in reaching the impact conclusions. | Thank you for your recommendation. Effect determinations in the EIS consider EPMs that are proposed by the applicant and therefore are considered part of the Proposed Action. Each resource section in Chapter 3 contains a separate mitigation section that discusses potential additional mitigation measures that could be applied to the project. These mitigation sections have been refined in the EIS to provide further clarity on what additional mitigation measures beyond the applicant's proposed measures are anticipated to be required and how they affect impact conclusions. The EIS has also been revised in Section 3.3 to provide further clarity to the reader that mitigation measures are not included in impact determinations preceding the mitigation section. |
| BOEM-2022-0045-0110 | 11 | BOEM needs to rigorously review the potential impacts of offshore wind development on marine wildlife and habitat, including potential impacts related to future projects at the scale envisioned by the President's offshore wind goals, to ensure appropriate mitigation measures are developed and adopted. | Thank you for the comment. Reasonably foreseeable future offshore wind projects were evaluated as part of the cumulative analysis for each resource throughout Chapter 3. |
| BOEM-2022-0045-0110 | 17 | We also urge BOEM to require Revolution Wind Farm to undertake mitigation and monitoring measures identified in the Draft EIS. | Thank you for the comment. Appendix F Environmental Protection Measures, Mitigation, and Monitoring presents the Environmental Protection Measures committed to by the developer and included in the Proposed Action, Mitigation Measures resulting from consultations, and potential additional Mitigation and Monitoring Measures proposed by BOEM. The Record of Decision will include any additional mitigation and monitoring measures from the Final EIS that BOEM is requiring under NEPA, should the COP be approved or approved with modification. |
| BOEM-2022-0045-0071 | 20 | The recommendations outlined in our offshore wind energy policies, referenced above, should be reflected as terms and conditions for approval of the Revolution Wind project. We provided a separate comment letter on the draft Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries.3 We support many of the mitigation measures recommended in that draft guidance. We recommend that all final mitigation guidelines be reflected in terms and conditions for BOEM's approval of Revolution Wind. For example, the project design envelope for Revolution Wind includes burial depths of 4 to 6 feet for inter-array and substation interconnection cables. BOEM's draft fisheries mitigation guidelines recommend a minimum cable burial depth of 6 feet. Although the Councils have not endorsed a specific cable burial depth to minimize impacts to fisheries, we strongly support the draft guidance recommending a minimum burial depth of 6 feet. We recommend that BOEM not approve any cable burial depths of less than 6 feet for Revolution Wind or any other wind projects. | Appendix F of the EIS has updated the comprehensive list of monitoring and mitigation being considered and evaluated. Specifics on the implementation of proposed mitigation measures is found in Appendix F, which has been updated with additional details based on pubic comments on the Draft EIS, consultations with NMFS, *Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR 585* (BOEM 2022), and the recently published *NOAA Fisheries and BOEM Federal Survey Mitigation Implementation Strategy* (NOAA 2022). Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. |
| BOEM-2022-0045-0086 | 60 | The DEIS contains referenced mitigation, however, the effectiveness of referenced mitigation is conclusionary and without any specifics as to its content or feasibility. Consequently, some described impacts within the DEIS range from minor to major, leaving the reader with little understanding of the agency's impact determinations. Many of these impacts and their possible mitigation have been addressed in more detail by BOEM in previous wind farm FEISs. | Thank you for your comment. Each resource section in Chapter 3 contains a separate mitigation section that discusses potential additional mitigation measures that could be applied to the project. These mitigation sections have been refined in the FEIS to provide further clarity on what additional mitigation measures beyond the applicant's proposed measures are anticipated to be required and how they affect impact conclusions. |
| BOEM-2022-0045-0086 | 61 | The DEIS deferred most impact conclusions to the FEIS as well as the eventual scope of the proposed mitigation, and, consequently, making it difficult for the public to responsibly comment. We recommend that the FEIS clearly establishes the expected level or degree of impacts prior to mitigation, and specifically describe all mitigation that is under consideration for these impacts. | Thank you for your comment. Each resource section in Chapter 3 contains a separate mitigation section that discusses potential additional mitigation measures that could be applied to the project. These mitigation sections have been refined in the FEIS to provide further clarity on what additional mitigation measures beyond the applicant's proposed measures are anticipated to be required and how they affect impact conclusions. |

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| BOEM-2022-0045-0086 | 90 | Appendix F: Mitigation measures (e.g., establishment of exclusion and monitoring zones) associated with HRG surveys or UXO detonation activity are not mentioned within Appendix F. This is inconsistent with what is included within the DEIS body language as well as the Revolution Wind LOA application. | As stated in the COP, if required, detonation is considered a short-term disturbance in the immediate area of the confirmed MEC/UXO and will occur prior to seafloor preparation and construction and installation activities. Detonation will only be used where avoidance or other methods of removal are deemed impractical or unsafe. As stated in Appendix F Table F-2 the measures required by the final MMPA Letter of Authorization (LOA) for Incidental Take Regulations would be incorporated into COP approval, and BOEM and/or BSEE will monitor compliance with these measures. |
| BOEM-2022-0045-0100 | 206 | Please distinguish between the mitigation and monitoring measures proposed by Revolution Wind and those that BOEM is proposing (e.g., restrictions on nighttime pile driving). | Thank you for the comment. Each resource section in Chapter 3 contains a separate mitigation section that discusses potential additional mitigation measures that could be applied to the project. These mitigation sections have been refined in the EIS to provide further clarity on what additional mitigation measures beyond the applicant's proposed measures are anticipated to be required and how they affect impact conclusions. The EIS has also been revised in Section 3.3 to provide further clarity to the reader that mitigation measures are not included in impact determinations preceding the mitigation section. EIS Appendix F, Table F-1, lists applicant-committed Environmental Protection Measures (EPMs) for the project, and Table F-2 and Table F-3 list agency-proposed mitigation measures for the project. |
| BOEM-2022-0045-0100 | 207 | Revolution Wind must monitor clearance and shutdown zones, not exclusion and monitoring zones. NMFS requires that PSOs monitor as visibility allows, rather than limit monitoring to a particular zone. Please correct this in Table F-1. | The measures in Table F-1 are the applicant proposed EPMs as presented in the COP. BOEM has included updated mitigation measures in Table F-2 for monitoring of clearance and shutdown zones, including updates from the NMFS ESA consultation and MMPA rulemaking. |
| BOEM-2022-0045-0100 | 208 | Revolution Wind must conduct sound field verification on the first 3 pile installations, and additional pile installations should installation conditions change (e.g., water depth, substrate), to satisfy the MMPA ITA requirements. Please correct the text to reflect this requirement. | The number of piles will be determined by NMFS through the MMPA rulemaking process. BOEM will update the NMFS-proposed measures once the draft LOA is available. The measures in Table F-1 are the applicant proposed EPMs as presented in the COP. These updates have been applied to the measures outlined in Table F-2. |
| BOEM-2022-0045-0100 | 209 | Please include the following: Visual observers may be third-party observers (i.e., NMFS-approved PSOs) or crew members, dependent on ensuring crew members acting as dedicated observers receive prior training on protected species detection and identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements in the IHA. | Visual observers may be PSOs or Trained Lookouts that act as dedicated observers that receive prior training on protected species detection and identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements |
| BOEM-2022-0045-0100 | 210 | EPM MM10: Please include time of day restrictions on pile driving if BOEM intends to impose them. | BOEM is not proposing time of day restrictions at this time. BOEM has included updated measures in Table F-2 for monitoring of clearance and shutdown zones, including updates from the NMFS ESA consultation and MMPA rulemaking. |
| BOEM-2022-0045-0100 | 211 | Please include that Revolution Wind would be required to employ trained PAM operators in addition visual PSOs. | BOEM has included trained PAM operators in addition to trained PSOs. |
| BOEM-2022-0045-0100 | 212 | Please note that NMFS would require that the PAM Plan, Sound Field Verification Plan, and Pile driving Monitoring Plan be submitted 180 days prior to the start of pile driving. | Requested edit has been incorporated as a NMFS-proposed measure. |
| BOEM-2022-0045-0100 | 213 | Please clarify that NMFS will decide whether or not zone sizes may be modified based on Sound Field Verification data. The way it is currently written implies that BOEM and BSEE would be part of that decision-making process. | BOEM and BSEE must approve any changes to the COP approval conditions or compliance with the conditions therein. BOEM and BSEE are also responsible for reviewing the sound source field verification results. BOEM holds the primary expertise between the two agencies through our Center for Marine Acoustics which has published guidelines for conducting source measurements. |

## Navigation and Vessel Traffic

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| BOEM-2022-0045-0058 | 3 | Because of the RWF's proximity to these ports, the Coast Guard anticipates an increased traffic density in the Buzzards Bay approach and in the vicinity of the RWF. Accordingly, it is imperative that all the mitigations listed in Appendix F, consistent with the USCG's input to previous projects, be made mandatory. | BOEM will consider adopting and translating mitigation measures in to terms & conditions of the COP approval and will develop the language of those terms and conditions with USCG input. |
| BOEM-2022-0045-0070 | 3 | The Port of New Bedford is continually undertaking port improvements to support offshore wind development. We are also in the initial stages of developing a harbor Vessel Management Plan, which will take into account current and future offshore wind activity. In addition, we are updating our mandated Municipal Harbor Plan in conjunction with Town of Fairhaven, MA. The Project filing states that temporary localized minor to moderate adverse impacts to ports and navigation would be expected. Furthermore, "Construction activities would result in increased vessel traffic near the lease areas and ports used as well as obstructions to navigation and changes to navigation patterns. Additional impacts would include delays within or approaching ports; increased navigational complexity; detours to offshore travel or port approaches; or increased risk of incidents such as collision, strikes or allisions, and groundings. Other reasonably foreseeable future offshore projects would produce additional vessel traffic during." (p. 3.16-8) With the initial phases of construction tentatively scheduled as early as the first quarter of 2023, state and local agencies are responsible for minimizing the potential adverse impacts of additional port utilization by managing traffic to ensure access to ports. It is critical that any port taking part in any aspect of the Project be identified at the earliest possible stage of the proposed development. Preparation for such activity will help ensure port managers can maintain safe and reliable operations and infrastructure for the benefit of all harbor users. | Thank you for your comment; Ports listed in the COP describe the PDE. Port improvement projects are discussed in Appendix E of the EIS. |
| BOEM-2022-0045-0058 | 4 | a) Periodic Review: The wind farm installation and operation, including the control center and its operators, and all plans and policies related thereto, should be subject to regular review by the Coast Guard on at least an annual basis, or more frequently if circumstances dictate. The Coast Guard should be included in emergency response exercises. | BOEM will consider adopting and translating mitigation measures in to terms & conditions of the COP approval and will develop the language of those terms and conditions with USCG input. |
| BOEM-2022-0045-0058 | 5 | b) Safety Zones: The establishment of safety zones or other regulated navigation areas should not be used as the key mitigating factor when considering risks and impacts. Commander, Coast Guard First District may consider safety zones in the RWF lease area, but safety zones will not be granted for the sole purpose of keeping project construction on track. | Thank you for the comment. Edits made to clarify the developer will request USCG to establish safety zones. |
| BOEM-2022-0045-0058 | 6 | c) Post ROD involvement: The USCG requests timely access to construction plans, such as Facility Design Reports and/or Fabrication Installation Reports that may identify activities that impact the USCG missions or the Marine Transportation System, especially Cable Burial Plans and their associated risk and feasibility assessments. Early and easy access to these documents may prevent conflicts with planned activities. | BOEM will continue coordinating with USCG, and will consider adopting and translating certain mitigation measures into terms & conditions of the COP approval. |
| BOEM-2022-0045-0058 | 7 | d) Amending Mitigations: The Coast Guard requests the opportunity to suggest amendments to approved mitigations and terms and conditions at any time before, during, or after installation of the wind farm should material facts or circumstances come to light that were either unforeseen or were not reasonably available at the time these conditions were issued. | Any post-approval modifications to the Terms and Conditions of Construction and Operations plan approval is out of scope for NEPA. |
| BOEM-2022-0045-0058 | 8 | e) Re-Evaluation: The Coast Guard requests the opportunity to re-evaluate any required analyses submitted by Revolution Wind, or require additional analysis after installation (e.g., to determine post-installation radar and communications impact). | BOEM will continue to coordinate with the USCG throughout the remainder of the process. BOEM welcomes any post installation study proposals as mitigation measures. |
| BOEM-2022-0045-0059 | 11 | Section 3.16 of the DEIS, "Navigation and Vessel Traffic" relies on incomplete information and is unjustifiably restricted to a limited geographic area. The cumulative navigational only includes the listed MA/RI wind leases OCS-A 0487, OCS-A 0500, OCS-A 0501, OCS-A 0517, OCS-A 0520, OCS-A 0521, and OCS-A 0522.67 However, federally permitted commercial fisheries operating in the region will be encountering and affected by offshore wind leases not only off MA and RI but also off NY, the NY Bight, NJ, DE, MD, VA and NC, as well as the Gulf of Maine and Central Atlantic Call Area. Only consideration of projects over that entire region can estimate the true cumulative impact to federally permitted commercial fisheries by BOEM's offshore wind plans in the Atlantic. Analyzing anything less than that is a segmentation of NEPA analysis that will downgrade impacts. A full regional impact for the Greater Atlantic Region must be conducted by an independent body. Project specific navigational risk assessments and "cumulative" analysis limited to the leases closest to the Proposed Action are inadequate to assess impacts. Furthermore, a developer's navigational risk assessment cannot be the primary source of data for assessing impacts, as there exists a clear conflict of interest on the part of the developer or developer's contractors to minimize impacts.<br>Project specific navigational risk assessments are inadequate when the analysis is meant to identify impacts to mobile vessels which operate over large regions covered with multiple wind farm leases. Cumulative and regional assessments are necessary. These assessments must include all aspects of navigation and mariner safety, including marine vessel radar interference analysis and HF radar | BOEM maintains that the GAA and future OSW projects considered in Section 3.16 is a reasonable estimate for purposes of analyzing cumulative impacts from the proposed action. Updates have been made to Section 3.16 of the EIS to incorporate the National Academies of Science, Engineering, and Medicine 2022 study and more discussion on marine vessel radar. Marine vessel radars are not optimized to operate in a WTG environment due to a combination of factors ranging from the slow adoption of solid-state technology to the electromagnetic characteristics of WTGs (National Academies of Sciences, Engineering, and Medicine 2022). USCG also noted in its final Areas Offshore of Massachusetts and Rhode Island Port Access Route Study (USCG 2020) that various factors play a role in potential marine radar interference by offshore wind infrastructure, stating that "the potential for interference with marine radar is site specific and depends on many factors including, but not limited to, turbine size, array layouts, number of turbines, construction material(s), and |

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| | | interference analysis, including impacts to USCG search and rescue capabilities resulting from HF radar loss. We request that BOEM update the DEIS with this information.<br>The DEIS references the USCG's MARIPARS as a primary source of information for its Navigation and Vessel Traffic section. We commented on that study, in both 2019 and 2020, which comments we incorporate by reference here.68 One of the primary issues we discussed in our comments was marine vessel radar interference and requested that the USCG conduct modeling studies and analysis on that subject related to the MA/RI Wind Energy Area, similar to its modeling study that it had conducted for the Cape Wind project. The USCG declined to conduct that modeling, resulting in a recent bipartisan Congressional letter from the US House Transportation and Infrastructure Committee to the USCG, which we have included as part of our comments. The US House Transportation and Infrastructure Committee acknowledged that the USCG has allowed BOEM to drive the offshore wind planning process with regards to maritime safety and ignored concerns about radar interference and search and rescue capabilities. We request that BOEM send an official request to the USCG, as a cooperating agency, to conduct an independent marine vessel radar modeling study using updated turbine parameters expected for the MA/RI Wind Energy Area projects and include the results of that modeling study in an updated Revolution Wind DEIS. We also request that BOEM send an official request to the USCG, as a cooperating agency, to conduct analysis of diminished search and rescue capabilities resulting from both marine vessel radar interference on its own vessels as well as the loss of HF radar due to interference from the cumulative impacts of offshore wind project turbines and include analysis results in an updated Revolution Wind DEIS. It is the USCG which holds the independent and sole responsibility of ensuring US maritime safety, not analysis from the offshore wind developer's navigational risk assessment.<br>We also point out that BOEM has neglected to include the results of the National Academies of Sciences (NAS) 2022 study entitled "Wind Turbine Generator Impacts to Marine Vessel Radar (2022)" as a reference document in the Revolution Wind DEIS, despite the fact that the study was supported by contracts between the National Academy of Sciences and Bureau of Ocean Energy Management under Award Number 140M0119D0001/140M0121F0013.69 BOEM contracted to have the study conducted but now has omitted the study and results from that study in its Revolution Wind DEIS. This is unacceptable and we request that BOEM update and revise its DEIS with this information included and analyzed in the DEIS Alternatives.<br>The NAS study quotes Seafreeze comments submitted to the USCG MARIPARS in its actual analysis on page 15, Figure 1.3. The USCG did not address these impacts in the MARIPARS, however the NAS study validates that they are a concern. In fact, the NAS report opens with "Marine vessel radars are not presently optimized to operate in a WTG environment. Marine WTGs are very large structures, with towers on the order of several hundred meters and blade lengths exceeding 100 meters. Being heavily composed of steel, the nominal WTG structure has a large radar cross section. Furthermore, many hundreds to thousands of WTGs will be constructed throughout the U.S. OCS. The combination of high radar reflectivity and vast number of WTGs leads to many strong reflected signals entering the radar receiver, further complicated by other factors, such as multipath and range ambiguous returns. In addition, blade motion generates aspect-dependent, Doppler-spread interference. These various effects, left unresolved, combine to complicate navigation decision-making. Certainly, there is a need to collect more data, develop physics-based models, identify key failure mechanisms, and devise mitigating strategies to effectively manage the situation."70 This statement alone should necessitate a cumulative impacts modeling analysis for the Revolution Wind DEIS including all current wind leases on the US East Coast, and in particular for a vessel attempting to transit through the MA/RI Wind Energy Area, as BOEM expects vessels to do in a safe manner.<br>There is no factual basis for this expectation. Currently, no proven mitigation methods exist for marine vessel radar interference in the presence of wind turbines. The NAS report states, "WTGs reduce the effectiveness of both magnetron-based and Doppler-based MVR radar…It is noteworthy that there are no published studies of WTG interference on Doppler-based solid state radar used for marine navigation".71 Key findings of the NAS committee included "no standard approach to active radar deployment for operation in a WTG environment is available" and that the USCG recognizes that "how MVR will lose efficacy in a WTG environment, and corresponding impact on navigation performance, requires in-depth testing and evaluation".72 Considering these facts, it is inexplicable that BOEM can conclude that impacts to navigation from the Proposed Action merely range from negligible to moderate, with moderate impacts being temporary.73 These are illogical conclusions; however, BOEM has omitted a key study from the DEIS that it itself paid for. We request that the NSAS study and results be added to the DEIS and conclusions regarding navigation re-analyzed, in addition to the USCG modeling analysis requested above. | the vessel types." BOEM expects the industry to adopt both technological and non- technology-based measures to reduce impacts on marine radar, including greater use of AIS and electronic charting systems, new technologies like LiDAR, employing more watchstanders, and avoiding wind farms altogether. |
| BOEM-2022-0045-0116 | 13 | And I have stated more than once how important the Right Whale is to our culture. There are 340 of those whales in the world, in the world. I am concerned with the boat traffic. How many of these boats are going to be running back-and-forth? Where they're coming from, where are they going to be in the harbor? | Thank you for the comment. Please refer to Table 3.16-3, which states that up to 59 construction vessels could be involved during construction. Operations traffic would be much lower. Please see Figure 3.16-1 for the ports that could be used for wind farm activities. Table 3.16-4 gives the cumulative number of vessels from other offshore wind projects that could be active during |

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| | | | construction and operations. Table 3.16-3 and Table 3.16-4 were updated after the DEIS was published based on updated information provided by the developer. Where these vessels would transit and moor would depend on each project's supply ports.<br>BOEM expects that future offshore wind projects would include similar Environmental Protection Measures to those proposed for this project, which include vessel speed restrictions to minimize vessel strike risk for North Atlantic right whale and other marine mammals. Please refer to Section 3.15 Marine Mammals for details. |
| BOEM-2022-0045-0065 | 14 | The DEIS continues BOEM and USCG's inconsistent presentations of their respective authorities regarding the analysis, and potentially designation, of transit lanes and relevant safety considerations. This topic is well documented in previous RODA letters to both agencies, and the problem was even recently highlighted in a letter from the U.S. Congress Transportation and Infrastructure Committee to USCG.20 In this DEIS, BOEM perpetuates confusion by stating the developer's proposed layout "meets the layout rules set forth in the MARIPARS report Recommendations" (emphasis added).21 This contrasts with USCG's denial of RODA's Information Quality Act appeal of the MARIPARS, which states that "the MARIPARS, like any PARS, is a study intended to make recommendations, and is not a decision in and of itself."22 Moreover, BOEM's reliance on the MARIPARS to conclude there is not incomplete or unavailable information on navigation and vessel traffic that is essential to a reasoned choice among alternatives" directly contradicts the denial letter's assertion that "the [MARIPARS] analysis was neither scientific nor statistical in nature." | The USCG is a cooperating agency on the DEIS and is the leading agency on navigational matters. Therefore, BOEM relies on the USCG's expertise and analyses for purposes of informing the navigational impacts in the EIS. |
| BOEM-2022-0045-0101 | 16 | Recommended Action Items.<br>Develop mitigation measures for the following conditions:<br>• The potential impacts of WTG structural failure to vessel navigation and traffic. | Thank you for your comment. An event of this nature is described in Section 2.2, Table 2.21. In the event of a non-routine or low-probability event, Revolution Wind would consult with local, state, and federal agencies as well as other groups to communicate the hazard according to mitigation measure Nav-8 in Appendix F, Table F-1. |
| BOEM-2022-0045-0086 | 52 | Revolution Wind would like to clarify that NOAA will not supply any physical or virtual Automatic Identification System (AIS) systems. These systems are supplied by the developer, and their deployment is subject to USCG regulation. Furthermore, the USCG does not recommend displaying AIS on all structures at all times, and only requires the capability to do so. | Thank you for the comment. |
| BOEM-2022-0045-0086 | 53 | BOEM has recognized that developer offered mitigation options or BOEM suggested options will mitigate navigation safety concerns. The 1x1 nm spacing is a compromise to facilitate safe navigation agreed upon by many stakeholders, including adjacent projects. CRMC commented on Vineyard Wind's DEIS stating, "CRMC's preferred alternative of an east-west alignment of the wind farm with 1 nm spacing between turbines and all rows between turbines will allow the Rhode Island-based commercial fishing industry of fixed and mobile gear operations to continue to operate (with modifications to gear and methods) within the Vineyard Wind Wind Development Area (WDA) in a manner that the commercial fishing industry can coexist with the offshore wind energy industry". Revolution Wind respectfully objects to the blanket stipulation that commercial fishing vessels irrespective of fishing vessel and gear type, will be unable to safely fish; while for-hire or recreational vessels, using perhaps the same vessels and with perhaps less training and certifications, will be able to successfully fish the same area. | Thank you for the comment. |
| BOEM-2022-0045-0086 | 54 | Revolution Wind would like to respectfully point out that USCG Search and Rescue (SAR) Operations are de-optimized by all structures and land masses; by the nature of the Search and Rescue Optimal Planning System (SAROPS) program, a human SAR Planner must account for items in the water such as rocks, bridges, coastline, piers, shoals, powerlines, etc., as well as natural phenomena such as sun glare, wave angle, and human fatigue. It is well within the USCG's training and capability to adapt search patterns, especially in a windfarm specifically designed with a 1X1 nm spacing with two lines of orientation, as consistent with USCG guidance26. | Thank you for the comment. |
| BOEM-2022-0045-0100 | 179 | Please update Figure 3.16.-1 to reflect that Davisville, RI is also a commercial fishing port. | Thank you for your comment. The map in the navigation section uses the same designations as those used in commercial fisheries and for-hire recreational fishing in Section 3.9. Davisville was not included as a commercial fishing port in that impact analysis because of the low level of fishing activity in the Lease Area and along the RWEC that is associated with this port. |

## Other Marine Uses

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| BOEM-2022-0045-0070 | 4 | Section 3.17.2.12 addresses mitigation measures for other uses (scientific research and surveys) proposed by BOEM and other cooperating agencies. It is important to reiterate that current and future wind projects do not occur separate from one another. Thus, any review or analysis must consider the cumulative effects of all wind projects on species and their habitat. It is therefore the responsibility of BOEM to assess cumulative impacts across multiple wind energy projects regionally, through all phases of the project and through all life history stages of the various species effected. In adhering to federal survey mitigation guidance, cooperation and collaboration with our regional colleges and universities on data collection and assessment would provide additional valuable data and resources. Additionally, providing opportunities for our fishermen and their vessels to take part as data collectors for research and environmental assessments, or at the very least encouraging a robust engagement between the two industries, could result in more comprehensive and instructive data gathering. As is the case with any new industry introduced into an existing environmental and economically diverse area, the true outcome of the new endeavor will not be known for some time after the industry is underway. There is an element in the submittals by the proponent of the wind developer asking BOEM to trust their numbers and their statements as to impact, or lack thereof. We strongly encourage BOEM to take advantage of its authority to actively monitor a project and require the developer to demonstrate that they not having additional negative impact through the life of the project. There must be some follow-up to make sure that the developer's assertions were indeed accurate. We feel that BOEM must require that a developer confirm the impact of the development at some point after the lease area has been fully operational such as 5 years after construction was commenced. We also feel strongly that it should not be the fishermen or government agencies/institutions who pay for any studies or surveys to assess the actual impact of the development. The proponent of a project who made certain assertions to obtain the permit must be the one to conduct whatever research is necessary to prove their assertions to be correct. | Thank you for your comment. Appendix F identifies all specific mitigation proposed for the Project, the anticipated enforcing agency for each proposed measure, and reporting requirements where applicable. Potential compensatory mitigation is specifically considered related to resolving adverse effects on historic properties, compensation for fishing gear loss or damage, and for lost fishing income, as well as adherence to federal survey mitigation guidance (see Appendix F). Over the course of monitoring, Revolution Wind will work with BOEM and other relevant regulatory agencies to determine the need for adjustments to monitoring approaches, consideration of new monitoring technologies, and/or additional periods of monitoring, based on an ongoing assessment of monitoring results. |
| BOEM-2022-0045-0118 | 6 | I had a couple practical comments and then one moving forward in the future. The first two practical ones are to ask that the Corps and BOEM both take into account the Radar Study that was done that says that there may be issues with older radar equipment and interaction with the arrays. | BOEM (2020) conducted a radar impact study for commercial wind development on the mid-Atlantic OCS. This study identified potential issues with older land-based radar and intended mitigation, specifically software upgrades to HF radar to reduce interference effects. The commenter is referred to Section 3.17.2.3.2 (in DEIS Appendix E) for details. |
| BOEM-2022-0045-0100 | 15 | As we have discussed previously, we have significant concerns related to the major impacts offshore wind will have on our NOAA scientific surveys. Regional offshore wind development projects are the primary cause of immediate impacts on NOAA scientific surveys and research due to the presence of structures, as noted in the DEIS. The DEIS states that implementation of the NMFS/BOEM Federal Survey Mitigation Strategy would reduce effects on commercial fisheries and for-hire recreational fishing from a major adverse impact to a long-term moderate adverse impact level. This conclusion is not supported nor is it consistent with the best available analysis conducted by NMFS. The DEIS does not include any discussion nor details on how these major impacts will be mitigated at the project level other than referencing the ongoing BOEM/NMFS survey mitigation efforts, suggesting that the project would comply with mitigation measures set forth in the federal survey mitigation strategy. However, the mitigation strategy is not currently resourced and does not set requirements or standards with which projects must comply. In order to minimize the major adverse impacts expected on scientific surveys, we recommend mitigation measures be required and implemented before development moves forward, consistent with our joint survey mitigation efforts. As stated in the DEIS, we will continue to work with you to ensure these details can be included in the FEIS. | This comment is a repeat and combination of three individual comments provided by the same commenter. Reader is directed to FDMS Submission #BOEM-2022-0045-0100, Comments #180, #181, and #182 for individual responses. |
| BOEM-2022-0045-0100 | 180 | The DEIS states that implementation of the NMFS/BOEM Federal Survey Mitigation Strategy would reduce effects on commercial fisheries and for- hire recreational fishing from a major adverse impact to a long-term moderate adverse impact level. This conclusion is not supported nor is it consistent with the best available analysis conducted by NMFS. Please revise. | While the federal survey mitigation strategy is a collaborative path forward to monitor the effects of offshore wind energy and these effects on fisheries surveys, the strategy is not specifically designed to reduce impacts on commercial fisheries and for-hire recreational fisheries. As monitoring becomes mitigation through ongoing collaboration between BOEM, NMFS, and Revolution Wind, beneficial effects to these fisheries may be realized, along with potential beneficial effects associated with habitat creation. The EIS section 3.9 was revised to clarify that the action alternatives would result in major adverse impacts, primarily as a result of climate change, fisheries management activities, and the presence of offshore structures. But the mitigation strategy, in combination with other proposed mitigation measures, could reduce adverse impacts. |

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| BOEM-2022-0045-0100 | 181 | The DEIS does not include any discussion nor details on how major impacts will be mitigated at the project level other than referencing the ongoing BOEM/NMFS survey mitigation efforts, suggesting that the project would comply with mitigation measures set forth in the federal survey mitigation strategy. However, the mitigation strategy is not currently resourced and does not set requirements or standards for projects to comply. | The federal survey mitigation strategy was the result of collaboration between NMFS and BOEM both of whom will continue to collaborate on survey mitigation strategies. The strategy is a collaborative path forward with goals for mitigation for offshore wind energy impacts through collaborative planning and adaptive implementation. Strategy goals were clarified in the mitigation subsection of the EIS (3.17.2.22), with specific reference to strategy Goal 2, which specifically targets NOAA Fisheries surveys. Objectives and actions provided under Goal 2 were also expanded upon, noting that one of the Goal 2 actions is to evaluate the impact of offshore wind energy through project-specific monitoring plans. |
| BOEM-2022-0045-0100 | 182 | In order to minimize the major adverse impacts expected on scientific surveys, we recommend mitigation measures be required and implemented before development moves forward, consistent with our joint survey mitigation efforts. As stated in the DEIS, we will continue to work with you to ensure these details can be included in the FEIS. | BOEM has funded a study to define the impacts from offshore wind on NMFS fisheries surveys and to design a modeling framework that could then be conducted in a follow-on study to adapt NMFS fishery resource surveys to impacts of offshore wind development. The study has been designed to answer questions related to BOEM wind energy lease areas impacts to fishery resource surveys and the provisioning of scientific advice for management, appropriate methods to employ to evaluate impacts of offshore wind on NEFSC, and fishery resource survey designs and operations. BOEM will continue to collaborate with NMFS to develop effective mitigation measures to meet the needs of all stakeholders. |

## Recreation and Tourism

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| BOEM-2022-0045-0080 | 8 | For example, the DEIS does not properly contemplate the effect of the wind turbine generators (WTGs) on tourism from visual effects other than to dismiss the risk. Under NEPA, BOEM must consider a wide range of effects, specifically including impacts that are "historic, cultural, [and] economic." 7 Tourism revenue and property values are vital to the Town of New Shoreham's and City of Newport's economy. Tourism alone is a $7.1 billion industry in Rhode Island, supporting over 87,800 jobs every year. Spoliation of the Town of New Shoreham's and City of Newport's historic landscape increases the risk of lost tourism revenue and property taxes, which are expected to decrease after Revolution Wind, South Fork, Wind, and Sunrise Wind industrialize the ocean landscape with visual clutter and light. Impacts to our clients' tourism economies would be devastating to the economic health of the area and would put tens of thousands of jobs at risk, creating environmental justice risks.<br>Despite this risk, the DEIS' discussion of tourism blithely dismisses potential impacts to Block Island's and Newport's economies without sufficient discussion or supporting research. BOEM cannot support its conclusion that the overall impact to tourism is "minor," especially when Project impacts at the landscape level are expected to range from "moderate" to "major adverse."8 BOEM must carefully consider the impacts on the Town of New Shoreham and City of Newport's unique character and historic properties that qualify as a "resource" both to the area's economy and under NEPA's definition. Negative impacts on tourism revenues and tax revenues due to the WTGs are expected be significant. BOEM must further analyze and quantify these potential adverse effects as BOEM develops the Final EIS.<br>Footnote 7: 40 C.F.R. § 1508.1(g)(1).<br>Footnote 8: DEIS, ES-10. "Moderate" means that a visual impact would have a substantial impact on the viewer's visual<br>experience. DEIS at 3-5. "Major" means that a visual impact would fundamentally change the character, features,<br>elements, key qualities, and visibility of the existing landscape. Id. | Tables G-40 through G-41 discuss seascape, landscape, and visual impacts to the Newport and New Shoreham areas (see KOPs AI03, BI04, BI12, BI13), while tables G-42 through G-47 discuss these impacts across the other action alternatives in the EIS. The EIS concludes that most turbines would be visible from these areas, resulting in moderate to major impacts to the scenic character within the viewsheds enjoyed by recreation, tourism, and historic resources, properties, and activities. However, the impact to recreation, tourism, historic properties and activities may or may not match the impact levels to the visual resource. Impact to visual and scenic resources is one of numerous factors considered when evaluating impacts to recreation, tourism, and historic resources and properties. As discussed in Section 3.18.1, studies and surveys that have evaluated the impacts of offshore wind facilities on tourism found that established offshore wind facilities in Europe did not result in decreased tourist numbers, tourist experience, or tourist revenue, and that Block Island's WTGs provide excellent sites for fishing and shellfishing (Smythe et al. 2018). Research also suggests that at a distance of 15 miles, few beach visitors (only 6%) would select a different beach based on the presence of offshore wind turbines (Parsons and Firestone 2018). The basis of the Parsons and Firestone 2018 study was a hypothetical project depicted in all photomontages with 100 turbines. Each turbine was 6 MW and was 574 feet high (blade at apex) with a rotor diameter of 492 feet. The project design envelope analyzed for the Revolution Wind Project allows for installing wind turbines that may reach 873 feet to the tip of blade (52 percent taller those studied by Parsons and Firestone) with a rotor diameter of 538 feet (9 percent larger rotor diameter than the Parsons and Firestone study). While it is predictable that the percent of social acceptance or change in choice may shift, the shift would not be proportional to the difference in the size and scale of the wind turbines in the 2018 study and those analyzed in this EIS. A 2019 survey of coastal recreation users in New Hampshire (Ferguson et al. 2020) also found that most users (77%) supported offshore wind development along the New Hampshire coast, 74% anticipated that offshore wind development would have a neutral to beneficial impact on their recreational activities, and 26% anticipated that offshore wind development would have an adverse impact (Ferguson et al. 2020). The EIS acknowledges that while some visitors to south-facing coastal or elevated locations could alter their behavior, this changed behavior is unlikely to meaningfully affect the recreation and tourism industry as a whole. |
| BOEM-2022-0045-0122 | 14 | iv. The DEIS does not address how drastic of a change the RWF would be to Aquinnah as a destination spot. Buses of tourists take the 35-minute journey to Aquinnah for the sole purpose of the Viewshed from the Cliffs and especially at sunset. Destination Weddings are held at the Aquinnah Cliffs area and the Gay Head Lighthouse. The view is the subject of paintings, post cards, and promotion materials for Martha's Vineyard. Once 50 WFGs are erected within 12 miles and another 900 are erected in view of Aquinnah and once the WFGs become the focal point at sunset, tourists are much less likely to make the trip and wedding parties will no longer want a venue where the wedding pictures have WFGs easily seen in the background. According to the DEIS p. 3.18-8, trip loss averaged 8% when the WFGs are 12.5 miles offshore. However, in Aquinnah's case, the Viewshed is almost the sole purpose for the visit and therefore the trip loss will likely be much higher. | Thank you for your comment. Section 3.20 of the EIS discloses potential changes to the viewshed if the proposed action or other action alternatives were to be implemented. Visual impacts associated with the general visual environment for KOP MV07 - Aquinnah Overlook would range from Major to Moderate as a result of the degree of visual change along the ocean horizon considering the potential view value and /or potential sensitivity to visual change. However, the impact to recreation, tourism, historic properties and activities may or may not match the impact levels to the visual resource. Impact to visual and scenic resources is a one factor considered in addition to other factors when evaluating impacts to recreation, tourism, and historic resources and properties. Section 3.3-18 states that visual contrast created by |

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| | | | the WTGs could have a beneficial, adverse, or neutral impact on the quality of the recreation and tourism experience depending on the viewer's orientation, activity, and purpose for visiting the area. While some visitors to south-facing coastal or elevated locations could alter their behavior, research suggests that this changed behavior is unlikely to meaningfully affect the recreation and tourism industry as a whole. Increased visitation by individuals who view the WTGs as positive would offset some lost trips from visitors who consider views of WTGs to be negative (Parsons and Firestone 2018). Studies and surveys that have evaluated the impacts of offshore wind facilities on tourism found that established offshore wind facilities in Europe did not result in decreased tourist numbers, tourist experience, or tourist revenue (Smythe et al. 2018). |
| BOEM-2022-0045-0116 | 16 | I don't -- I have not received the complete picture of the effects on the marine environment, which, in turn, affects the economy of this island that relies so heavily. Not the fishing in and of itself, but also the economic part of it. People come to the island to fish. People come here for tourism. And I'm not so sure that's what they want to see, especially at sunset, because they will be backlit. | Thank you for your comment. Section 3.20 of the DEIS discloses potential changes to the viewshed if the proposed action or other action alternatives were to be implemented. Section 3.3-18 also states that visual contrast created by the WTGs could have a beneficial, adverse, or neutral impact on the quality of the recreation and tourism experience depending on the viewer's orientation, activity, and purpose for visiting the area. As discussed in Section 3.18.1, research suggests that at a distance of 15 miles, few beach visitors (only 6%) would select a different beach based on the presence of offshore wind turbines. An estimated 55 WTGs would fall within this distance, based on the proposed Project array. Considering these factors, BOEM expects the impact of visible WTGs on the use and enjoyment of recreation and tourist facilities and activities during O&M of the Proposed Action Alternative to be long term and minor adverse. While some visitors to south-facing coastal or elevated locations could alter their behavior, this changed behavior is unlikely to meaningfully affect the recreation and tourism industry as a whole. Additionally, increased beach visitation by individuals who view the WTGs as positive would offset some lost trips from visitors who consider views of WTGs to be negative (Parsons and Firestone 2018). Revolution Wind has also committed to implement ADLS (as described in Appendix F) as a measure to reduce the duration of lighting impacts. |
| BOEM-2022-0045-0086 | 36 | The DEIS also states in Section 3.12.1.1, Page 3.12-14 that "Visual impacts on recreation and tourism would be short term during construction and long term during O&M, with negligible to moderate adverse impacts, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed." Revolution Wind respectfully requests additional detail or reference support for the statement "responses by recreationists and visitors." | Thank you for your comment. As stated in Section 3.18, "Visual impacts from the presence of vertical structures on the offshore horizon would create a visual contrast contrary to the horizontal plane of the ocean's water surface and the line at the visual horizon that separates the ocean from sky." However, studies and surveys that have evaluated the impacts of offshore wind facilities on tourism found that established offshore wind facilities in Europe did not result in decreased tourist numbers, tourist experience, or tourist revenue, and that Block Island's WTGs provide excellent sites for fishing and shellfishing (Smythe et al. 2018). The proximity of WTGs to shore may be correlated to recreational experience. As noted in Parsons and Firestone (2018), different changes to beach experience occurred based on distance to visible WTGs. Reported trip loss (respondents who stated that they would visit a different beach without offshore wind) averaged 8% when wind projects were 12.5 miles (20 km) offshore, 6% when 15 miles (24.1 km) offshore, and 5% when 20 miles (32 km) offshore. Conversely, approximately 2.6% of respondents were more likely to visit a beach with visible offshore wind facilities at any distance. A 2019 survey of coastal recreation users in New Hampshire (Ferguson et al. 2020) also found that most users (77%) supported offshore wind development |

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| | | | along the New Hampshire coast, 74% anticipated that offshore wind development would have a neutral to beneficial impact on their recreational activities, and 26% anticipated that offshore wind development would have an adverse impact (Ferguson et al. 2020). " |
| BOEM-2022-0045-0100 | 183 | An analysis of private recreational angler exposure should be included based on methodologies of Kirkpatrick et al. 2017 with updated data that is publicly available through MRIP. See section 3.1.4.2 and 3.1.4.2 for methodologies. https://espis.boem.gov/final%20reports/5580.pdf | Information regarding public fishing sites that are located in proximity to project infrastructure that could be temporarily disrupted during construction and potentially impact subsistence anglers has been added to EJ Section 3.12.2.3.1 of the FEIS. |
| BOEM-2022-0045-0100 | 184 | Please use the Community Social Vulnerability Indicators (CSVIs) Recreational Indicators to identify the communities that are engaged in and reliant on recreational fishing. | Table 3.12-1 of the EIS presents environmental justice indices provided by NMFS (2020) that describe the social vulnerability of coastal communities engaged in fishing activities in terms of existing local social conditions that are likely to determine how potentially disruptive events affect communities. The environmental justice indices in Table 3.12-1 were expanded to include three additional indices. |
| BOEM-2022-0045-0100 | 185 | It's difficult to assess the full impacts of recreational fishing by separating private angling into tourism and considering for-hire separate. These are overlapping sectors in the economy. Recreational fishing should provide the same environment description and analysis as commercial and for-hire fishing. This section should include more detail regarding trips, species by trips, effort estimates in the region (see MRIP datasets: Access Point Angler Intercept Survey and Fishing Effort survey. https://www.fisheries.noaa.gov/recreational-fishing-data/types-recreational-fishing-surveys). Data is available for the mode of fishing (shore, head boat, charter, private boat/rental boat), time of year, # of trips, catch, geographic location (i.e., open ocean, >3 miles). Note where the data is limited for private angling. | Information regarding public fishing sites that are located in proximity to project infrastructure that could be temporarily disrupted during construction and potentially impact subsistence anglers has been added to EJ Section 3.12 of the FEIS. |

## Sea Turtles

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| BOEM-2022-0045-0110 | 43 | Specific concerns with Description of Affected Environment and Table 3.19-1:<br>Sea Turtle Species Occurrence: Loggerhead, leatherback, Kemp's ridley, and green turtles are all expected to occur in the Project Area. Occurrence designations are based on the Kenney and Vigness-Raposa (2010) study mentioned earlier, with similar questions here as to the data compiled to come up with the designations for the Project Area (e.g., a need to use combination of historic and recent data sources to calculate total observations in the Project Area). In addition, BOEM's designation of the green turtle as "unlikely/uncommon" is misleading.149 Although they are not abundant in this region, southern New England is a regular part of their range.150 Recent surveys have detected green turtles in the New York Bight and the Rhode Island-Massachusetts WEAs.151 NYSERDA surveys used to detect sea turtles were conducted at high altitudes (1000 ft), making it difficult to both detect sea turtles as well as identify to the species level.152 Additional data sources and resources missing from the data include Project-specific geophysical surveys, additional Northeast Large Pelagic Survey Collaborative (NLPSC) survey data (referred to some survey reports within text but not tables),153 AMAPPS surveys,154 and New York Bight surveys.155 BOEM lists the seasonal occurrence for all turtle species as May to November but also needs to mention that they can occur outside these months as well. | Additional and more recent surveys have been reviewed and incorporated as applicable. |
| BOEM-2022-0045-0110 | 44 | Specific concerns with Description of Affected Environment and Table 3.19-1:<br>Abundance Estimates for Sea Turtles: The Navy study referenced for sea turtle density estimates is out of date and does not include all species or cover all seasons.156 New sea turtle density models are to be released imminently; these data should be used to update estimates for the Project Area. | Sea turtle density estimates were revised consistent with updated information presented in the NMFS Section 7 consultation. |
| BOEM-2022-0045-0110 | 47 | For sea turtles, BOEM has determined through its impact analysis that impacts will be "negligible to minor adverse; minor beneficial".161 BOEM's determination is based on the potential for the presence of offshore wind structures to be beneficial to individual sea turtles due to the creation of artificial reefs, additional foraging habitat, shelter from predation and strong currents. We urge BOEM to carefully consider how these changes are counterbalanced by adverse impacts from pile-driving noise and increased vessel traffic. | Comment noted. BOEM has reviewed the impact determination and has maintained the conclusion of negligible to minor adverse; minor beneficial as it accurately represents the range of potential impacts in accordance with Table 3.32. Definitions of Potential Adverse Impact Levels . |
| BOEM-2022-0045-0086 | 87 | Page 3.19-9, Section 3.19.1.1: The statement: "As described in Section 3.19.1, sea turtle populations likely to be impacted by the Project are..." is within future offshore wind activity without the Proposed Action but the phrasing refers to Project-related impacts. The sentence should be re-written to address offshore wind activity without the Proposed Action. | Comment noted. Language has been revised to refer to future off-shore wind activities. |
| BOEM-2022-0045-0100 | 186 | Global comment: This section notes that "GAAs are not used as a basis for analyzing the direct and indirect effects of the Proposed Action, which represent a subset of these broader effects and expressed over a smaller area. These impacts are analyzed specific to each IPF." This language is also used in other sections of the document, but in general, the intent and relevance of this statement are unclear as written, and it should be revised. Please see additional comments on GAAs and scale of impacts in the attached letter. | Language regarding the sea turtle GAA was revised to clarify that the intent of the GAAs used in this EIS is to define a reasonable boundary for assessing the potential effects, including cumulative effects, resulting from the IPF with the maximum area of impact from the development of an offshore wind energy industry on the mid-Atlantic OCS. |
| BOEM-2022-0045-0100 | 187 | Global comment: The Gulf of Mexico is listed as a potential port and thus at least a portion of the Gulf and connecting waters are part of the Affected Environment; however, the DEIS does not consider hawksbill sea turtles or ESA-listed species that occur in the Gulf of Mexico. This issue should be rectified in coordination with the BA prepared for the ESA section 7 consultation. Revisions may be needed to other chapters in addition to sea turtles if activities are planned in the Gulf of Mexico. | The Section 7 consultation has been revised to incorporate vessel trips to distant ports, including ports in the Gulf of Mexico. Construction vessel trips to the Gulf of Mexico would cross habitats used by hawksbill sea turtle. However, the need for these vessel trips is not certain and no specific ports have been identified. Based on the small number of potential vessel trips each year (16-17), this potential activity would not measurably change cumulative effects on this species. The EIS analysis was updated accordingly. |
| BOEM-2022-0045-0100 | 188 | Global Comment: As the DEIS is revised, to ensure consistency between documents please refer to the recent comments we have submitted to BOEM on the BA prepared for the ESA section 7 consultation. | The Final EIS has been reviewed to ensure consistency with the updated BA in response to comments, where applicable and necessary. |
| BOEM-2022-0045-0100 | 189 | Global comment: The sea turtle density estimates do not match those in the South Fork Biological Opinion which seems to be based on the same data sources. In general they are lower than those presented in the South Fork BiOp. For example, Kemp's and greens are 0.009 in the SF BiOp and 0.0001 in the RevWind BA, though they both refer to the SERDP data for these densities. Loggerheads and leatherbacks look the same in the summer and fall, but have different densities in winter and spring (again from SERDP). This issue should be rectified in coordination with the BA prepared for the ESA section 7 consultation. | Sea turtle density estimates have been revised consistent with updated information presented in the NMFS Section 7 consultation. |

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| BOEM-2022-0045-0100 | 190 | Global comment: The section is missing IPFs and subsequent analysis that should be considered for sea turtles (i.e. habitat disturbance, cable laying, pollutants/discharges, lighting, EMF, surveys/monitoring). The ESA Info Needs document and prior EISs should be consulted for guidance on the appropriate IPFs to be analyzed. | IPFs having negligible and minor effects are discussed in EIS Appendix E. |
| BOEM-2022-0045-0100 | 191 | The use of other environmental review documents (e.g. BOEM 2021a, Denes 2021) to describe project activities and justify impacts for other projects is not appropriate. This section uses other EISs and other associated documents prepared specifically for other projects as evidence that species will not be affected without any context or rationale. Citations should be reviewed throughout this section to ensure that they provide information that supports the conclusion being made. The rationale/analysis should be carried out in this document, citing primary literature as needed. | Primary references have been reevaluated for proper incorporation by reference, with additional supporting rationale and context being added as appropriate. However, information in certain references (e.g., reference values for underwater noise generated by construction vessels presented in Denes et al. 2021) are not project-specific and are directly applicable. |
| BOEM-2022-0045-0100 | 192 | UXOs are missing from the Noise IPF; this should be added to the FEIS. | UXO information has been incorporated. |
| BOEM-2022-0045-0100 | 193 | Sea turtles nest in areas where potential cable routes come ashore and some onshore activities related to cable laying could have impacts that may affect the marine environment/habitat. Consider revising this section which currently states no impacts from onshore activities will occur. | There is no suitable sea turtle nesting habitat in the RWEC corridor in general or the sea-to-shore transition site in particular. We have considered potential impacts from onshore construction and have determined that no measurable effects on marine or shoreline habitats would occur. |
| BOEM-2022-0045-0100 | 194 | Mitigation and monitoring measures are only briefly referenced with no analysis of their effectiveness. Additionally, measures that are mentioned are very sparse (only a few measures listed in Appendix F with little to no specific details) and there is not adequate information provided to understand what the measures would include. Given the reliance on mitigation measures as part of the analysis, the lack of details regarding the actual measures, how they will be implemented, and their effectiveness is problematic and does not allow for a complete analysis. This should be addressed in the FEIS. | The analysis incorporates environmental protection measures (EPMs) detailed in Appendix F, Table F-1 as part of the proposed project. Additional mitigation measures that could be required by BOEM or by cooperating agencies under other statutes are detailed in Appendix F, Table F-2 and Table F-3. The latter details specific criteria required to ensure the effectiveness of proposed EPMs. Mitigation measures have been updated to reflect new information and recommendations received subsequent to publication of the DEIS. |
| BOEM-2022-0045-0100 | 195 | Global comment: Analyses overall are brief; the lack of detail on relevant project information limits the ability for a reader to understand the relevant project activities and impacts associated with them. Additionally, the impact definitions used in the analysis make it difficult to understand what the actual impact on the species/taxa will be. It is unclear how BOEM determines that impacts will affect the viability of sea turtle populations given the ESA status of some species. | Thank you for your comment. Table 3.3-2. Definitions of Potential Adverse Impact Levels discusses the biological criteria for the sea turtle analyses. Individual impacts are discussed as appropriate and observe all species (population or individual) as a whole. Sea turtles are generally solitary animals. The Endangered Species Act of 1973 (ESA, 16 U.S.C. §§ 1531 et seq.), as amended, establishes a national policy designed to protect and conserve threatened and endangered species and the ecosystems upon which they depend. Section 7(a) (2) of the ESA requires each Federal agency to ensure that any action that they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the adverse modification of designated critical habitat. With respect to the sea turtle species, BOEM consults with respected service agencies (e.g., FWS and NMFS) on the applicable proposed future actions. |
| BOEM-2022-0045-0100 | 196 | Please add citations for all the thresholds listed in table 3.19-3. Additionally, clarify in the FEIS the ranges of the various threshold distances and any considerations for those distance ranges. | Citations and clarification of ranges has been added. |
| BOEM-2022-0045-0100 | 197 | The characterization of nighttime pile driving is not consistent with the BA prepared for ESA section 7 consultation. Nighttime pile driving is being proposed by the developer. This is a critical omission and the effectiveness of mitigation measures at night needs to be carefully considered. | This comment has been addressed to be consistent with the BA. |
| BOEM-2022-0045-0100 | 198 | The text states that "individuals could become habituated to repeated exposures over time and ignore a stimulus that was not accompanied by an overt threat (Hazel et al. 2007)," this suggests that sea turtles may not move away from elevated noise levels (as assumed above) and thus be at risk of exposure to injurious levels of noise. Suggest revising the text for clarity about habituation. | Comment noted. The text was revised to be consistent with the analysis in the BA that more appropriately covers potential displacement due to noise, rather than speculation about habituation to pile driving noise. |
| BOEM-2022-0045-0100 | 199 | Columns in Table 3.19-4 are split for UXO detonations for PTS, please clarify in the table what the two fields are. | Comment noted. Table 3.19-4 fields are clarified. |
| BOEM-2022-0045-0100 | 200 | The consideration of the effects of the presence of structures on oceanographic conditions is improved from the pDEIS but only considers impacts to productivity/stratification. A wind farm/regional analysis is also needed. This section should consider the range of other potential oceanographic impacts, how prey aggregate, how different sea turtles forage, and how the presence of structures | The hydrodynamic modeling analysis (Johnson et al. 2021) supporting the description of oceanographic impacts presented in the DEIS considers full regional buildout of the RI/MA and MA WEAs. BOEM evaluated and |

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| | | may/may not impact their ability to forage efficiently, both in the pelagic zone and near the seafloor. It should also be noted that presently there is no way to mitigate potential oceanographic/atmospheric impacts. Thus this section should thoroughly explain both project oceanographic and atmospheric impacts and subsequent ecosystem impacts. | incorporate the recommended analysis components, as appropriate, based on what can be supported by available science. Text was revised to clarify detail about potential downfield effects of wind farms on oceanographic conditions. |
| BOEM-2022-0045-0100 | 201 | Based on the information presented, we do not agree with the determination that the potential for vessel strikes on sea turtles is negligible adverse. Project vessel traffic will overlap with sea turtles and it is unclear how mitigation measures will reduce the impact to negligible. | Thank you for your comment. BOEM evaluated this impact determination and has revised the finding to minor, consistent with your recommendation |

## Visual Resources

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| BOEM-2022-0045-0109 | 1 | I am a firm believer in renewable energy, but I am extremely concerned about the impact the wind farm will have on the future of Rhode Island. The digital images seemed designed to obscure the impact of the farm and to mislead the residents. This fraudulent misrepresentation makes the entire enterprise suspect. Rhode Island depends on the vitality of its coastal shoreline. The proximity of the windmills to the shoreline and the visibility of the windmills from almost every vantage point will forever mar this asset. Why not build the farm farther offshore, where the impact will be less? The short comment period, the few and rushed town meetings, and the misleading digital representation all suggest that residents should be suspicious that the impact of this farm has not been properly communicated. I firmly oppose this plan as currently proposed and strongly suggest that the residents in coastal towns have more time to judiciously consider the impact and that the companies involved provide more transparent and accurate renditions of the visual, economic, and environmental impact. The shortsighted and rushed nature of this venture could negatively impact Rhode Island for generations | Photorealistic visual simulations have been developed for the project from predetermined viewing locations (Key Observation Points) and are based on current industry practices and technologies. Additional visual simulations with higher resolution can be found on the BOEM website at the following link under the Visual Simulations tab: https://www.boem.gov/renewable-energy/state-activities/revolution-wind |
| BOEM-2022-0045-0046 | 1 | I am an Aquinnah resident and while I am 1) a proponent of wind energy and 2) am a marine conservationist (former NOAA employee) by profession, I am VERY concerned about the visual impacts of our entire view shed which very important to the culture and economy of this small town. | Thank you for your comment. Cultural and viewshed impacts to the Town of Aquinnah were evaluated in Sections 3.10 and 3.20 of the EIS, respectively. The Town of Aquinnah is also a consulting party on this Project under Section 106 of the National Historic Preservation Act, as described in Appendix K. |
| BOEM-2022-0045-0099 | 2 | The appearance of over 100 WGTs just 12 miles south-southwest of or vantage point would significantly alter that experience not only for our many visitors but our residents that regularly “go up to the Head” to catch a beautiful sunset yearround. We can only imagine what the total cumulative impact the 100 plus Revolution Wind and Southfork Wind turbines will have being so close to our shores. We had a preview of what to expect in the visual simulation from Cuttyhunk Island that was presented in the project overview, and it was alarming. The Gay Head Light and Cliffs are even closer and a good 75-100 feet higher in elevation. We would like to see a simulation from that vantage point, atop the lighthouse and the overlook represented most especially at sunset when the turbines will be backlit and silhouetted. This is one of the few places on the East Coast from which you can view spectacular sunsets over the Atlantic Ocean, waiting to see the “ green flash” on the horizon as the sun disappears. That experience will be greatly compromised and obscured by the interceding structures. | Due to the proximity of Gay Head Lighthouse (KOP MV09) to Aquinnah Overlook (KOP MV07); sunset and nighttime impacts at Gay Head Lighthouse (KOP MV09) are anticipated to be similar to impacts at Aquinnah Overlook (KOP MV07) which are anticipated to be Major for both sunset and nighttime scenarios due to the elevated viewing position and field of view across the horizon. During the site visit to complete daytime photography, it was clarified that the lighthouse platform is not open during sunset hours. The Gay Head Lighthouse website currently posts 10 am to 4 pm for the 2022 season. |
| BOEM-2022-0045-0122 | 2 | A. Photo Simulations<br>The most valuable exhibits to laymen for understanding the visual impact of the proposed project are photo simulations.<br>1. The BOEM photo simulations are hypothetical projects and are not simulations of the proposed project. BOEM explains this and provides the parameters that went into the simulations. However, without photo simulations of the actual proposed project the public is forced to use the hypothetical projects thus giving a misleading view of the RWF:<br>a. The height of the proposed WFGs is different than the WFGs used in the hypothetical WFGs. 5<br>Footnote 5: BOEM’s Visualization Study for the Massachusetts and Rhode Island Wind Energy Areas states that the visual simulations online modeled turbines are 510-575 feet tall rather than the 875 feet tall proposed RWF turbines. The Visual Resources section of Appendix C, Incomplete or Unavailable Information, states that “There is no incomplete or unavailable information related to the analysis of impacts on visual resources.” C-12. Not providing visual simulations using the WFGs at 875 feet rather than the 510-575 feet and not including the flashing amber USCG lights makes the visual analysis incomplete and is misleading for the public even with the disclaimers. | The project design envelope was analyzed as a worst case scenario and photorealistic simulations were developed based on the maximum turbine height of 886 feet. Additional visual simulations with higher resolution can be found on the BOEM website at the following link under the Visual Simulations tab: https://www.boem.gov/renewable-energy/state-activities/revolution-wind |
| BOEM-2022-0045-0122 | 3 | b. The nighttime photo simulation does not identify whether the red lights are flashing or fixed, and whether they are the aircraft warning lights or the nacelle red lights. | The project Construction and Operations Plan (COP) describes warning light types as defined and required under USCG and FAA regulations. Figures illustrating the location and type of lighting to be used in the RWF (Figure 2.1-4 Wind Turbine Generator Lighting Scheme and Figure 2.1-6 Offshore Substation Lighting Scheme) have been included in Chapter 2 of the EIS. |
| BOEM-2022-0045-0122 | 4 | c. The nighttime photo simulation does not appear to include the flashing amber USCG lights, which according to the DEIS will have the most adverse impact the Viewshed. Section 3.1.5 of the Cumulative Historic Resources Visual Effects Analysis – Revolution Wind Farm and Revolution Wind Export Cable Project, pages 47-48, emphasizes that the greatest visual impact would be caused by the flashing amber USCG warnings lights around the WTG foundations and that the “mass” number of amber lights would diminish the sense of openness. Nighttime Lighting. 3.1.5.1. At the October 4, 2022 Public Hearing, BOEM representatives seem to confirm that the simulated photos do not show the flashing amber USCG lights that the DEIS states will have the greatest visual impact on Aquinnah. Similarly, | The project Construction and Operations Plan (COP) describes warning light types as defined and required under USCG and FAA regulations. Additionally, Figures illustrating the location and type of lighting to be used in the RWF (Figure 2.1-4 Wind Turbine Generator Lighting Scheme and Figure 2.1-6 Offshore Substation Lighting Scheme) have been included in Chapter 2 of the EIS. |

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| | | these flashing amber lights are not shown in any video simulation for Aquinnah on the BOEM Visualization Study For the Massachusetts and Rhode Island Wind Energy Areas. Omitting the lights that will have the greatest impact on Aquinnah does not provide a fair and accurate analysis of the environmental impact of the RWF. This misleads anyone viewing these simulation photos and misrepresents the adverse effect on Aquinnah. If the amber lights are included, please explain where and how they can be seen. | Multiple factors can contribute to navigation lights being less visible in simulations. The primary reason that navigation lights would not be visible in a visual simulation is due to the relatively low placement of navigation lights (approximately 75 feet above mean sea level on OSS and 70 feet on WTGs) compared to FAA lighting (approximately 262 feet above mean sea level on OSS and up to 535 feet on WTGs) and the screening effect of curvature of the earth which effectively eliminates visibility of the navigation lights from many KOPs. Each of the photo simulations presented in the COP includes a graphic detailing the theoretical visibility of the deck (navigation lights), mid-tower (FAA lights), and nacelle (FAA lights). Additionally, navigation lights are significantly more diffuse and dimmer than FAA lighting.<br><br>Visual simulations with higher resolution can be found on the BOEM website at the following link under the Visual Simulations tab: https://www.boem.gov/renewable-energy/state-activities/revolution-wind.<br><br>It is recommended that viewers use a darkened room when viewing nighttime simulations. |
| BOEM-2022-0045-0046 | 5 | Our town will be the most negatively impacted from this wind farm from the standpoint of view. This is closer to us than any other community and we are not even receiving energy benefits from this development. I feel that minimizing the impacts on our view should be prioritized. | Thank you for your comment. BOEM has considered and evaluated alternatives to minimize impacts to the Town of Aquinnah and adjacent areas on Martha's Vineyard. BOEM continues to consult under Section 106 of the NHPA to evaluate impacts and develop mitigation measures to minimize or offset potential impacts. More information on the Section 106 consultation as it relates to the identification of action alternatives for consideration in the EIS can be found in Appendix K. |
| BOEM-2022-0045-0099 | 5 | We also need to have an accurate visual simulation of the views at sunset to present to the townspeople in order further fully assess the impact to our community that this project along with other proposed wind farms. These offshore endeavors will certainly have a direct adverse effect on our lives. | Due to the proximity of Gay Head Lighthouse (KOP MV09) to Aquinnah Overlook (KOP MV07); sunset and nighttime impacts at Gay Head Lighthouse (KOP MV09) are anticipated to be similar to impacts at Aquinnah Overlook (KOP MV07) which are anticipated to be Major for both sunset and nighttime scenarios due to the elevated viewing position and field of view across the horizon. During the site visit to complete daytime photography, it was clarified that the lighthouse platform is not open during sunset hours. The Gay Head Lighthouse website currently posts 10 am to 4 pm for the 2022 season. |
| BOEM-2022-0045-0116 | 5 | And my third question, when I was looking back there, it says potential that we will not see any towers from our cliffs. I didn't like the word "potential". | Thank you for the comment. |
| BOEM-2022-0045-0122 | 5 | d. The OSSs do not appear to be shown in some simulation photos. Based on the DEIS and talking to BOEM representatives the two OSSs may produce a significant amount of light and therefore need to be included to provide an accurate representation.<br>i. At the October 4, 2022, Public Hearing, when questioned about the amount of people on board the two OSSs, BOEM personnel stated that the OSS would be unmanned. If correct, what lighting would be required for the OSSs and what lighting would be allowed? | BOEM has reviewed nighttime simulations where the OSSs would be visible and has determined that the OSSs have been simulated appropriately based on lighting diagrams. The project Construction and Operations Plan (COP) describes warning light types as required under USCG and FAA regulations.<br><br>Multiple factors can contribute to navigation lights being less visible in simulations. The primary reason that navigation lights would not be visible in a visual simulation is due to the relatively low placement of navigation lights (approximately 75 feet above mean sea level on OSS and 70 feet on WTGs) compared to FAA lighting (approximately 262 feet above mean sea level on OSS and up to 535 feet on WTGs) and the screening effect of curvature of the earth which effectively eliminates visibility of the navigation lights from many |

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| | | | KOPs. Each of the photo simulations presented in the COP includes a graphic detailing the theoretical visibility of the deck (navigation lights), mid-tower (FAA lights), and nacelle (FAA lights). Additionally, navigation lights are significantly more diffuse and dimmer than FAA lighting.<br><br>Figures illustrating the location and type of lighting to be used in the RWF (Figure 2.1-4 Wind Turbine Generator Lighting Scheme and Figure 2.1-6 Offshore Substation Lighting Scheme) have been included in Chapter 2 of the EIS. Additional visual simulations with higher resolution can be found on the BOEM website at the following link under the Visual Simulations tab: https://www.boem.gov/renewable-energy/state-activities/revolution-wind<br><br>It is recommended that viewers use a darkened room when viewing nighttime simulations. |
| BOEM-2022-0045-0123 | 5 | Nighttime Light Impacts<br>Ideally, no nighttime construction would be allowed to reduce what are likely to be very large visual nighttime impacts should multiple projects be under construction at the same time. Understanding this is highly unlikely, as wind speed dictates acceptably safe construction periods and these periods often occur at night. Daytime only construction would significantly delay project construction. We ask BOEM to analyze the cumulative nighttime construction lighting impacts, including the duration of such impacts in days or months and the likely seasons of construction, and identify possible measures to reduce this impact. Information gathered at the Site Assessment Plan (SAP) stage on wind speeds and wave size at various times of the day and night would be useful in this determination. | BOEM has evaluated construction nighttime lighting to visual resources in the EIS. See Sections 3.11.2.2, 3.18.2.2, and Section 3.20 Table 3.20-1 of the EIS. The Proposed Action would require nighttime lighting for construction vessels traveling and working within the Lease Area, as well as the addition of warning lighting systems at each WTG and OSS during an 8-month construction period. This lighting would be short-term and localized to only the areas actively being constructed and associated vessel traffic to and from the site. There is not expected to be multiple offshore wind projects in the vicinity under construction at the same time. |
| BOEM-2022-0045-0122 | 7 | 2. This mass of flashing amber lights also do not appear to be shown in the simulations prepared by RWF. App_U3 Visual Impact Assessment (“RWF VIA”) provides simulation photos of views of the ocean at night from Aquinnah both before and after installation of the WTGs. See Appendix C: Sheet 101 of 153 et al. (Page 330 of 575). The photos accurately show that there are no lights currently viewed from Aquinnah and the natural Viewshed still exists after thousands of years. The RWF VIA states on page 53 that due to the effects of the curvature of the earth and refraction, the USCG navigation warning lights were only considered in views that had a direct line of sight to the deck at the WTG base. Despite that 50 WTGs are within 12 miles of Aquinnah the RWF simulation photos do not seem to show the mass of amber flashing lights that Section 3.1.5 states will create the greatest adverse effects. | The project Construction and Operations Plan (COP) describes warning light types as required under USCG and FAA regulations. Figures illustrating the location and type of lighting to be used in the RWF (Figure 2.1-4 Wind Turbine Generator Lighting Scheme and Figure 2.1-6 Offshore Substation Lighting Scheme) have been included in Chapter 2 of the EIS.<br><br>Multiple factors can contribute to navigation lights being less visible in simulations. The primary reason that navigation lights would not be visible in a visual simulation is due to the relatively low placement of navigation lights (approximately 75 feet above mean sea level on OSS and 70 feet on WTGs) compared to FAA lighting (approximately 262 feet above mean sea level on OSS and up to 535 feet on WTGs) and the screening effect of curvature of the earth which effectively eliminates visibility of the navigation lights from many KOPs. Each of the photo simulations presented in the COP includes a graphic detailing the theoretical visibility of the deck (navigation lights), mid-tower (FAA lights), and nacelle (FAA lights). Additionally, navigation lights are significantly more diffuse and dimmer than FAA lighting.<br><br>Additional visual simulations with higher resolution can be found on the BOEM website at the following link under the Visual Simulations tab: https://www.boem.gov/renewable-energy/state-activities/revolution-wind<br><br>It is recommended that viewers use a darkened room when viewing nighttime simulations and make sure the video is being displayed at HD or UHD resolution which is a selectable option in the video player. |

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| BOEM-2022-0045-0122 | 8 | 3. The simulated sunset provided with Appendix K in Figure K-13 does not provide the bearing, the date of the photo simulation, or other data provided for BOEM's other simulated photos. BOEM personnel stated that the simulated sunset was for December, but it would be helpful to include the information provided on or with the photo simulation as with the other BOEM simulations. Additionally, photo simulations for different seasons would be helpful. | Additional visual simulations with higher resolution and additional information can be found on the BOEM website at the following link under the Visual Simulations tab: https://www.boem.gov/renewable-energy/state-activities/revolution-wind |
| BOEM-2022-0045-0122 | 9 | B. Effect of Alternative E.<br>Table G-46, Visual Impact Assessment Impacts Matrix – Alternative E (Viewshed Alternative), states that the Alternatives would only increase the distance to the RWF by less than one mile, not enough to mitigate the complete change in the character and environment of Aquinnah caused by the RWF and associated lighting. However, based on the 1 nm distance between WTGs, and the scale on the layout options, it appears that removing the WFGs as suggested by the Alternatives would increase the distance from Aquinnah greater than the mile stated in the comparison charts. Can you verify the distance the RWF would be from Aquinnah based on the Alternative E changes and the bearings to the WFGs? | Based on GIS calculations, WTGs that would remain to the far left of the field of view as part of Alternatives E1 and E2 would be the closest to Martha's Vineyard as calculated and are reflected as such in Table G-46. Views to the central and right field of view would have decreased visibility of WTGs associated with Alternative E1 vs E2, Alternative E2 is associated with turbine removal and distancing from KOPs in geographic relationship to that alternative. Additional EIS text has been added associated with Alternatives E1 and E2 to further describe the relationship of the removed turbines to KOPs MV07 and RI08 as an example noting that Table G-46 provides a worst-case scenario. |
| BOEM-2022-0045-0122 | 10 | C. Potentially Misleading Generalizations.<br>a. The RWF Visual Impact Assessment either is confusing or misleading when it addresses the view from Aquinnah based on this proximity.<br>i. Page 12 of The RWF Visual Impact Assessment states, in part:<br>1. . . . . It is important to note that all Foreground-Middle Ground and Background views of the proposed Project would only be available to those traveling on the open ocean in commercial vessels, passenger boats, or pleasure craft. Consistent with BLM guidance, distance zones for this VIA are described as follows:<br>Background: 5 to 15 Miles . . . .<br>ii. This statement implies that the RWF WTGs will not be within 15 miles of Aquinnah and will not be viewed from Aquinnah as "Background." This is not accurate because, according to BOEM, approximately 50 of RWF's WTGs are within 12 nm of Aquinnah and thus within the 5 to 15 miles defined as being in the Background. This also does not account for the elevation of the Cliffs at Aquinnah, the prominent destination from which the WTGs will be viewed. Thus, the RWF Visual Impact Assessment does not seem to accurately describe the view of the WTGs from Aquinnah, and therefore the adverse effect. | Thank you for your comment and BOEM agrees with your observation. The lessee's Construction and Operations Plan, Visual Impact Assessment will be revised accordingly. |
| BOEM-2022-0045-0123 | 10 | BOEM discloses that the visual impacts would have a major cumulative impact. For instance, in the DEIS in Table G-48 (Pg. G-193) it appears that 2 out of 3 Key Observation Points (KOPs) that were taken at night would have a major cumulative impact. Table E4-1 (DEIS, pg. E4-3) shows that at maximum case scenario for cumulative impacts including the proposed action would result in over 1,000 WTGs that would impact visual resources and recreation-tourism. This is stated in an appendix and nowhere in the body of the DEIS or in the appendices is there discussion of how to reduce those adverse impacts on cultural (including NHLs), recreational and visual resources. The developer's proposals for minimizing or mitigating impacts appears to be in the COP - Appendix BB, which we don't have access to. NPS asks BOEM to include a discussion of how to avoid, minimize and mitigate adverse impacts in the DEIS. Further, the determination of appropriate mitigation measures can not be finalized until the identification of and effects to all historic properties has been completed, which as we've noted elsewhere in this letter, BOEM has said won't be completed until after the ROD, and before construction. | The comment appears to conflate the analysis of historic/cultural resources with non-historic/non-cultural resources. The EIS addresses potential visual impacts to historic/cultural resources in Section 3.10 Cultural Resources Viewshed Resources. Potential visual impacts to all other non-historic and non-cultural resources are addressed in Section 3.20 Visual Resources. Appendix G Tables G-40 through G-53 are an extension of the Section 3.20 Visual Resources analysis and address non-historic and non-cultural resources impacts. Each EIS resource section includes a Mitigation subsection discussing proposed mitigation measures.<br><br>See Section 3.20 Visual Resources, Table 3.20-1 for information on nighttime construction lighting impacts to non-historic and non-cultural visual resources. Refer to Section 3.18 Recreation and Tourism for discussion of impacts which were determined to be minor.<br>Revolution Wind–committed measures, also known as Environmental Protection Measures (EPMs), are identified in COP Appendix BB (Cultural Resources Avoidance, Minimization, and Mitigation Measures), listed in EIS Appendix F, Table F-1, and are included in the EIS analysis as a component of the Proposed Action. Mitigation measures for cultural resources are addressed in EIS Appendix F, Table F-2 and Table F-3, and are drafted in the memorandum of agreement (MOA), and its historic property treatment plans |

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| | | | (HPTPs) attached in EIS Appendix J which was published in the Federal Register for public review and provided to Consulting Parties for review through the Section 106 consultation process. The MOA and its requirements would be set by BOEM under NHPA Section 106 as a condition of BOEM's signing the ROD. Under the MOA, adverse effects from the Project to NRHP-eligible cultural resources, including NHLs and TCPs, would be avoided, minimized, or mitigated in accordance with the NHPA Section 106 regulations (36 CFR 800) and in compliance with Section 110(f). |
| BOEM-2022-0045-0122 | 11 | b. The DEIS makes generalizations about the adverse impact of the RWF that do not apply to Aquinnah. Therefore, when evaluating the Alternatives, BOEM should make sure to use Aquinnah specific information rather than rely on the generalized characterization. For example,<br>i. "Lighting impacts would be most pronounced for views that can be currently characterized as undeveloped where lighting from human infrastructure and activities is not dominant or even exists. However, less than 5% of the lighted WTG positions envisioned in the GAA would be within 15 miles from coastal locations. Therefore, visual impacts on recreation and tourism would be short term during construction and long term during O&M with negligible to moderate adverse impacts, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed." Page 3.18-8.<br>1. Aquinnah takes light pollution very seriously and light pollution is kept to a minimum. There is often not a single light on Aquinnah other than the lighthouse that can be seen from some parts of the Aquinnah Cliffs area. The only lights are from the mainland or from the few fishing vessels offshore. With minimal residences, slow development, and very few commercial establishments, light pollution is currently easily contained. Therefore, the proposed mass of flashing amber USCG lights and other WFG lighting will be a major impact and not a negligible or moderate adverse impact. | Nighttime visual impacts associated with KOP MV07 - Aquinnah Overlook range from Major to Moderate for the proposed action and action alternatives as a result of the relationship of visible light sources and massing of wind turbines along the nighttime horizon considering the potential view value and /or potential sensitivity to visual change. Similarly, the cumulative impact associated with nighttime lighting in relation to KOP MV07 would be Major, with the closest wind turbine(s) approximately 13.7 miles away. However, the impact to recreation and tourism may or may not match the impact levels to the visual resource. Impact to visual and scenic resources is one factor considered in addition to other factors when evaluating impacts to recreation, tourism, and historic resources and properties. As discussed in Section 3.18.1, studies and surveys that have evaluated the impacts of offshore wind facilities on tourism found that established offshore wind facilities in Europe did not result in decreased tourist numbers, tourist experience, or tourist revenue, and that Block Island's WTGs provide excellent sites for fishing and shellfishing (Smythe et al. 2018). Research also suggests that at a distance of 15 miles, few beach visitors (only 6%) would select a different beach based on the presence of offshore wind turbines (Parsons and Firestone 2018). The basis of the Parsons and Firestone 2018 study was a hypothetical project depicted in all photomontages with 100 turbines. Each turbine was 6 MW and was 574 feet high (blade at apex) with a rotor diameter of 492 feet. The project design envelope analyzed for the Revolution Wind Project allows for installing wind turbines that may reach 873 feet to the tip of blade (52 percent taller those studied by Parsons and Firestone) with a rotor diameter of 538 feet (9 percent larger rotor diameter than the Parsons and Firestone study). While it is predictable that the percent of social acceptance or change in choice may shift, the shift would not be proportional to the difference in the size and scale of the wind turbines in the 2018 study and those analyzed in the Revolution Wind DEIS. A 2019 survey of coastal recreation users in New Hampshire (Ferguson et al. 2020) also found that most users (77%) supported offshore wind development along the New Hampshire coast, 74% anticipated that offshore wind development would have a neutral to beneficial impact on their recreational activities, and 26% anticipated that offshore wind development would have an adverse impact (Ferguson et al. 2020). The EIS acknowledges that while some visitors to south-facing coastal or elevated locations could alter their behavior, this changed behavior is unlikely to meaningfully affect the recreation and tourism industry as a whole.<br><br>The project Construction and Operations Plan (COP) describes warning light types as required under USCG and FAA regulations. Figures illustrating the location and type of lighting to be used in the RWF (Figure 2.1-4 Wind Turbine |

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| | | | Generator Lighting Scheme and Figure 2.1-6 Offshore Substation Lighting Scheme) have been included in Chapter 2 of the EIS. |
| BOEM-2022-0045-0123 | 11 | Visual Resource Impacts<br>It appears the Visual Impact Assessment (VIA) was completed before the adoption of the Seascape, Landscape, and Visual Impacts Assessment (SLVIA) model was adopted by BOEM. The DEIS and Appendix G have attempted a crosswalk from the VIA method to SLVIA. Table G-40a in Appendix G is a good addition to help explain the impacts and relationship of the VIA/SLVIA results. It would be helpful to further explain how a particular impact level was derived. Is it a combination of the SLVIA magnitude and SLVIA sensitivity? How, or at what point does the level of impact cross the threshold from one level of impact to the next? NPS requests that this is more clearly explained. | Methodology for Visual Resources impact determinations are provided in Appendix G of the EIS. Appendix G, Page G-154, describes the visual resources components analyzed, their relationship and associated impact definitions as referenced in the SILVA methodology found in Section 7.5 Evaluation of Impacts, and overall impact determinations as defined in *Table 3.3-2 Definitions of Potential Adverse Impact Levels* |
| BOEM-2022-0045-0122 | 12 | ii. Where in the DEIS are the specific conditions of Aquinnah discussed? | Please refer to Appendix G and visual impact tables associated with each project alternative. Additional visual simulations with higher resolution and additional information can be found on the BOEM website at the following link under the Visual Simulations tab: https://www.boem.gov/renewable-energy/state-activities/revolution-wind |
| BOEM-2022-0045-0123 | 12 | The EIS section would also benefit from a summary – either a table or grouping of KOPs by similar impacts – that describes how the various user groups are affected (and therefore the resulting impact levels) so that the reader is not always having to reference the Appendix. Simply stating that impacts would range from negligible to major is not as informative as it could be. One approach could be to summarize the impacts by viewer group and KOP - such as “residents would be subject to moderate impacts at KOPs X,X,X,X....primarily due to the (types of impacts).” | A summary table of overall impact determination by KOP and action alternative has been developed and included in Appendix G for ease of comparison between alternatives. |
| BOEM-2022-0045-0122 | 13 | iii. Table E2-11, Summary of Activities and the Associated Impact-Producing Factors for Visual Resources, states, in part, that “Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast.” Page E1-73-74. As described above, this description of widespread growth may apply generally to the four-state area but does not apply to Aquinnah. | Population growth and lighting related to Aquinnah may be incremental and possibly slower than other geographic areas, but the impact-producing factor can still be expected to gradually increase in line with population growth based on local ordinances. Aquinnah by-laws include directing and shielding light so that there is no direct glare from residential lights outside of the property line, and also require lighting on taller buildings to not be placed higher than 1 story. There is a restriction for the number of new residential building permits per year (no more than 6 per year). This restriction of building permits, as written, is only temporary - 3 years total. By-laws discourage the use of glass walls in buildings to minimize interior light impact on night skies. These measures combined would slow the amount of light producing impacts from incremental growth, but not stop it. |
| BOEM-2022-0045-0122 | 15 | a. On page 3.18-8, it states that “up to 38 WTGs (fewer than 5%) would be within 15 miles of shore (see Section 3.20 for details.)”. This seems to contradict other statements that 50 WTGs will be within 12 nm of Aquinnah. | Distances provided in the different EIS resource areas may deviate based on observation point. For example, the Cultural Resources section relies on distances considered from historic properties. Whereas the Visual Resources section may rely upon other Key Observation Points (KOPs) which could be a general location and not a specific point. Also, nautical miles and statute miles are different lengths (1 nm = 1.15 m). |
| BOEM-2022-0045-0122 | 16 | b. Consistent use of nautical miles. It appears that statutory miles are used in some places and nautical miles in others. If so, using a consistent measurement convention would be less confusing. | The BOEM style guide for this EIS includes use of statute miles only for terrestrial measurements (conversions not needed) and use of nautical miles only for marine measurements (conversions not needed when discussing a measurement previously defined such as the 1 x 1-nm grid). |
| BOEM-2022-0045-0086 | 55 | Revolution Wind reviewed Appendix G – Environmental and Physical Settings and Supplemental Information and had several comments regarding visual resource characterizations. Table G-40a mischaracterizes the views from each key observation point (KOP) by labeling the available ocean views as “Horizontal Field of View Occupied”. The term “occupied” should reference the field of view of in which the proposed offshore wind infrastructure occurs, which is a smaller arc than indicated in the Table G-40a. Revolution Wind respectfully suggests that BOEM change the column title to more accurately reflect the data presented or revise the data to accurately reflect the portion of the available ocean views from each KOP that could contain the Project. | BOEM reviewed and updated the approximate field of view occupied information based on KOP perspective to project. |

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| BOEM-2022-0045-0086 | 56 | Revolution Wind notes that Table G-40a presents a visibility threshold level (VTL) rating for the AI01 - Nighttime (Brenton State Park) that is inconsistent with the Visual Impact Assessment (VIA) panel ratings. We believe the VIA panel rating of VTL 4 accurately reflects the visual change the Project would introduce to this KOP and recommend that BOEM revise Table G-40a, accordingly. | BOEM reviewed nighttime simulations and re-evaluated the influence of nighttime lighting as viewed from AI01 - Nighttime (Brenton State Park) and BI04 Nighttime Southeast Lighthouse, Newshoreham, in comparison to current VTLs and determined that a VTL 5 rather than VTL 4 is more appropriate due to the lighting substantially contributing to drawing viewer attention across the ocean horizon. |
| BOEM-2022-0045-0086 | 57 | Revolution Wind does not agree with the DEIS conclusions (Table G-40b, Page G-160) regarding the visual impacts to nighttime views from the Southeast Lighthouse (BI04). The DEIS appropriately assesses the daytime visual impacts to Southeast Lighthouse as “moderate”, but nighttime impacts as “major”. The nighttime impact rating does not appear to take into account the efficacy of the proposed ADLS in substantially reducing the period of Federal Aviation Administration (FAA) light source illumination and should be revised. As the DEIS, itself, notes: “ADLS use would substantially reduce the visual impact from Project lighting and make lighting visibility much more intermittent but would not eliminate the impact fully” (Page 3.10-48). Likewise, as noted in Table 3.11-7 for Alternative B – Proposed Action, the “Light” Impact- Producing Factor may cause negligible to moderate impacts to a range of resources. Revolution Wind believes a “moderate” impact rating for nighttime views from Southeast Lighthouse is more appropriate and well-supported by the totality of analyses completed by Revolution Wind to support the DEIS. | BOEM has reviewed and has added clarifying text and/or table notes to disclose that nighttime impacts associated with FAA warning lights would be as evaluated, but impacts would be reduced to Negligible as described in Table 3.3-2. |
| BOEM-2022-0045-0086 | 58 | Revolution Wind believes the DEIS overstates the visual impacts of the Proposed Action (Alternative B) to Nantucket Island (Table G-40b, KOP NI10). Consistent with the VIA prepared by Revolution Wind, the table correctly notes that the “WTGs are barely visible” from this location. The Seascape/Landscape and Visual Impact Assessment (SLVIA) Overall Impact rating should be revised to “Negligible” in line with the location of the WTGs near the limits of perceptibility when viewed from Nantucket. | BOEM reviewed initial impact findings associated with KOP NI10 for the Proposed Action (Alternative B) and revised the overall impact determination to negligible based on the angle of view, field-of-view occupied, the number of wind turbines visible in addition to how much of the wind turbine is visible. |
| BOEM-2022-0045-0086 | 94 | Appendix G, Page G-188: For Brenton Point State Park (Night), recommend revising "When viewed at night, single aviation warning lights on nacelle..." to "When viewed at night, dual aviation warning lights on nacelle..." The WTGs are greater than 499' AGL, thus necessitating two aviation warning lights on each nacelle. | Table text has been revised to reflect nacelle lighting and the use of two obstruction lights not one, per FAA Advisory Circular 70/7460-1M (11/16/2020). Figures illustrating the location and type of lighting to be used in the RWF (Figure 2.1-4 Wind Turbine Generator Lighting Scheme and Figure 2.1-6 Offshore Substation Lighting Scheme) have been included in Chapter 2 of the EIS. |

## Water Resources

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| BOEM-2022-0045-0102 | 37 | MWT is concerned with cross contamination of sedimentation impacting sensitive resources areas utilized by it's tribal members. | BOEM acknowledges your concern. As described in Section 3.21.2.3.1, disturbances to the seafloor would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to the anchorage, disposal, or cable placement area. Sediment modeling completed for the Proposed Action indicates that in most locations the total suspended solids plumes are limited to the bottom 10 feet of the water column and are temporary at any given location. Suspended sediments would settle within hours or days, including up to 6.7 hours in the RWF IAC, 61 hours in the RWEC-OCS, approximately 70 hours along the RWEC-RI, and 70 hours at the landing site where HDD would occur. The HDD drill itself may reach a depth of up to 66 feet between the onshore TJBs and the offshore exit pits, but the sediment displacement would be largely confined to the two 3-foot-diameter bore holes.<br>EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. Changes to water quality would be detectable but would not result in degradation of water quality that would exceed water quality standards. For this reason, BOEM expects that sedimentation would have localized short-term negligible impacts on terrestrial and marine cultural resources. |

## Wetlands and Non-Tidal Waters

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| BOEM-2022-0045-0105 | 1 | Edits to text made by USACE | BOEM has incorporated these proposed edits into the FEIS. |
| BOEM-2022-0045-0105 | 2 | Removed WOTUS column. The < 0.01 acre of freshwater wetlands associated with the OnSS footprint and the 0.10 acre freshwater wetland in ICF footprint, why is that not regulated by the Corps? | Clarified these resources require coordination with regulating agencies, including USACE and RI CRMC, prior to any construction activities to determine jurisdiction. |

## Wildlife (General)

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| BOEM-2022-0045-0086 | 88 | Appendix E2, Page 3.8-1: "Native coastal fauna" is defined herein as terrestrial mammals, reptiles, amphibians, and terrestrial and intertidal invertebrates. Birds appear to be left out of the definition of coastal fauna. Please clarify if this is because birds are addressed under a separate section or should be included within the description of Native Coastal Fauna. | Thank you for the comment. Birds are addressed separately in Section 3.7 of the EIS. |

# Non-Substantive Comments

## General Opposition

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| BOEM-2022-0045-0002 | 1 | The cable recently proposed by Mayflower in the Sakonnet River through a very carefully orchestrated presentation is just one part of the overall Wind Turbine project, one which is designed to benefit only Massachusetts. And this is the same state that has blocked a badly needed natural gas pipeline to Rhode Island.<br>As a citizen and resident of the Rhode Island I have been closely involved in a number of similar projects, such as Deepwater Block Island. My qualifications as they relate to the factual assertions I am making include: a career as a Naval Aviator with training in oceanography, meteorology, air and sea navigation, air traffic control, and aeronautical engineering, and a second career as CEO of 4 separate manufacturing companies, two of them subsidiaries of multi-national conglomerates.<br>The ocean floor is where half of the planet's accumulated carbon is sequestered. Digging it up will release significant amounts of carbon into the atmosphere, which will combine with oxygen to become carbon dioxide, along with methane, which are factors in creating global warming, and will be harmful to the fisheries we depend on.<br>There is a high likelihood of gearbox failures and fires on these wind turbines caused by salt spray on the blades throwing them out of balance. Typically they contain not only oil, but around 4400 pounds each of neodymium for the magnets. This is a highly toxic and potentially deadly material when burned, and Rhode Island residents will be down wind. How will they put these fires out?<br>These turbines will also severely affect the accuracy of radars used for both air traffic control and defense. In addition, they will clutter the ocean in a way that will interfere with ship radars as well. The environmental risks are unwarranted. As one U.S. Supreme Court Justice noted in a recent case regarding eminent domain, "Transfers intended to confer benefits on particular, favored private entities, and with only incidental or pretextual public benefits are forbidden by the Public Use Clause." (Kelo v. City of New London, 2005.)<br>The fact that wind power has been proven to have no net positive impact on reducing fossil fuel use or carbon emissions is a matter of public record in the U.S. and Europe. (See the ERCOT Bentek IV study done in Texas, attached.) It is intermittent, not on demand, and not only causes more fossil fuel use and carbon emissions as a result, but can never replace a single conventional plant. There is absolutely no justification for industrializing the ocean this way. Fishing, recreation, and the view shed will be impacted, with a negative affect on public enjoyment, the local economy, and coastal property values.<br>Higher U.S. energy costs drive more manufacturing overseas where, in countries like China, they are building a new coal fired plant every week. China's GDP is less than the U.S. and Japan, yet they emit 5 times the carbon and other pollutants as the U.S. does. And much of this is manufacturing to supply countries like ours with products we used to make, far more cleanly, than they do. The only thing "green" about this project is the money the developers are making from taxpayer and ratepayer subsidies. What are Rhode Islanders getting from it? What is the U.S. getting?<br>Benjamin Riggs, 8/20/2022 | Thank you for your comment. Seafloor sediment disturbance was modeled in Appendix J of the COP and was evaluated in the EIS as an impact-producing factor associated with cable and foundation installation. |
| BOEM-2022-0045-0108 | 1 | This is not only a bad idea, but a collsal waste of money when many better and more realitic options abound. You are fast tracking this project at the peril of the environment, the special habitat, and the local people who cherish where they live and want to preserve what they have worked so hard to enjoy. You do this in a panic without seriously considering the longterm ramifications. I am a former commerical fisherman and live along the shoreline that will have to look out and see these turbines reuin the pristene ocen view - fail, then rust, then rot and finally stand out there unused as the largest environmental catastrophy this region will ever see - a waste of money. We are all for reducing fossil fuel consumption, but to put moving parts of shore in the most exposed area in the northeast is foolish when solar energy is both more reliable and sustainable. This is too close, too large and must be given far more consideration before pushing forward. It is exaclty this kind of thing - rushed, not thought out and not fully investigated that is destroying the earth. Please stop and reconsider | Thank you for your comment. |
| BOEM-2022-0045-0107 | 1 | Other states have Turbines, but not offshore Turbines. They don't want off shore Turbines precisely because everyone can see them and they value their coastline. Coastlines are a treasure. Every other state seems to realize that.<br>Why does RI think 150 won't matter to their coastal resources? Every other state has said "NO."<br>New York, Mass, Florida, Maine, etc., no one wants them to obstruct their ocean views, disrupt the wildlife, and diminish tourism and property values. No other New England state has offshore turbines. | Thank you for your comment. |

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| | | The digital images I have seen seem to misrepresent and mislead. It seems like the company obscures the background, by making the foreground so large and clear. They do not include anything else in the background for the eye to use as a comparison to evaluate size, and the atmosphere seems particularly hazy, which can happen in LC, but is not always the case.<br>The company released a 2000 page impact statement on September 2. They gave the public only 2 town meetings and 2 virtual meetings, all of them within a three week period (Sept. 29- Oct.11). Today, Oct. 17th is the last day to make a comment.<br>I just feel like RI will regret this for the rest of our lives. No other state wants to ruin its treasured coastline and ocean views. The Turbines will have a negative impact on tourism, property values, wildlife, fishing, basically everything.<br>Newer wind farms are inland. Amazon is planning a huge farm, but inland, where it won't ruin property values and the coastline. I personally came to RI because of the views. I don't think natural beauty is a bad thing to value.<br>I believe in global warming and want renewable energy, I just don't think you need to ruin a state's entire shoreline to accomplish that. We will regret this and we will be the only state with this problem. | |
| BOEM-2022-0045-0093 | 1 | Thank you for allowing individual submissions regarding this issue.<br>I am a home owner in Little Compton and am proud of RI for its commitment to renewable energy, but dismayed by this project and the impact it will have on the future of RI.<br>First, I think the process has been unnecessarily hurried. I do not understand why Rhode Island has to act so fast to implement a plan that will have such a long-term and potentially catastrophic impact. Right now, according to the U.S. energy information administration (https://www.eia.gov/state/analysis.php?sid=RI), Rhode Island consumes less energy per capita than ANY other state in the union. And, as of 2020, 12% of that energy was renewable. We do not need to act heedlessly.<br>Second, the project as planned will destroy Rhode Islands' best and most treasured resource, the vitality and beauty of its coastline and coastal habitats. Boating, fishing, and beach-going, all tremendously important to RI, will be indescribably negatively impacted. The value of every coastline town will be grossly diminished. Tourism generates 13.7% of the state's jobs and contributes 1.3 billion dollars worth of tax revenues (2020 data). The wind farm promises to cut these figures dramatically. Eventually, the wind farm will erode the tax basis for the entire state.<br>We do not have a good way to predict the impact of a wind farm of this size and proximity, because NO OTHER state has embraced such a drastic measure.<br>No other New England state has offshore wind farms. None of the west coast states have opted for off shore wind farms. Why should the smallest state in the union embrace such a disproportionately huge and potentially destructive enterprise, and with such haste?<br>The project, as planned, would provide CT with 43% of the generated power. CT is far wealthier than RI. They will gain almost half of the power without having to suffer from any of the adverse consequences.<br>No other state in the union has offshore windmills except for Virginia (it houses 2 offshore windmills, approximately 30 miles, double the distance from the coast as the proposed RI windmills). RI already has twice as many as any other state (off the coast of Block Island, with a bad record of unanticipated hidden costs, safety hazards, and breakdowns (https://www.theday.com/local-columns/20210807/the-block-island-wind-farm-has-largely-shut-down/). The notion that RI should be the first and potentially ONLY state to accept over 100 offshore windmills seems quite risky. RI is by far poorer than the rest of New England, and has fewer residents to fight against this change. Why saddle the poorest, smallest state in the area with this burden?<br>If RI accepts this, we will have ensured that we will remain the poorest state in the region for generations to come, and we will only have ourselves to blame. Property values and state revenues will all suffer. The wealthier communities, that were starting to see a renaissance, given the trend to work at home, will be halted in their tracks by this venture. Few people with resources will choose RI as a destination or a home, given the current project that will forever scar the coastline.<br>We need renewable energy, but we do not need to ruin our natural resources to do so.<br>Moreover, the digital simulations that attempt to visually represent the impact of the farm seem misleading. Neither the photo nor the video contains an island or a landmark in the distance to properly scale the windmills. These windmills (873 feet tall), just 15 miles off the coast, will tower almost six time higher than the highest point on Cuttyhunk (150 feet), an island at approximately the same distance from Little Compton as the proposed windmills. The potential misleading visual (and audio) representations cause deep concern that, if built, the Wind farm will dominate our landscape in an unexpected | Thank you for your comment. The action analyzed in BOEM's *Programmatic EIS for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf* was the establishment of the Marine Minerals Management Service Alternative Energy and Alternate Use Program on the Federal Outer Continental Shelf. Changes to BOEM's renewable energy program are outside of the scope of this environmental review and would be analyzed through a separate process.<br><br>Revolution Wind submitted a COP for Lease Area OCS-A 0486. BOEM's regulations require BOEM to analyze Revolution Wind's COP. As described in Section 1.2 of the Draft EIS, the purpose of BOEM's action is to determine whether to approve, approve with modifications, or disapprove Revolution Wind's COP.<br><br>Photorealistic visual simulations have been developed for the project from predetermined viewing locations (Key Observation Points) and are based on current industry practices and technologies. Additional visual simulations with higher resolution can be found on the BOEM website at the following link under the Visual Simulations tab: https://www.boem.gov/renewable-energy/state-activities/revolution-wind. |

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| | | and unwanted manner.<br>I strongly urge RI to re-examine this whole process and allow the people, especially residents of coastal towns, to have more input and offer alternative plans.<br>Perhaps the turbines need to be 30 miles off the coast (like Virginia's), not just 15 miles.<br>Perhaps every coastal town would rather install solar panels.<br>Perhaps inland possibilities exist that could house a Windmill farm that would not impact RI's best treasure.<br>Perhaps a more concentrated push for geo-thermal or solar power could make up the gap that rejecting this proposal might incur. Increasing solar power is the European Union’s current solution to increasing its renewable energy resources. Should we not learn from Europe? They are leading the renewable energy effort and are opting for solar. Please give us the option to choose solar over wind.<br>I would hate for needless haste to ruin, forever more, RI's coastal treasure.<br>Again, thank you for your time and consideration. | |
| BOEM-2022-0045-0088 | 1 | This will absolutely devastate the tourism industry in Rhode Island. | Thank you for your comment. As described in Section 3.18, BOEM anticipates that the overall impacts associated with the Proposed Action, when combined with past, present, and reasonably foreseeable activities, would result in minor adverse impacts and minor beneficial impacts to recreation and tourism. The overall effect would be small, and recreation and tourism would be expected to recover completely with no mitigating action required. |
| BOEM-2022-0045-0085 | 1 | Having grown up in Little Compton and now retiring down here, my wife and I are apposed to the wind farm development off our coast. We feel its too large in scope and size to be constructed only 15 miles from the coast. It will certainly negatively effect our views to the south and therefore negatively impact our home. Structures of that size (approximately 743 feet tall) should be constructed far enough off shore so as to NOT impact peoples views which they've invested dearly in. We vote NO!! | Thank you for your comment. |
| BOEM-2022-0045-0084 | 1 | This is too many turbines, too close to land. Tremendous visual pollution for many, many people. Ruining beautiful coastline that everyone deserves. Plus danger to natural resources . Process is too fast for adequate citizen involvement. Only a 3 week period from publication of impact statement to now. Simple as that. Other states are saying "No" to off shore turbines for the same reasons . Why not Rhode Island? Please say No this time. | Thank you for your comment. |
| BOEM-2022-0045-0074 | 1 | Why can’t these wind farms be further offshore or further inland? It will be sad to see our coastline that everyone can enjoy be ruined by these wind turbines. Our coastline is Rhode Island’s greatest asset. | Thank you for your comment. |
| BOEM-2022-0045-0073 | 1 | This is moronic. Wouldn’t even generate much. The state of RI property values will decrease and the state will loose money. RI most valuable asset is its ocean views. | Thank you for your comment. |
| BOEM-2022-0045-0063 | 1 | I am NOT in favor of the Wind Farm off the coast of Rhode Island. I think much more research needs to be done to weigh the environmental impact of this project and fast tracking is wrong | Thank you for your comment. |
| BOEM-2022-0045-0061 | 1 | There are compelling arguments in favor of moving toward a larger proportion of energy being sourced from wind; however the use of high visual impact turbines and the installation of so many at one time should be rethought. We should move slowly in order to preserve our coastline and the wildlife within it. This program is too much, too soon. Test. Get there slowly to prevent making a huge mistake. | Thank you for your comment. |
| BOEM-2022-0045-0037 | 1 | Members of NEFS 13 have been affected by the placement of just 5 turbines outside of Block Island. They now fish 13 miles further out to sea. Invasive species have moved in around the 5 turbine bases. The invasive species-python moved into the everglades; how's that working out? The ocean floor will change and habitat will change and migration patterns will change and be altered for ever. It is always surprising to listen to the silence from environmentalists that attend these meeting when they know the ocean environment will be changed negatively and for ever! There will never be enough money for the decommissioning. The environmentalists never question the decommissioning process or cost, but if this project was on land they would be making sure there was enough money set aside to restore the land to its previous condition; wonder why? There is a lot of talk now about social justice and environmental justice, yet no one is speaking out against the mining of the rare minerals that are necessary to move this green energy agenda forward. No one seems to care about the costs of | Thank you for your comment. |

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| | | this type of mineral mining; destruction of land, loss of lives, environment destroyed, and illness. This type of mining also affects poor communities disproportionately and no one speaks out; where are the social justice warriors? They are driving their Prius's. The wind farms will put the commercial fishing industry out of business. Draggers will not be able to fish in between the turbines. | |
| BOEM-2022-0045-0053 | 1 | I understand Revolution Wind is a "done deal." There is just too much money and political capital at stake for the outcome to be any other than full steam ahead as fast and forceful as feasibly possible. And when so-called "environmental" organizations have been co-opted into the destruction of the seabed and North Atlantic migratory flyway with visions of sugarplum technology and "grants" from the wind industrialists, all is lost. Yet the few humans who stand to gain tangible returns (i.e., boatloads of money) are flying blind—like roseate terns into football-field length blades, spinning at close to 200mph. The wind industrialists and their enablers have no idea how what they are hellbent on doing is going to effect the less than 350 North Atlantic Right Whales left on the planet, the piping plovers, roseate terns, the bats and insects drawn to lighting atop thousands of 866'-high turbines to be installed in the Mid-Atlantic Bight from MA to NC. Furthermore, these climate crusaders have little to say about their so-called "green," "renewable" technology that plunders Earth (and nearby rural and indigenous communities in Africa and China) for the highly toxic minerals required to make turbines, solar panels, and lithium-ion batteries. Nor do any of them talk much about the enormous amounts of steel and concrete it takes to construct behemoth turbines, the staggering amounts of fossil fuels it will take to build and power fleets of ships and other vehicles for transport, installation and maintenance of off-shore turbines. (I would also include decommissioning, since is is unlikely that these turbines will last more than 15-20 years, but we all know they will just leave their lubricant leaking, rusty ruins to eventually fall into the ocean.) It is clear that in order to "save" the planet from climate change (and pocket mind-blowing wads of public monies) they are willing and eager to kill it. | Thank you for your comment. |
| BOEM-2022-0045-0119 | 7 | So we building wind turbines for the trying to solve our um climate uh issue solving for the wrong variable because energy is not the problem. A problem is our destruction of the planet, the our destruction of the biosphere and killing species and destroying habitat. And that's exactly what these wind turbines will do the I wish that was indicate got into consideration, because, uh, there's so much uh involved in them just the making them. Uh the the mining that is required for these industrial devices, the the manufacturing, the smeltering it's. All this takes a tremendous destruction of the planet, and requires energy to produce that this is energy on top of energy that we're already using in a business as usual. So we're not taking subtracting energy away building these machines we're adding to our fossil fuel and our emissions into the atmosphere. So these will definitely not solve our problem, because um, global warming and climate change are symptoms of our problem, which is the the destruction of species species uh extinction and um habitat loss. And so there's will be many, many that those involved in this, because you're outsourcing all the mining that will be involved, and all those habitats that will be destroyed in that in that instance, too, so I wish those were uh considered also. But it's only you were. We're only accounting the direct uh externalities. So I thank you for your time. I I hope that that would be considered, and that, uh, the decision would be to a a No. To proceed on purpose and need. Thank you again. | Thank you for your comment. |
| BOEM-2022-0045-0115 | 11 | : I'm. In favor of the option of not proceeding with this project. Um! I think it's great that Rhode Island wants to try to decarbonize But oh, I don't see any. I don't think Rhode Island has any steel mills or cement factories, or uh plastic making for the blades. None of that's going to be done in Rhode Island or the copper wiring. No smelters here, so all of this carbon that will be required to produce these machines will be outsourced. So this I mean, It's solving for the wrong variable here. It's all about the jobs and the economy. And this that's It's not going to work. That's not what we're solving for. We're trying to solve for climate change, which is just a symptom. problem that is overshoot which was using too many resources for the planet. So business as usual, is not going to get us out of this problem. So that's That's number one. I mean, if we? If we want jobs, we can, we can we? There's plenty of things here to do for restoration, and to try to actually, in fact, decarbonize. But all these, all these turbines, all all these solar panels. They all require mining. So this is a destruction of the planet, Destruction of earth. We're not. We don't have any mines here in Rhode Island, so we're not mining those the steel. All the minerals that's that's going to be some other community, and usually one that is, it has been historically subjected to the injustice in terms of taking a brunt of energy requirements. So this this is this is not going to solve the problem. This is going to make our problem worse So i'm adamant against this. I don't understand why we think this is going to ah help this. It's it's not um That's it in terms of the animals that are there. The right whale, the fishermen who fish those seas. This is going to affect them all that. So those livelihoods and those those species are going to be affected. So. Um, So that this Ah, you know it. Ah, I can see. Okay, great. The Chamber of Commerce wants this. Yeah, this will be good. It will get jobs, but that's not | Thank you for your comment. |

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| | | what you were trying to do. We're trying to solve for climate change, and this is not going to happen so. Ah, this will just exasperate that. So now all this mining that's required, and because there are there aren't enough resources, you're going to run into the same problem as you do with fossil fuels. These are finite resources. They're now starting to mine the oceans. So here it is. So we have to electrify everything. Electrify the cars. Where do we get these metals? Well, let's mind the oceans. Well, that's really a good idea: And so it's not what we use, what kind of energy we use for our cars. It's the car period. Let's Let's get rid of the cars, so all the cars require mining. They require this electric or ah internal combustions have tires on them, the rubber, it's all. Where does the tires go? Where do they go? Where did everything get recycled? It Doesn't get recycled? They go to landfills, So i'm adamantly opposed to this, and it's not a a nimby thing. It's a Nope, not on planet Earth. Thank you for your time | |
| BOEM-2022-0045-0115 | 12 | Great. So this is uh David Michel. I'm a Connecticut uh State representative. Uh, thank you for uh organizing this public hearing, and I just wanted to make a couple of comments um in regards to both, of course, the is in the in terms of the environment and the jobs as well. I don't think that if we pal, drive those monopoes. We're going to solve climate issues for a couple of reasons. One, the Sound and I worked with Christopher Clark, who is the number one scientist in the world, and or to panic right whales before he was at hired by vineyard wind, talking about the sound limits, the noisiness and the the mitigation. The ways to mitigate sound will not be enough if a whale is in the area at a specific time within a half a mile, or whatever. Now I know that there's observation techniques that are going to be used. But if we know that at certain times of the year we're supposed to see whales in one specific area, because they follow the food. Well, talking to Noah personnel, I also found out that they're not necessarily where we expect them to be so. I think we're going to run into issues with the north of any great whales, despite what the developers saying, we, you know, and on the job creation. I really have to talk about this. I requested a study be made by Tufts University Structural Engineering Department to compare monopoly and concrete gravity base we're talking, say we don't build the secondary still for the monopoly in Connecticut. We will, with a concrete gravity base. We will create twenty five times the amount of jobs, and if we were to build, and there's no there's no plans on that right now in Connecticut to build the second industry for monopoly, we'd still be the amount of jobs by twelve, twelve times. Can't talk about economy. We're fixing the economy. If we're not going to take this seriously by on two levels. We talked about jobs. Well, there it is. We want to talk about environment. Let me explain. Go back to the Wells. Whales are the gardeners of the seas. They maintain the level of phytoplankton in the ocean. They maintain the phytoplankton with their ah plumes filled with nutrients and their well-teled movements sending the phytoplankton to the surface to multiply, and that phytoplankton is responsible for three things. It's responsible for carbon absorption so much that a whale when it dies could carry up to ten thousand trees worth of carbon absorption in its carcass. The phytoplankton also produces fifty to eighty percent of the oxygen we breathe, and third, the phytoplankton is the source of food for the zooplankton, which are the beneficiaries. So when we're talking about birds and all the other animals, I think that it's very important to talk about the keystone species, and and there are going to be the most affected by noise. Why are we even going to try this way. Why can't we be leaders in this industry on the east coast, or wherever we are going to do this this bit with concrete gravity base no vertical minds. It's not a floating foundation. The whales are not going to bump into it, but concrete gravity days that get silent me lower it to the sea floor. I've heard the arguments of the developers in Connecticut, and they've been the boat against concrete gravity base. So i'm not saying, we shouldn't be doing this. But when I look at the impact statement that I see moderate on on marine mammals, I see moderate on the bentos, how can you explain moderate impact on the bentic life? If you're going to pile, drive, steel pipes into the C Four. Where is the impact on the watertog with the cloudy. We've got to take this very seriously when the threshold of collapse with the ocean is on the threshold of collapse. We cannot play with it right now. I'm seeing a lot of a lot of gings, and these games have to stop and we need to step up to the plate. Be responsible. You don't find climate change by hurting the climate regulator in the ocean. That's a bad statement. We're not going to fix climate change by power, driving still Bytes teeth. Pacific concrete gravity basis. Thank you very much. | Thank you for your comment. |

## General Support

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| BOEM-2022-0045-0110 | 1 | Revolution Wind's offshore wind project, if responsibly developed to avoid, minimize, mitigate, and monitor potential environmental, cultural, and economic impacts, will provide substantial benefits to society and the environment. The Project is part of the urgent transition away from dirty, climate-altering fossil fuels to the clean energy economy envisioned by the Biden Administration that is necessary to avoid catastrophic warming. This rapid transition to a clean energy economy is paramount to preserving wildlife and the environment. Absent a substantial shift from carbon intensive sources of energy to solutions like offshore wind, we face climate change that will drive countless species to extinction in both marine and terrestrial environments, threatening entire ecosystems. | Thank you for the comment. |
| BOEM-2022-0045-0091 | 1 | Offshore wind is poised to play an essential role in the ability of Connecticut, Rhode Island, and the region, to meet critical greenhouse gas reduction and clean energy goals. Accordingly, we encourage a robust procurement of offshore wind that maximizes the deployment of these resources consistent while satisfying stringent environmental standards. Revolution Wind is an important part of the region's energy future. | Thank you for the comment. |
| BOEM-2022-0045-0113 | 1 | Offshore wind energy is critical to meet our nation's climate goals, particularly in New England where its technical energy resource potential is greater than all other clean energy resources combined.1 Adding even a modest amount of offshore wind to the New England grid could drive down wholesale energy costs, especially during cold snaps and storms when ratepayers often see a sharp spike in energy prices.2 Revolution Wind has three Power Purchase Agreements (PPAs) in place with Rhode Island and Connecticut, totaling 704 MW. Delivering the clean energy from this project successfully and on time is critical for these states to meet their clean energy goals. | Thank you for the comment. |
| BOEM-2022-0045-0114 | 1 | Let me begin by stating that I am a strong proponent of well sited, well designed and properly mitigated offshore wind projects off our Northeast coast, including Revolution Wind. The RI/ME WEA, NJ WEA, and the NY Bight are blessed with modest water depths extending well offshore as well as powerful wind regimes. These OSW projects can be built at a utility scale in relatively close proximity to major load centers from Boston south to Washington DC. Further, these projects can take full advantage of more than two decades of successful European experience. The currently available wind turbine generators (12-14 MW) coupled with extensive European construction and operating experience allows for competitive pricing and strong capacity factors. Successful pilot programs in US waters (Block Island, Dominion) provide additional supportive experience. Orsted's 30 MW Block Island project has now been in operation for more than five years in waters off mainland Rhode Island, with positive results. Unlike other areas in the United States (desert Southwest, Texas to North Dakota ''wind belt"), the population density, existing land uses and sunlight incidence in the Northeast is not conducive to cost competitive PV or land-based wind at utility scale. Moreover, the 1,500 mile plus, multi state HVDC transmission systems needed to move large blocks of power from the mid-Continent wind belt to the Northeast and mid-Atlantic are not yet moved beyond the early planning stage. If the Northeast and mid-Atlantic are to decarbonize their heavily fossil fuel driven electrical power, transportation and building heating/cooling sectors, large scale offshore wind must play a major role. President Biden's national goal of 30,000 MW (30 GW) by 2030 is a modest start but not nearly enough to keep pace with the expected demand for cost effective zero carbon energy. In fact, just 4 states (Massachusetts (5,600 MW), New York (9,000 MW), New Jersey (11,000 MW) and Virginia (5,200 MW)) have already advanced plans for purchasing 30,800 MW of OSW on their own initiative. Accordingly, our collective objective should be to move well sited OSW projects through the environmental review gauntlet as quickly as statutory timelines and the abundance of precedent studies and operating experience allow. 30 GW nationwide is just a down payment on the OSW capacity which our Nation will require. | Thank you for the comment. |
| BOEM-2022-0045-0003 | 1 | AIM strongly supports Revolution Wind's 700 MW proposal and its commitment to furthering the region's clean energy future and making economic commitments that will benefit New England. AIM is the largest general trade association in Massachusetts. AIM's mission is to promote the prosperity of the Commonwealth of Massachusetts by improving the economic climate, proactively advocating for fair and equitable public policy, and providing relevant, reliable information and excellent services. AIM strongly supports the development of offshore wind energy as a major new source of renewable power for all consumers. While this project was not the result of a procurement directed by Massachusetts (it is split approximately 60/40 between Connecticut and Rhode Island), it adds to the long-term offshore wind procurements recently completed by Massachusetts. The long-term power contracts that have emerged from procurements in Massachusetts, Connecticut, and Rhode Island, including this one, will deliver large amounts of carbon-free electricity for many years to the | Thank you for the comment. |

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| | | region's residents and businesses. This is extremely important as Massachusetts, Connecticut and Rhode Island have all committed to net zero carbon emissions in the coming decades. Meeting these goals is challenging. It requires an "all hands-on deck" approach for developing new renewable energy sources. The Revolution Wind project will complement other offshore wind projects in the area and add needed capacity to our renewable energy mix. Other than one large hydropower project from Canada through Maine, Revolution Wind and the other offshore wind projects are the only large-scale renewable energy projects capable of generating the amounts of renewable power we need. Solar, while important, will not generate enough to reach our goals. Successful completion of this project will help New England meet its greenhouse gas reduction goals.<br>The greenhouse gas reduction potential of this one project is enormous. It will remove the equivalent emissions from 150,000 cars, annually. With Revolution Wind our greenhouse gas goals are attainable. Without it, making these goals will be near impossible. That makes this project vitally important. None of this means that the review should be fast tracked or ignore legitimate concerns of impacted parties. BOEM must review all impacts to make sure all voices are heard and any negative impacts are addressed. That type of analysis will not only help Revolution Wind succeed but also help future projects as stakeholders know that the process is fair and inclusive. Additionally, Revolution Wind has made an enormous commitment to the economic vitality of the region. While much of the investment from this project will occur in Connecticut and Rhode Island, not Massachusetts, there is no doubt that economic vitality in these nearby areas will positively impact residents and businesses in Massachusetts and surrounding areas. Certain materials cannot be sourced locally and will need to be purchased throughout the Northeast region and throughout the United States, creating additional demand and jobs. Also, the carbon reduction benefits will benefit the entire United States and contribute to the necessary worldwide reduction in greenhouse gas emissions that will help mitigate climate change. The benefits in jobs and to the environment will accrue even more once additional offshore wind projects follow Revolution Wind's example and begin construction soon after. Revolution Wind, and offshore wind in general is a win-win situation. It will result in large reductions in greenhouse gas emissions and bring large amounts of investment regionally. We can no longer delay offshore wind development – too much economic and environmental benefits depend on it and the Revolution Wind project has been studied extensively. Without it there is no chance we will stop the negative impacts of climate change. We urge the Bureau of Ocean Energy Management to allow the New England region, and the United States, to be the new leader in clean energy development. | |
| BOEM-2022-0045-0004 | 1 | I write today to express my enthusiastic support for the Revolution Wind Energy Project under development by Ørsted and Eversource. Revolution Wind represents significant benefits on the federal, state, and local levels. This project will contribute to the national goal of producing 30 gigawatts of electricity from offshore wind by 2030, it will support the state goal of a carbon-free electricity supply by 2040, and it will provide my community with increased opportunities for jobs that include family-sustaining wages. While these federal and state clean energy goals are critical to the nation's collective good regarding energy security and independence, it is the local benefit that I am most qualified to address regarding the benefits of Revolution Wind. Of the 25 Distressed Municipalities in Connecticut, New London is ranked fourth. The Port of New London is home to State Pier, located on the City of New London's waterfront. Components for Revolution Wind will be staged, assembled, and shipped from State Pier, which is nearing completion of a $255 million rebuilding that will transform this facility into a hub for offshore wind along the East Coast, and a state-of-the-art marine terminal with heavy-lift capabilities to handle a wide variety of cargo for decades to come. Revolution Wind initiated the rebuilding of this long-underutilized state facility through a public-private partnership with the state. The Host City Agreement we signed for use of the pier by Østed and Eversource guarantees the City at least $5.25 million in payments over seven years, or $750,000 annually. Combined with payments from other project partners, New London will realize more than $1 million in new revenue to its general fund. In addition to these benefits, Ørsted and Eversource have committed millions of dollars in community development in Connecticut to support offshore wind supply chain and workforce development, maritime research, STEM education, and local fishing. New London will benefit from an increase in activity at State Pier from jobs directly related to Revolution Wind and the two other offshore wind energy projects already committed to the port -- South Fork Wind and Sunrise Wind. The transformational rebuilding of this marine terminal combined with the need for new careers in the offshore wind industry will provide a multiplier effect for jobs in my city as the terminal and its workers increase the need for a wide range of goods and services. On a personal level, I am proud that New London will play a vital role in supplying Connecticut with 304 megawatts of clean, sustainable energy produced by Revolution Wind as our nation works to address the pressing matters of climate change and energy security. | Thank you for the comment. |

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| BOEM-2022-0045-0007 | 1 | I write on behalf of the Chamber of Commerce of Eastern Connecticut's Board of Directors' unanimous decision to support the Revolution Wind Energy Project and to urge your speedy approval of the necessary permit to proceed.<br>Our Board of Directors firmly believe that the Revolution Wind project is essential for Connecticut to comply with the state legislative mandate that commits the state to a carbon-free electric grid by 2040. This legislation codifies the Governor's Executive Order issued in 2019. It is also equally important that we work to meet President Biden's mandate to generate 30 gigawatts of electricity from offshore wind power by 2030.<br>On a more local level, Revolution Wind will provide significant support for the Chamber's economic development work on behalf of the 41 municipalities we represent. From the construction jobs in place now to the specialized staging, assembly, shipping, operation, and maintenance jobs during and after construction, Revolution Wind will bolster the region's economy by increasing opportunities for skilled trade occupations and advanced technology careers.<br>Revolution Wind and the entire offshore wind industry represent a major diversification of the region's economy. And because of the specialized nature of this new industry, the region stands to gain more career opportunities that will provide good-paying wages that in turn will support existing businesses, entrepreneurs, homeownership, and stable communities.<br>The magnitude of what Revolution Wind and the offshore wind industry means to this region cannot be overstated. Much of the work related to the industry will be launched out of the State Pier in New London. The pier, located in a distressed city and in an Opportunity and Enterprise Zone, will provide opportunities for local and regional residents for decades to come.<br>Additionally, the Chamber is in the process of launching a Regional Innovation Center/Co-working location in the heart of New London. This effort was launched to provide support for residents of the city and elsewhere, an opportunity to partake in this new industry. The Center will focus on education, advanced-skill training, and support for entrepreneurs in all areas of business, none of which would have happened had it not been for Revolution Wind selecting New London as their base of operations.<br>As a leader in Eastern Connecticut for decades, I am pleased that this new industry is a major step towards a carbon-free energy industry and confident in stating that Revolution Wind represents the beginning of economic development opportunities in Eastern Connecticut that will last for generations to come. I wholeheartedly support the Revolution Wind project and urge speedy approval of the necessary permits. | Thank you for the comment. |
| BOEM-2022-0045-0008 | 1 | As the Business Manager of Iron Workers Local 37 Providence RI, I support offshore wind large scale utility development.<br>The Revolution Wind project is an opportunity to not only drive the nation's clean energy future, but also create quality family sustaining union jobs at the same time.<br>Although on a smaller scale, my members benefited by these family sustaining jobs while working on Americas first offshore wind project, Deep Water Wind off the coast of Block Island. Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the East Coast. As we begin recovering from the unprecedented social and economic impact of the COVID-19 pandemic, the approval of the Revolution Wind project, developed by Orsted and Eversource, will directly lead to the creation of union jobs that come with good pay and benefits.<br>Offshore wind is critical to the future of our national security and environment. I urge BOEM to move forward with Revolution Wind's permitting process. | Thank you for the comment. |
| BOEM-2022-0045-0009 | 1 | I am writing in support of the Revolution Offshore Wind Project off the coast of Rhode Island. Offshore wind development is key to reducing our dependence on fossil fuels. It is a must if we are to face the climate crisis effectively. Please move this project ahead at full speed. We haven't a moment more to squander. Thank you. | Thank you for the comment. |
| BOEM-2022-0045-0041 | 1 | I am submitting this testimony regarding Revolution Wind on behalf of the 800 members of Menunkatuck Audubon Society, the local chapter of Audubon for 12 cities and towns in south central Connecticut.<br>Climate change is the biggest threat to birds. Audubon's climate science at climate.audubon.org reveals that we may lose 389 species of North American birds if warming climbs to 3 degrees Celsius above pre-industrial levels. We must get to 100% clean energy and net zero emissions as soon as possible and Menunkatuck Audubon supports offshore wind's contribution to that goal.<br>Offshore wind represents the largest source of renewable energy in the Northeast region. By 2040, it is estimated that offshore wind will represent the largest share of Connecticut's renewable energy portfolio. This project will go a long way in advancing Connecticut's clean energy goals and decreasing our dependence on fossil fuels, and bring tens of thousands of jobs to our region.<br>Revolution Wind will support the state of Connecticut's target of acquiring at least 2,000 MW of offshore wind energy by | Thank you for the comment. |

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| | | 2030 and deriving 100% of the state's electricity needs from zero-carbon generation, as well as the Biden administration's goal of developing 30 Gigawatts of offshore wind nationally by 2030.<br>Offshore wind projects will provide significant economic, as well as environmental, benefits to the region. Estimates of the total economic benefits of harnessing our offshore wind potential range from $12 to $25 billion, with 77,000 - 83,000 associated jobs.<br>However, in advancing this project BOEM and Revolution wind must take every measure to avoid, minimize, and mitigate effectively for the project's impacts of collision and displacement of birds. These birds are protected by federal laws including Endangered Species Act and Migratory Bird Treaty Act.<br>It makes little sense to cause harm while seeking to do good when the harm could be avoided. | |
| BOEM-2022-0045-0011 | 1 | I support the Revolution Wind proposed offshore wind farm project and I hope it will be expedited for approval and installation. We need to increase our sources of renewable energy and we can follow Denmark's example to use wind turbines and our offshore wind capacity to generate electricity and reduce greatly our dependence on fossil fuels. Wind farms have a track record; we can look at the evidence of modern wind turbine installations offshore around the world and conclude that their impact on the marine environment and on avian migration is much less than opponents would assert. In fact, I'm sure that shipping, trawling and other fossil-fuel powered commercial marine uses have greater overall impact.<br>As Americans, we use a lot of electricity to power our businesses and homes, and in the Northeast we especially need clean sources of electricity for heating in the winter as we make a transition from gas and oil furnaces, wood burning stoves and other polluting heat sources. We know there are high rates of asthma in Connecticut and air pollution is a known contributing factor. As for aesthetic concerns, I personally think wind turbines look graceful and attractive whether on land or in the sea. I am doing my small part to fight climate change with home solar panels, a modest EV (Chevy Bolt), native planting, recycling, etc. We need systemic change and Revolution Wind Farm is part of that. I support the proposed wind farms off Long Island too. We need the clean energy. | Thank you for the comment. |
| BOEM-2022-0045-0012 | 1 | On behalf of the Eastern CT Workforce Inveshnent Board (EWIB), we would like to express support for the Revolution Wind Energy Project now under your review.<br>EWIB is a non-profit agency that serves a 41-town region as mandated through the Federal Iimovation and Opportunity Act (WIOA). Our team oversees a network of workforce-related programs funded from a variety of sources including the operations of the region's American Job Centers. We created Comlecticut's manufacturing "Pipeline" training approach via the Eastern CT Manufacturing Pipeline Initiative (MPI), which has earned national recognition as an accelerated, demand-driven model for building a sector-specific talent pipeline.<br>Revolution Wind will diversify the economy of Southeastern Connecticut, a goal of leaders across the region for years as residents and businesses here have for generations experienced the challenges associated with an economy based largely on defense spending and tourism. Each of these sectors have suffered at various points over the decades, proving that an overbearing reliance on just a few indush·ies can be harmful to a regional economy.<br>Revolution Wind, which will be built 15 miles off the Rhode Island Coast, 32 miles off the C01mecticut coast, and 12 miles off Martha's Vineyard, will provide a new source of careers for the region and state. | Thank you for the comment. |
| BOEM-2022-0045-0013 | 1 | I am writing on behalf of the MassHire Greater New Bedford Workforce Board in support of Ørsted and Eversource's Revolution Wind project.<br>The Workforce Board is a business-led, policy-setting board that oversees workforce development initiatives in the ten-community region stretching from Dartmouth to Wareham, MA. The Board is composed of business, civic, education, labor and community leaders and is appointed by the New Bedford Mayor.<br>Our partners, Ørsted and Eversource understand our mission and will add to the region's workforce development in clean energy. We recognize that the success of their offshore wind projects equates to success for the Southcoast<br>Offshore wind's continued growth is a regional economic development opportunity and a critical component of the state's clean energy future. While Revolution Wind will serve the states of Connecticut and Rhode Island, its advancement is crucial for future projects that will directly benefit Massachusetts. A win for offshore wind in our neighboring states is a win for us as we look to secure cleaner, renewable energy from several offshore wind projects in the pipeline.<br>We are encouraged by Revolution Wind's positive local economic and community impact and look to it as a model for what the industry is capable of providing in terms of job creation, supply chain opportunities, workforce development initiatives, environmental education, port redevelopment, and more. | Thank you for the comment. |

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| | | We are confident that the Ørsted and Eversource team will build a project that not only Connecticut and Rhode Island can be proud of, but all New England, including here on the Southcoast of Massachusetts. For all these reasons, we support the Revolution Wind project and offshore wind more broadly as a solution to achieving a carbon-free, clean energy future for the region. | |
| BOEM-2022-0045-0014 | 1 | On behalf of the seventeen (17) Local Trade Unions and approximately 10,000 members that comprise Rhode Island Building and Construction Trades Council I write in support of the proposed Revolution Wind project and urge your office to approve it. Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the East Coast. As we begin recovering from the unprecedented social and economic impact of the COVID-19 pandemic, the approval of the Revolution Wind project, developed by Orsted and Eversource, will directly lead to the creation of union jobs that come with good pay and benefits. As a union member, I support offshore wind and I know our council does. Large scale utility development, like offshore wind, will not only help reduce our massive carbon footprint, but will also mean a tremendous amount of economic opportunity in the form of good paying middle class jobs and careers, and community benefits.<br>I strongly believe that Americans should not have to choose between a good job and a clean environment—we can and must have both. The Revolution Wind project is an opportunity to not only drive the nation's clean energy future, but also create quality, family sustaining union jobs at the same time. I urge BOEM to move forward with Revolution Wind's permitting process. BOEM provided six alternatives for further review. Within those six alternatives, there is one that BOEM should not consider – No Action. No Action would harm our state's efforts to address climate change, while also eliminating quality job opportunities and sustainable work for hard working, local tradesmen and women that come with this project. Revolution Wind must be built. Offshore wind is critical to the future of our national security, environment and economic recovery. Accordingly, I urge BOEM to stick to its published schedule for the Revolution Wind project and put our tradesmen and women to work. Thank you. | Thank you for the comment. |
| BOEM-2022-0045-0016 | 1 | I write to express support for the Revolution Wind project. Blount Boats has been building state-of-the art vessels at our full-service shipyard in Warren for over 73 years. We've worked on a great number of complex, interesting projects throughout our long history, but it would be difficult to find a project more interesting than the vessels we are building to support the U.S. offshore wind industry, including Revolution Wind.<br>We had the opportunity to build the Atlantic Pioneer, America's first service vessel solely dedicated to supporting offshore wind farms. Since then, Blount Boats has emerged as a leader in the CTV space, having built two of the three U.S. flagged CTVs in operation. And thanks to Revolution Wind, we're building more.<br>We appreciate BOEM's careful consideration of the Revolution Wind project and understand that BOEM provided six alternatives for further review. Within those six alternatives, there is one that BOEM should not consider - No Action. Without action, Rhode Island will not realize Revolution Wind's tremendous potential to create jobs and grow the supply chain. Revolution Wind is good for Rhode Island's economy and the region's environment. We at Blount Boats urge you to approve this project and keep our state's momentum going. | Thank you for the comment. |
| BOEM-2022-0045-0018 | 1 | I am writing on behalf of the Connecticut Business & Industry Association (CBIA) in support of Ørsted and Eversource's Revolution Wind project. The project is Connecticut's first offshore wind farm and will help the state achieve its goal of a 100 percent zero-carbon electricity supply by 2040. It will deliver 304 megawatts of renewable energy to the state as well as 400 megawatts to Rhode Island – enough to power more than 350,000 homes across both states.<br>While the clean energy merits of Revolution Wind are substantial on their own, another exciting benefit for Connecticut is the project will help launch the state's next great maritime industry from the Port of New London. Revolution Wind is one of three Ørsted and Eversource projects that will stage and assemble wind turbines at the newly redeveloped State Pier, a long-underutilized state asset that is being transformed into a modern, heavy-lift capable port facility.<br>This transformative port infrastructure project is creating an offshore wind industry hub now and will position the facility to serve a broader range of industries, cargo and vessels while receiving significant funding from Ørsted and Eversource to achieve this goal. Once transformed into a state-of-the-art, heavy-lift terminal, State Pier will be a world-class resource for Connecticut for decades to come and will reestablish New London as a hub for global commerce. State Pier will help put the Port of New London back on the map as the epicenter of Connecticut's maritime economy while increasing revenues for the state.<br>State Pier will also play a vital role in the fight against climate change, supporting the construction of Ørsted and Eversource's South Fork Wind (starting in early 2023), followed by Revolution Wind and Sunrise Wind projects. Collectively | Thank you for the comment. |

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| | | these wind farms will provide enough clean energy to power more than one million homes in the Northeast.<br>Additionally, State Pier will become a regional hub for the offshore wind industry, serving as an anchor to attract other aspects of the offshore wind industry supply chain to the region and the state. The Port of New London's proximity to all wind farms off the southern New England coast makes it the primary staging and shipping point for projects in those waters.<br>The redevelopment of State Pier is already creating jobs, including those for Connecticut's building trades. More than 400 well-paying construction jobs are anticipated by the project's completion in 2023. It is estimated that the project will add millions of dollars in value to the New London economy, with workers and visitors frequenting local establishments to eat and shop.<br>As a staging and assembly hub for Ørsted/Eversource projects, vessel activity will significantly increase at State Pier and generate high-skilled, long-term employment in New London. The companies anticipate 80 to 120 well-paying offshore wind-related positions at the site.<br>The State Pier and Revolution Wind projects are important for Connecticut's leadership in the green economy and its ability to assist the national effort to reduce our carbon footprint, while also helping diversify the region's economy. They serve as a catalyst for the endless possibilities for our region's future. In addition to the hundreds of construction jobs, including union laborers, that have already been created on-site at State Pier in recent months, it is exciting to think about the future creation of a robust offshore wind ecosystem in the region thanks to the revamped port and Revolution Wind. | |
| BOEM-2022-0045-0019 | 1 | Dear Program Manager:<br>Building Futures' mission is to meet employer and industry needs for skilled workers through registered apprenticeship and create family-sustaining career opportunities for Rhode Island's diverse community members. Our successful building trades' pre-apprenticeship program is nationally recognized for its efficacy and comprehensive approach. To date, three-hundred and sixty men and women have graduated our pre-apprenticeship program and launched their careers as apprentices in one of twelve building and construction trades.<br>Offshore wind is an investment in our future. Revolution Wind has already made a significant training commitment to ensure that diverse community residents experiencing poverty are not left out of this future. Instead, they will have a clear path to family sustaining careers through Registered Apprenticeships in the construction trades.<br>Large-scale utility development, like offshore wind, will help reduce our massive carbon footprint and create economic opportunity in the form of jobs and community benefits. The approval of the Revolution Wind project, developed by 0rsted and Eversource, will directly lead to the creation of union jobs that come with good pay and benefits.<br>The Revolution Wind project is an opportunity to not only drive the nation's clean energy future, but also create quality, family sustaining union jobs at the same time. I urge BOEM to move forward with Revolution Wind's permitting process.<br>BOEM provided six alternatives for further review. Within those six alternatives, there is one that BOEM should not consider - No Action. No Action would harm our state's efforts to address climate change, while also eliminating quality job opportunities and sustainable work for hard working, local tradesmen and women that come with this project. Revolution Wind must be built.<br>Offshore wind is critical to the future of our national security, environment and economic recovery. We urge BOEM to stick to its published schedule for the Revolution Wind project and put our tradesmen and women to work.<br>Sincerely,<br>Andrew L. Cortes<br>Executive Director | Thank you for the comment. |
| BOEM-2022-0045-0020 | 1 | Dear Program Manager:<br>I am writing on behalf of the Massachusetts Business Roundtable in support of 0rsted and Eversource's Revolution Wind project. Our organizational mission is to strengthen the state's economic vitality by engaging with public and private leaders to develop public policy solutions that make Massachusetts a more competitive, desirable place to do business within the global economy. Two of our members, 0rsted and Eversource, understand this mission and are leaders in the clean energy industry in our region. We recognize that the success of offshore wind projects equates to economic growth for the Commonwealth.<br>Leaders from our member institutions, who employ more than 250,000 people in Massachusetts, have made it resoundingly clear that clean energy is imperative to the long-term success of our state and region. In fact, continuing our support for offshore wind development as a regional economic development opportunity and essential component of the state's clean | Thank you for the comment. |

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| | | energy future has been a key component of the Roundtable's public policy again. Projects like Revolution Wind will help address climate change and achieve a carbon-free economy while simultaneously creating jobs and new business opportunities for companies in Massachusetts and beyond.<br>We are encouraged by Revolution Wind's positive local economic and community impact and look to it as a model for what the industry is capable of providing in terms of job creation, supply chain opportunities, workforce development initiatives, environmental education, port redevelopment, and more. The Roundtable has been engaged in initiatives to ensure a pipeline of skilled workers are available as the industry grows and matures.<br>We are confident that the 0rsted and Eversource team will build a project that will be of great benefit to our region and we are pleased to express support for the Revolution Wind project and offshore wind more broadly as a solution to achieving a carbon-free, clean energy future for the region.<br>Sincerely,<br>JD Chesloff<br>President & CEO | |
| BOEM-2022-0045-0023 | 1 | I am writing to show my support for the offshore wind industry here in the U.S. and to thank your agency for its work in releasing the draft Environmental Impact Statement for Revolution Wind. Please accept this letter to serve as a formal statement of support for the project.<br>The North Kingstown Chamber of Commerce is one of Rhode Island’s leading business membership and trade organizations located in North Kingstown, RI that includes the Quonset Business Park that employs more than 10,000 people within over 200 businesses. Quonset, the home to Port Davisville, has served as the staging, storage, and assembly area for wind turbine equipment and continues to serve the offshore wind industry today.<br>While offshore wind is a developing industry for the U.S., it is a proven industry that began right here in Rhode Island with the Block Island Wind Farm. Now, we’re looking to continue the momentum with the Revolution Wind project. Revolution Wind is making investments in our ports, workforce training, institutions of higher education, and creating opportunities for businesses in the local supply chain. We need Revolution Wind to be built.<br>We appreciate BOEM’s careful consideration of the Revolution Wind project and understand that BOEM provided six alternatives for further review. Within those six alternatives, there is one that BOEM should not consider – No Action. Without action, Rhode Island will not realize Revolution Wind’s tremendous potential to create jobs and grow the supply chain.<br>Revolution Wind is good for Rhode Island’s economy and the region’s environment. I urge you to approve this project and keep our state’s momentum going. | Thank you for the comment. |
| BOEM-2022-0045-0021 | 1 | To whom it may concern,<br>It is with great enthusiasm that I write you in support of the Revolution Wind energy project.<br>While the overall goal for project partners Ørsted and Eversource is to deliver clean, sustainable energy derived from offshore wind power, this project also will deliver jobs and economic development opportunities for New London County and the state.<br>And the hub for all of this economic energy is State Pier in the City of New London, which is ranked as the fourth most economically distressed city in Connecticut. This is not a small point. For decades New London has sought to revive its once bustling downtown, which in its heyday was the center of commerce in southeastern Connecticut. From its days as an international hub for the whaling industry to its role as the county leader in retail commerce and professional services, New London for generations drove the regional economy.<br>Decades of decline and false starts followed. Now, however, Revolution Wind, in its role at the forefront of the nation’s offshore wind industry, is providing the foundation for a distressed city’s rebirth as the leader in economic opportunity for the region.<br>The development of offshore wind projects such as Revolution Wind, which will be staged, assembled, and shipped from State Pier will create more than 100 ongoing, well-paying, pre-assembly positions, as well as thousands of other indirect and induced jobs throughout the state and region to support the facility and its workers.<br>Ørsted and Eversource, through Revolution Wind, are contributing nearly $100 million to help transform State Pier from an underutilized asset into an offshore wind energy hub, and a modern, heavy-lift capable marine terminal that can process a far wider variety of cargo than it has in the past. | Thank you for the comment. |

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| | | Additionally, Revolution Wind means direct investment in the City of New London, which is guaranteed at least $5.25 million in payments over seven years, or $750,000 annually, as Ørsted and Eversource use State Pier. Combined with payments from other project partners, the city will realize more than $1 million in new revenue to its general fund. In addition to these benefits, Ørsted and Eversource have committed millions of dollars in community development in Connecticut to support offshore wind supply chain and workforce development, maritime research, STEM education, and local fishing.<br>Perhaps most importantly, Revolution Wind will diversify an economy that has long been primarily dependent on the insurance, defense, and aerospace industries.<br>Thank you for this opportunity to voice my support for Revolution Wind. | |
| BOEM-2022-0045-0095 | 1 | ConservAmerica, a nonprofit organization that promotes market-based solutions to today's environmental, conservation, and energy challenges, is pleased to support Revolution Wind, the offshore wind farm that will provide electricity to Connecticut and Rhode Island. Our organization is focused on fostering relationships between policymakers and stakeholders in order to protect the environment and grow the economy. We believe in the development of clean, affordable energy and the reduction of carbon emissions. Revolution Wind helps to accomplish both of those goals.<br>Revolution Wind will deliver over 700MW of electricity, enough to power 350,000 homes. Not<br>only will the project help to satisfy the country's growing demand for electricity, it will help both Connecticut and Rhode Island to meet their clean energy goals. The Bureau of Ocean Energy Management's Draft Environmental Impact Statement (DEIS) provides a meticulous review of the potential impacts and various alternatives for Revolution Wind. It is reassuring that the DEIS found negligible or minor adverse impacts on animal populations, tourism and recreation, and coastal communities.<br>Additionally, the project will provide significant economic benefits. It is projected that the construction of the wind farm will create roughly 1,200 direct jobs, as well as dozens of permanent positions in operations and maintenance once construction is completed. We also understand that that the developers have committed $77.5 million to redevelop Connecticut's New London State Pier and $40 million to improve Rhode Island's port infrastructure. These investments will boost economic activity in both states while creating and supporting hundreds of jobs.<br>The findings of the DEIS demonstrate that the "No Action Alternative" should not be pursued. If the No Action Alternative is taken and the project does not proceed, its associated benefits, which include eliminating an estimated one million metric tons of carbon dioxide emissions, powering hundreds of thousands of homes and creating many good paying jobs, would not be realized.<br>We appreciate BOEM's diligence in preparing the DEIS and reviewing public comments. For the reasons stated above, ConservAmerica supports the continued development of Revolution Wind. | Thank you for the comment. |
| BOEM-2022-0045-0094 | 1 | (Revolution Wind) submitted to the U.S. Bureau of Ocean Energy Management (BOEM).<br>Revolution Wind and the several other projects in adjacent lease areas that are now under contract are essential to realize President Biden's goal of deploying 30 gigawatts of offshore wind in the United States by 2030. Approval of offshore wind projects are pivotal for states on the Atlantic Coast to realize their economic development potential from renewable energy.<br>A recent economic development study from American Clean Power (as the former the American Wind Energy Association) reported that offshore wind development off the Atlantic Coast could translate into $57 billion in direct investment, add $25 billion in annual economic output and create 83,000 well-paying jobs by 2030, all while stabilizing retail electricity rates and emitting no climate-altering greenhouse gases.<br>It will help New England reach its goals for renewable energy and reduction of greenhouse gas emissions. The two states contracting with Revolution Wind have requirements for a clean energy power grid. Connecticut has established a 100 percent zero carbon electric sector by 2040 goal while Rhode Island requires 100 percent of electricity demand be from renewable energy by 2033.<br>RENEW recognizes that offshore wind projects must be developed with strong, and reasonable, protections in place to protect our coastal and marine environment and wildlife. On behalf of RENEW, I offer my appreciation to BOEM for working to ensure offshore wind development is accomplished responsibly.<br>BOEM's determination on Revolution Wind and other projects advanced in permitting will send a clear message to the entire offshore wind industry in welcoming it to continuing its majorinvestments in this new clean energy sector. | Thank you for the comment. |
| BOEM-2022-0045-0090 | 1 | Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the East Coast.<br>As we begin recovering from the unprecedented social and economic impact of the COVID-19 pandemic, the approval of the | Thank you for the comment. |

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| | | Revolution Wind project, developed by Orsted and Eversource, will lead to significant job creation and economic development.<br>The Revolution Wind project is an opportunity to advance a future for clean energy and create quality, family sustaining union jobs at the same time. RIAGC urges BOEM to move forward with Revolution Wind's permitting process.<br>The use of renewable energy alternatives, like wind energy, are important to addressing our nation's efforts to develop clean energy. These issues directly impact our nation's national security, environmental concerns, and economic recovery. We urge your support. | |
| BOEM-2022-0045-0087 | 1 | Vaisala has long been committed to renewable energy and is in full support of the construction and operations plan (COP) submitted by Revolution Wind, LLC (Revolution Wind) for its proposed Revolution Wind Offshore Wind Farm Project (Project) offshore Rhode Island. As a weather and environmental technology leader for more than 85 years, Vaisala is very encouraged by the recent renewed commitment to offshore wind energy and we are in full support of this project. | Thank you for the comment. |
| BOEM-2022-0045-0078 | 1 | Revolution Wind's commercial-scale offshore wind energy facility is needed to fulfill three Power Purchase Agreements (PPA): a 200-MW contract with the State of Connecticut approved in January 2019, a 400-MW contract with the State of Rhode Island approved in June 2019, and a 104-MW contract with the State of Connecticut approved in December 2019. These projects contribute to Connecticut's legislative directive to purchase 2,000 megawatts (MW) of offshore wind energy by 2030, and Rhode Island's 100% renewable energy goal by 2030. Several decarbonization studies have concluded that New England alone will need between 30-45GW from offshore wind to achieve 80% greenhouse gas reductions by 2050. And these estimates may be low given that Massachusetts now requires an 85% reduction in greenhouse gas emissions and many New England states have 100% renewable energy or clean energy mandates. | Thank you for the comment. |
| BOEM-2022-0045-0077 | 1 | New England is perfectly positioned to seize the environmental, economic, and public health benefits of offshore wind power. While energy demand is high and new clean energy options are few, we are within reach of one of the strongest offshore wind resources in the world. The Bureau of Ocean Energy Management's swift and thorough review of Revolution Wind's Construction and Operations Plan is critical for us to stand up this clean energy solution in a timely and responsible manner. Offshore wind energy is in a unique position to address the unprecedented and intersecting environmental, public health, and economic crises that exacerbate racial and social injustices. We can transition away from fossil fuels that are concentrated in low-income and communities of color, and develop this renewable energy resource with attention to stakeholder input, improving access to public comment opportunities to ensure that impacts are properly evaluated. We can prioritize training a local workforce and people that have been the hardest hit by the COVID-19 pandemic, and revitalize U.S. manufacturing to maximize economic benefits from this industry. And we can protect wildlife and ecosystems while we do it, requiring the use of best management practices informed by the latest science. We can do all of this – and we must.<br>We have no time to lose in advancing clean energy solutions that rise to the environmental, economic, and public health crises our nation faces. It's time to chart another course, and make responsibly developed offshore wind power a pillar of our energy future. I urge you to act expediently and with thorough care to complete the environmental review of Rhode Island and Connecticut's Revolution Wind project. | Thank you for the comment. |
| BOEM-2022-0045-0068 | 1 | After a careful review of the Draft Environmental Impact Statement, I am confident that completion of this important offshore wind farm will have be a substantial net positive for our country, particularly as it relates to expanding our nation's energy infrastructure, diversifying our electricity portfolio, and growing our economy. As your office moves forward, it is my hope that you reach the same conclusion GAIN has: that completion of this project is in the best interest of the country and deserves approval.<br>The GAIN coalition represents a diverse coalition of businesses, trade associations, and labor groups that share a vested interest in creating jobs and strengthening our nation's economy through infrastructure development. Investing in our nation's infrastructure creates both long and short-term benefits for our communities, and keeps our economy competitive in an increasingly global marketplace. It provides good paying jobs, an additional tax base to local schools and municipal services, increased safety for the movement of goods and people across the country and added revenues for small businesses throughout the supply chain.<br>Our country continues to deal with stubbornly high inflation, driven in large part due to surging energy and electricity costs. The last several months have shown the need for the United States to increase the supply of energy infrastructure, particularly when it comes to production capacity. Supply imbalances, caused by a combination of foreign conflict, | Thank you for the comment. |

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| | | government policy misfires, supply chain disruptions, and lingering effects from Covid-19 have created a volatile period in energy commodity prices. Consequently, American families are paying considerably more for the electricity that powers there home.<br>Nevertheless, private sector businesses need long-term certainty as they deploy their capital into energy infrastructure projects. Government plays a critical role in this. When businesses make decisions on where to put their own capital, or from investors, they need signals from Washington that reflect the importance of energy production, encourage industry investment, and ensure the supply of affordable and reliable energy. This consistent approach will help spur further investment into all types of energy production, whether it be oil and gas, or other renewable sources like solar, nuclear, and wind. Specific to your agency is how we scale the utilization of energy production that lies just off the coasts. Offshore wind energy must be part of an all-of-the-above strategy for America's energy<br>future, and we must deploy it expeditiously.<br>This power source is already widely utilized across developed parts of the world, but only a handful of turbines are operational here in the United States, like the Block Island Wind Farm and the Coastal Virginia Offshore Wind Farm, for example. Despite the slow start, due largely to government policies, the private sector has dedicated significant capital into the research and development of renewables in order to expand the slate of resources that can reliably and affordably power our electricity grid. That is why the completion of Revolution Wind is so important. This project will have the capacity to generate up to 704 Megawatts of clean power between Rhode Island and<br>Connecticut. Importantly, private sector investments into offshore wind will help to meet both Rhode Island's recently signed law to acquire 100 percent of its electricity from renewable sources by 2033 and Connecticut's goal of reaching zero carbon emissions by 2040. On a broader level, Revolution Wind will help us meet President Biden's national goal of 30 GW of offshore wind power by 2030.<br>Rhode Island has been on the cutting edge of offshore wind, as it is home to country's very first offshore wind farm at Block Island. While that project is relatively small, it showcased the viability of this power source. Now, following in the footsteps of the Block Island Wind Farm, Revolution Wind will be the first large-scale commercial project for the Ocean State. Once approved and operational in 2025, it will generate enough clean energy to power more than 350,000 Connecticut and Rhode Island homes.<br>Importantly, offshore wind is reliable and far less intermittent compared to wind onshore, making this electricity more reliable and dependable. The addition of offshore wind power to the Ocean State's energy grid will ensure ratepayers and customers benefit from a diverse set of resource types, which would be a departure from its current generation capabilities. According to the Energy Information Administration, Rhode Island generates nearly 90 percent of its electricity from natural gas, the largest share of any state in the country.<br>BOEM's approval of Revolution Wind is critical. In the Draft Environmental Impact Statement, your agency, the "No Action Alternative" is not feasible. Under the No Action Alternative, the benefits of the project would not happen, benefits which include cleaner air quality due to the reduction of greenhouse gasses, local job creation, tax revenues and more. The industry's growth also provides us a rare opportunity to revitalize manufacturing and port communities throughout the nation. Revolution Wind, a joint partnership between Orsted and Eversource, is investing heavily in Rhode Island and Connecticut, to which the developers have committed to spending hundreds of millions of dollars and creating thousands of jobs in the process. For example, they are spending $77.5 million of a $157 public-private partnership with the State of Connecticut and Connecticut Port Authority to re-develop New London State Pier into a heavy-lift cargo and deep-water port and $40 million in improvements to Rhode Island's port infrastructure. At the same time, the cost of the project is estimated to total $1.5 billion – a sizable investment.<br>The investments and facilities that the project supports will support job creation. The project will create approximately 460 construction jobs for the redevelopment of State Pier, new supply chain jobs, and an estimated 1,200 direct construction jobs and dozens of permanent operations and maintenance jobs in Connecticut and Rhode Island combined Under the No Action Alternative, the benefits of the project would not happen, including cleaner air quality due to the reduction of greenhouse gasses, local job creation, tax revenues and more.<br>From my perspective, this is a scenario that should not occur. Simply put, Revolution Wind delivers for Rhode Island and Connecticut. I again thank BOEM and its staff for their diligence in preparing the DEIS, and for soliciting public comments. In conclusion, the GAIN Coalition fully supports Revolution Wind for the aforementioned reasons. I am confident it will be a defining standard for the next generation of energy generation, and in helping our country become energy independent. | |

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| BOEM-2022-0045-0067 | 1 | I proudly served for over two decades in the US Army Corps of Engineers (USACE), where I was privileged to reach the title of District Commander (Three times). In my role in the USACE, Energy infrastructure projects help the United States to maintain energy independence, as well as create thousands of jobs while producing affordable energy for American homes. For these reasons, I am pleased to comment in favor of Revolution Wind, a proposed offshore wind project that is currently undergoing review through an environmental impact statement by BOEM. The project will be located 15 miles off the coast of Rhode Island and 32 miles off the coast of Connecticut. Once completed, Revolution Wind will produce 704 MW of clean, renewable energy - enough to power 350,000 Connecticut and Rhode Island homes and eliminate over one million metric tons of carbon pollution during its projected 25-year lifespan. This year especially, everyday Americans were plagued with unstable energy prices, and with OPEC's recent decision to cut oil production by two million barrels a day, high energy prices will be a reality for many going into the winter. That is why it is crucial that we continue to fund and approve projects like Revolution Wind, to enable the U.S. to become more energy independent and secure, and not having to rely on foreign sources. Additionally, to meet our country's ever growing energy needs, we need to start focusing on an<br>all of the above approach and realize the incredible potential of adding more renewables to our energy portfolio. As it stands, the U.S.'s offshore wind presence is meager compared to that of other developed nations. The completion of Revolution Wind will showcase the massive energy generating and job creating potential that offshore wind has to offer, hopefully inspiring other states to consider offshore wind to power their homes and businesses. Its construction will also be good for the economy, as it is projected to create 1,200 good-paying jobs during its construction phase alone. Additionally, the project will generate thousands of other indirect jobs by boosting the local economies of its host communities, and through third party businesses that will need to be hired as part of the construction and review process. If that wasn't enough, Revolution Wind has additionally committed over $70 million to a publicprivate partnership with the State of Connecticut to redevelop the New London State Pier, a project that is expected to create 460 construction jobs. Additionally, the project will invest $40 million towards improving Rhode Island's port infrastructure, which will directly create construction jobs along with indirect jobs by boosting the port areas' respective economies. I hope that this comment has made clear the wide and diverse range of benefits that the Revolution Wind project will bring to not just the states of Connecticut and Rhode Island, but also the US as a whole by strengthening our energy portfolio. I strongly encourage BOEM to not pursue the No Action Alternative, and to allow this project to proceed in a timely fashion. | Thank you for the comment. |
| BOEM-2022-0045-0066 | 1 | Americans across the country struggled this year to keep up with record levels of inflation and the sky-high cost of energy. The current reality is that now more than ever, the United States needs to double down on domestic energy production and diversify the sources of power that feed into the energy grid. To meet such a goal, it is crucial that we promote the development of all types of energy sources, whether it be fossil fuels or renewable power. Both will be sure to play a key role in meeting America's future energy needs.<br>I am writing to you in support of Revolution Wind, an offshore wind farm that will be constructed off the coasts of Rhode Island and Connecticut. The project - which is currently in its pre-development phase, having its Construction & Operations Plan (COP) and Draft Environmental Impact Statement (DEIS) reviewed by the Bureau of Ocean Energy Management (BOEM) - is set to be operational in 2025. Projects like Revolution Wind showcase the untapped potential of offshore wind to provide cost-effective power to American homes while supporting the local economy and creating jobs.<br>Once its construction plans are approved by BOEM, Revolution will be developed 15 miles off the coast of Rhode Island and 32 miles southeast of the coast of Connecticut. Positioning both these states as offshore wind leaders, Revolution Wind is projected to deploy 704 MW of offshore wind-generated energy, which will be enough to power 350,000 Connecticut and Rhode Island homes. This energy will be produced right close geographically to the consumers. As for reliability, offshore wind turbines are capable of generating energy nearly twenty-four hours a day. At the same time, this project, like other wind projects, would rely on a form of baseload power, such as coal, oil, gas, reserving a role for fossil fuels. As former Chairman of the Oklahoma Corporation Commission - the state's regulator for oil and gas drilling, utilities and telecommunications companies - my expertise lies in energy and utility pricing related matters. As such, it is my opinion that Revolution Wind will meet the need for competitively priced renewable energy and additional capacity, aligning with energy demands and goals respective to Connecticut, Rhode Island, and the region as a whole.<br>In addition to meeting both Rhode Island and Connecticut's renewable energy goals, the Revolution Wind project will bring an economic boost to its host communities and states. Revolution Wind is committed to investing nearly $160 million into the Connecticut economy, which will go towards redeveloping the New London State Pier and creating hundreds of good paying construction jobs. The project will additionally invest $40 million into improving Rhode Island's port infrastructure, | Thank you for the comment. |

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| | | bringing jobs and further economic activity to the waterfront area by supporting local businesses. Development of Revolution Wind itself is estimated to create 1,200 union-backed jobs in Rhode Island and Connecticut during its construction phase, along with dozens of competitive, permanent jobs in its operations and maintenance facilities. Thousands of additional indirect jobs will be generated through partner companies that support the project - such as wildlife monitoring companies - as well as boosting profits for local businesses that operate in the port areas.<br>I am pleased to offer my support of the continued development of the Revolution Wind offshore wind farm, and encourage BOEM to not pursue the No Action Alternative in response to the DEIS. Americans need an "all of the above" solution to the global energy crisis, and Revolution Wind has the potential to pave the way for future creative energy solutions such as offshore wind, while creating good paying, reliable jobs. | |
| BOEM-2022-0045-0029 | 1 | With climate change due to the burning of fossil fuel, development of wind power is a "must" for the benefit of the next generation. Complaints about the visual impact of the wind farm are self centered and the alleged potential impact to fisheries without scientific merit. | Thank you for the comment. |
| BOEM-2022-0045-0030 | 1 | I am the President of the Southeastern Wind Coalition, a non-profit with the goal of bringing economic benefit to industry, utilities, ratepayers, and residents of the Southeast through wind energy. I write to you today in support of the Revolution Wind project.<br>We are presented the opportunity here to shape the United States' burgeoning offshore wind industry in a way that will benefit both communities and the environment for decades to come. In the wind energy industry, we have the unique and essential ability to replace outdated energy infrastructure with clean energy production. In replacing such systems, many of which have historically contributed to environmental degradation and injustice, we bring jobs to communities which often are disproportionately negatively affected by carbon intensive energy production.<br>Rhode Island has already pioneered the entry of offshore wind in the United States with the Block Island wind project. A project which has proved popular amongst the community and has eliminated the Island's reliance on highly pollutive diesel fuel. Rhode Island stands to make further gains towards a carbon neutral energy system with the supplement of wind energy in the Revolution Wind project.<br>We are positioned to create the kind of green economy that can save our planet, produce well paying jobs for the local economy, and reduce undue burdens placed on communities in proximity to antiquated, carbon intensive energy production. The Revolution Wind project is a step significant towards a better Rhode Island for generations to come.<br>There are so few opportunities to get in on the ground floor of economic and environmental revolution. We have one here and it is up to us to seize it. To establish new supply lines. To build new relationships. To create new markets. Having worked closely with representatives from 0rsted and Eversource for 4 years we can attest to the high quality of their corporate citizenship.<br>In closing, as president of the Southeastern Wind Coalition, I believe Revolution Wind will provide a future not just for our industry, but for the country and the planet as a whole. I ask you to approve the permitting for Revolution Wind. | Thank you for the comment. |
| BOEM-2022-0045-0033 | 1 | The Northeast Clean Energy Council ("NECEC") appreciates the opportunity to provide comments to the Bureau of Ocean Energy Management ("BOEM") on the Revolution Wind project (the "Project") proposed by Ørsted and Eversource. The Project presents a crucial opportunity to the states of Connecticut and Rhode Island to achieve their increasingly ambitious renewable energy goals,1 but also welcomes an opportunity for major economic development benefits and a more reliable, dynamic electric grid. Thus, NECEC urges BOEM to review the draft environmental impact statement ("DEIS") within this context and to adhere to the published schedule for the Revolution Wind project as it moves through the EIS process.<br>NECEC leads the just, equitable, and rapid transition to a clean energy future and a diverse climate economy. It is the only organization in the Northeast that covers all clean energy market segments, representing the business perspectives of investors and clean energy companies across every stage of development. Our members span the broad spectrum of the clean energy industry, including clean transportation, energy efficiency, wind, solar, energy storage, microgrids, fuel cells, and advanced and "smart" technologies.<br>The expansion of offshore wind capacity is essential for realizing greenhouse gas ("GHG") emission reduction commitments across the region and around the world. Today, offshore wind provides a major opportunity for emissions reductions due to high capacity factors, technological advancements, and economies of scale. The 704MW Project will deliver enough clean, renewable energy to power more than 350,000 homes across both states, keeping Rhode Island on track to meet its goal of 100% renewable energy by 2033 and helping Connecticut achieve its decarbonization commitment. | Thank you for the comment. |

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| | | NECEC supports the development of offshore wind to reduce GHG emissions in the region and improve local air quality by either displacing existing fossil fuel generation or preventing the development of new fossil plants. In the Northeast, electric sector emissions have already dropped substantially since 1990, largely due to cheap and abundant natural gas. It must be noted, however, that our over-reliance on natural gas generation has caused supply and cost challenges in New England, limits further emissions reductions, and carries significant methane leakage risks. Methane leakage poses a significant concern due to its GHG potency and prevalence of use.2 For these reasons, we will have to dramatically reduce and eventually phase out natural gas generation over the coming decades. Revolution Wind will enable this transition by providing emission free electricity,3 lowering the local reliance on natural gas generation.<br>Moreover, states are seeing major hikes in electricity supply rates due to an over-dependence on fossil fuel generation, most notably natural gas. Rhode Island is facing over 50% price increase this winter. Via the Revolution Wind project, these states will be able to diversify their electricity portfolio. allowing them to be less susceptible to global market shifts in the future and contributing more stable electric costs.<br>Lastly, the Project also presents a tremendous opportunity for economic development and job creation. To support the Project, Orsted and Eversource are proposing over $115 million to support port infrastructure redevelopment in both states, along with significant commitments to offshore wind education, supply chain, and workforce development. The Revolution Wind project is estimated to generate 1,200 jobs across both states during its construction phase and dozens of well-paying, fulltime operations and maintenance positions overseeing and servicing the wind farm. Thousands of indirect and induced jobs are also anticipated, ranging from local suppliers constructing crew transfer vessels and monitoring wildlife and the seabed around the project, to local businesses who provide goods and services within the vicinity of the ports in which Ørsted and Eversource will operate.<br>NECEC understands and respects the need for BOEM to conduct a thorough EIS process but urges BOEM to keep to its published schedule for Revolution Wind. The approval of the Revolution Wind project will help create a cleaner, greener, and more sustainable Rhode Island and Connecticut. We appreciate the opportunity to provide these written comments. Thank you and please contact us with any questions. | |
| BOEM-2022-0045-0034 | 1 | Please approve as much offshore wind energy as possible - our climate, economy, energy supply, national security and public health desperately need it! | Thank you for the comment. |
| BOEM-2022-0045-0035 | 1 | On behalf of the Greater Boston Chamber of Commerce and our 1,300 members, I write in support of the Revolution Wind Energy Project, which will help support the national goal of generating 30 gigawatts of electricity from offshore wind power by 2030. The Chamber strongly supports development of the offshore wind industry to access clean, reliable, and renewable sources of energy for Massachusetts and the rest of New England. Offshore wind energy is essential to achieving greenhouse gas emissions reductions, diversifying our region's electric generating resources, and helping to curb the impacts of climate change. The development of this industry will also create jobs and stabilize energy prices, providing economic benefits to our region as well.<br>New England states are well positioned to lead this national effort based on access to the relatively shallow waters of the Continental Shelf, which provides the ability to install wind power turbines efficiently from our ports. Revolution Wind will be located 12 miles off Martha's Vineyard, 15 miles off the Rhode Island coast, and 32 miles off the Connecticut coast and will deliver clean energy to 350,000 homes annually in Rhode Island and Connecticut. While the project does not provide power directly to Massachusetts, the regional success of the offshore wind industry is essential to achieving climate goals and providing the clean power all of New England needs to ensure reliability and stability of our electric grid.<br>Massachusetts, Connecticut, and Rhode Island have all made commitments to carbon-free electric grids and to offshore wind power. Working together, these commitments represent significant efforts to fight climate change with a regional approach.<br>In August, Massachusetts Governor Charlie Baker signed An Act driving clean energy and offshore wind, which included specific offshore wind power provisions as part of a broad effort to address environmental challenges. The Legislation reaffirmed the state's commitment to the offshore wind industry, including the development of 10GW of offshore wind generating resources by 2035. Massachusetts was the first state in the nation to pass comprehensive offshore wind legislation and helped launch the industry in the United States.<br>In May, Connecticut Governor Ned Lamont signed into law the state's commitment to a carbon-free electric grid by 2040, codifying an Executive Order he issued in 2019. | Thank you for the comment. |

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| | | In June, Rhode Island Governor Daniel McKee signed legislation requiring that 100 percent of Rhode Island's electricity be offset by the production of renewable energy sources by 2033. This is the most aggressive renewable energy standard in the nation. These individual efforts to pursue clean, sustainable, offshore wind power will contribute to the shared New England power grid, meaning each state can help its neighbors attain carbon-free electricity goals. Additionally, as recent global events have made clear, domestic, sustainable energy production is also vital to our nation's energy security.<br>Revolution Wind is at the forefront of the national commitment to sustainable, clean energy production, and by virtue of its connection to the New England power grid, the entire region can be proud to support this nation-leading project to fight climate change and advance energy security. | |
| BOEM-2022-0045-0036 | 1 | I am writing to you today in support of the Revolution Wind project. As America grows its offshore wind industry, we have the opportunity to shape the future of the energy market in the United States.<br>BlastOne International is a Columbus OH based company who builds facilities and equipment for surface preparation and painting on large steel structures. The wind energy (especially offshore!) has been a significant part of our business, and we are proud to be building the first monopile blast and paint facility for EEW in Paulsboro NJ!<br>We have the unique opportunity to build the future of the energy industry in our country. We are uniquely positioned to build the future of the green-energy industry in the US through the creation of lucrative job opportunities that will be sought after by those looking to build their American dream, create families, and purchase homes. We have the opportunity to create a green economy that will save our planet and deliver the next generation a cleaner environment and stronger future.<br>It is a rare opportunity to get in on the ground floor of an economic revolution. This is our window to impact the future through the creation of new relationships, supply lines, and new markets. We are proud to be a part of this revolution.<br>BOEM provided six alternatives for further review. Within those six alternatives, there is one that BOEM should not consider – No Action. No Action could hinder further development of the U.S. offshore wind domestic supply chain. The supply chain needs clarity and confidence that projects can move forward, and in a timely manner. We need Revolution Wind to be built. Revolution Wind is good for the economy, environment, and our nation's energy security. I urge you to approve this project on its current timeline and keep our industry working. | Thank you for the comment. |
| BOEM-2022-0045-0044 | 1 | Climate change is the greatest challenge of our time and our future depends on fighting it head-on. We see these impacts directly along our coast. Rising sea levels, stronger storms, impacts to wildlife, coastal erosion – and the crisis is only getting worse. There is momentum here in Rhode Island and across the country to achieve a clean energy future. It's clear that offshore wind must be a part of that solution.<br>The Revolution Wind project being developed jointly by Orsted and Eversource, represents a cleaner energy future for Rhode Island, ensuring that offshore wind energy, wildlife and our natural resources thrive together. Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the East Coast. As we begin recovering from the unprecedented social and economic impact of the COVID-19 pandemic, the approval of the Revolution Wind project, developed by Orsted and Eversource, will help create a cleaner, greener, more sustainable Rhode Island.<br>The transition to clean energy is critical as Rhode Island continues to focus on bringing more clean, carbon-free sources to the region. Rhode Island has the most ambitious clean energy goal in the nation: 100 percent renewable energy by 2030. Revolution Wind is critical in helping Rhode Island meet that goal.<br>BOEM provided six alternatives for further review. Within those six alternatives, there is one that BOEM should not consider – No Action. No Action would harm our state's efforts to address climate change, increase our reliance on fossil fuels, and decrease the environmental benefits that will be realized by this project.<br>I understand the environmental concerns that offshore wind presents to some concerned with the well-being of our natural resources. Ongoing engagement, education and outreach, combined with plans to avoid and mitigate any disturbances are part of the process and I have full confidence that Revolution Wind will build a project that we all can be proud of.<br>I urge BOEM to stick to its published schedule for Revolution Wind and make this project a reality. | Thank you for the comment. |
| BOEM-2022-0045-0045 | 1 | On behalf of the working men and women of the International Union of Painters and Allied Trades District Council 11 (IUPAT DC 11) I am writing in support of the Revolution Wind farm project.<br>IUPAT DC 11 represents two thousand plus finishing trades workers across Rhode Island, Connecticut, and Massachusetts. The experience of our Painting and Industrial Coating Application Specialists working on the Block Island Wind farm project was fundamentally life changing. Several of our members were able to buy houses from the work on the five turbines of | Thank you for the comment. |

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| | | Deep-Water Wind.<br>The opportunity that this project represents to the hard-working men and women of the IUPAT is without hyperbole or exaggeration a fundamentally transformational project. We see a need to engage in a “just transition” of our energy production in this country as we face the existential crisis of rapidly advancing climate change. This project allows literally that, a chance for workers who are highly trained and skilled to reapply their skillset from fossil fuel projects to a renewable energy project. It is our expectation that this project will create a large number of jobs for the industrial painters of the IUPAT, not only in the installation process, but also in the manufacturing supply chain and in the preventative maintenance work once the turbines are in place. Our organization spends a voluminous amount of time, energy and resources to meet the needs of the industry when it comes to corrosion prevention. We work with industry partners like Ørsted and Eversource, and train our members to meet third party engineering standards with industry leaders like AMPP (formerly NACE and SSPC) We as a country stand on the cusp of a massive chance to get things right for working families, our country, and the world as a whole. For all of the reasons that I have detailed, I ask that you please consider with judicious deliberation, but also a sense of urgency the rapid permitting of the Revolution Wind project. Thank you very much for your time and attention to this matter, and please do not hesitate to contact the undersigned if you have any questions. | |
| BOEM-2022-0045-0048 | 1 | I write to express my deep appreciation to the dedicated staff at the Bureau of Ocean Energy Management for releasing its Draft Environmental Impact Statement (DEIS) for Revolution Wind, a major offshore wind energy project off the coasts of Rhode Island and Connecticut. I believe that completion of this venture is critical for the United States to meet its renewable energy goals, create jobs, and make our country more energy secure. With these factors in mind, I am pleased to comment in favor of Revolution Wind. For the past several decades, American policymakers at all levels have looked for methods to combat climate change and diversify our country’s energy portfolio. As a former Representative of Maryland’s 4th Congressional District, I was proud to champion multiple pieces of legislation to expand the utilization of renewable energy, which is crucial to the future of our nation. During my tenure in Congress, I was privileged to serve on the House Energy and Commerce Committee, as chairman of the Subcommittee on Environment and Hazardous Materials, and as a member of the Subcommittee on Energy and Air Quality. Through this position, I played an integral role in crafting and passing the landmark “Energy Policy Act of 2005,” a bipartisan bill that provided much needed clarity and certainty to America’s nascent offshore wind industry. Working across party lines, this law grants the Department of the Interior, through your agency, jurisdiction over offshore wind projects and establishes a process for environmental review of proposed offshore wind projects. It is from this perspective that I write in favor of Revolution Wind. Already, our country lags behind other developed countries when it comes to the deployment of offshore wind, and this cutting edge technology will create American jobs, harness an infinite supply of American energy, lower carbon emissions, and reduce our reliance on energy from foreign countries. As a result, I am confident that this project will help Connecticut and Rhode Island to reduce their reliance on fossil fuels while providing clean and reliable energy, employment opportunities, and supply chain improvements in the surrounding counties, across the northeast, and beyond. Developed through private sector investment, Revolution Wind will increase our capacity of clean energy production and help us meet President Biden’s national goal of 30 GW of offshore wind energy by 2030. Though this project will be 15 miles of the coast of Rhode Island and 32 miles off the coast of Connecticut, its impact will be felt immensely. Capable of producing up to 704 MW of clean energy, it will be able to reliably power about 350,000 homes per day – the equivalent of removing nearly 150,000 cars from the road. This additional power generation will expand the supply of electricity, which will ensure we have the ability to meet future demands and put downward pressure on prices. The pre-fabrication, installation, and maintenance of this project will also greatly generate economic activity by providing job opportunities and generating indirect economic activity from suppliers and other businesses that support activity along the northeastern coast. Together with Eversource, Revolution Wind’s developer Orsted has already committed $77.5 million of a $157 public-private partnership to redevelop the New London State Pier in Connecticut - a project that is estimated to create 460 construction jobs. Orsted and Eversource have pledged to invest an additional $40 million to improve Rhode Island’s port infrastructure. Development of Revolution Wind itself is projected to create 1,200 direct construction jobs, along with dozens of permanent operations and maintenance jobs in both Connecticut and Rhode Island. In conclusion, I strongly support the development of Revolution Wind. Our country will benefit greatly from the expansion of this important infrastructure across the eastern United States over the coming years, including in my home state of Maryland. Thank you for your consideration of these comments and please do not hesitate to contact me if you have any questions. | Thank you for the comment. |

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| BOEM-2022-0045-0049 | 1 | Becoming energy independent is fundamental to our nation's long-term security. In order to achieve such an outcome it is important that the federal government allow and promote a wide array of sources, whether they come from renewables or fossil fuels. Thankfully, the United States has a capacity to leverage these domestic sources of energy. Pertinent to your agency is the expansion of offshore wind energy, as you know, growing yet still underutilized source of power that holds great potential for our nation's energy future. For the reasons outlined below, I am pleased to comment in favor of Revolution Wind, an important project currently undergoing federal environmental review by BOEM.<br>I am confident that the final approval and construction of Revolution Wind will help our country become more energy secure and reduce our dependence on foreign sources of energy. As a retired US Army General officer with deep and current experience in national security challenges, I know firsthand how important domestic energy production is to the security of our nation. As today's geopolitical turmoil has shown, the United States must focus on building an energy industry that will reduce our reliance on foreign sources. The more we rely on foreign sources to power our electric grid, the more vulnerable we are to energy price volatility and shortages.<br>The Draft Environmental Impact Statement (DEIS) is an important tool to ensure major projects best serve the environment, the economy, and the local community. I understand that BOEM provided six alternatives for further review. Of those six alternatives, there is one obvious "throw away," the No Action Alternative. It cannot be overstated that Revolution Wind must be built.<br>It is critical that the federal government pursue an "all-of-the-above" agenda to ensure developers of clean energy technologies and conventional energy sources can succeed. A cornerstone of this federal energy strategy must include offshore wind. It should be a priority for the United States to diversify our energy sector. With only a handful of offshore wind turbines currently in operation, it is now more important than ever that we expand this new and exciting industry into something that can adequately and reliably power our grid. So while our country does have many projects already in the pipeline to be constructed, our government must recommit to ensuring these projects get completed, and Revolution Wind is a crucial step in that process.<br>Expanding offshore wind energy through private sector investment will promote energy independence in the long term. Revolution Wind will increase the generation capacity of clean energy by capturing the infinite supply of wind off the coast. According to estimates, this project will be capable of producing up to 704 MW of clean energy, enough to reliably power a combined 350,000 Connecticut and Rhode Island homes. This additional power generation will expand the supply of electricity to meet future demands and keep prices in check.<br>In addition to diversifying our energy grid with green energy and bolstering our national security interests, I also know that this project will help the economic and financial security of the area. Revolution Wind is estimated to generate 1,200 jobs in Rhode Island and Connecticut during its construction phase, creating many permanent jobs as well. Further, the project is expected to generate thousands of other indirect and downstream employment opportunities that support the project. Altogether, it's estimated that the project will generate hundreds of millions of dollars worth of economic benefits for both Rhode Island and Connecticut.<br>In conclusion, I strongly support the development of Revolution Wind. Our country will benefit greatly from the expansion of this important infrastructure to make the United States more energy secure. I thank the Bureau of Ocean Energy Management for holding this comment period and for considering this comment and many others. | Thank you for the comment. |
| BOEM-2022-0045-0050 | 1 | As a former Administrator of the Energy Information Administration (EIA), I am pleased to comment in favor of Revolution Wind, an offshore wind farm that is set to be developed off the coasts of Connecticut and Rhode Island. With over forty years of experience working in the energy industry, I recognize the great potential that Revolution Wind will have in equipping these two states with the tools needed to meet their future energy demands, along with the economic and societal benefits it will bring to the surrounding community.<br>My tenure at the EIA was spent monitoring independent data, forecasts, and analyses related to energy production and consumption here in the US. While electricity generation has historically been dominated by the consumption of fossil fuels, renewable energy has experienced a significant jump over the past decade. Today, over twenty percent of U.S. electricity generation comes from renewable resources like wind, solar, and hydroelectric power; double what it was just a decade ago. I expect that growth to continue in the years ahead.<br>I recognize that the United States needs an all-of-the-above approach to satisfying its diverse energy needs, which includes the expansion of renewable energy like offshore wind. In a report published in June, the my former agency further confirmed the benefits of offshore wind energy, finding that "offshore wind tends to operate at a higher capacity factor than | Thank you for the comment. |

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| | | onshore wind because of stronger and less variable wind speeds", and "offshore wind can provide power to population centers in coastal areas, where electricity demand is high."<br>Yet, the slate of offshore wind farms in the United States is limited, and most consumers are not aware of the broad potential that offshore wind technology has for providing power for entire communities. But I am confident that the Revolution Wind project, along with many other projects in development along the East Coast will help change the narrative by not only providing competitively priced renewable energy, but also a varied set of benefits to its host community.<br>As the United States looks to expand its supply of power in the face of rising demand, offshore wind is the missing element that we have been looking for. Top US officials recognize this, including the Biden administration which announced a goal of deploying 30 GW of offshore wind energy by the year 2030. Meeting this goal to add 30 gigawatts of offshore wind generation capacity to the grid, will power about 21 million homes.<br>Revolution Wind will be an essential part of achieving that milestone. Once operational in 2025, it will deliver 704 MW of clean energy: providing 304 MW to Connecticut and 400 MW to Rhode Island. That's enough electricity to power more than 350,000 Connecticut and Rhode Island homes. Utilizing the unlimited power of coastal wind aligns with goals established by the Ocean and Nutmeg states to significantly curb carbon emissions.<br>The site will additionally bring good-paying, union supported, manufacturing and construction jobs to the community. Earlier this year, one of the developers of the project, Orsted, announced that all workers on this project, and all future projects, would leverage union-workers, representing a strong commitment to America's workers. Additionally, the project is spurring significant capital investment into underinvested communities, such as a $157 public-private partnership with the State of Connecticut and Connecticut Port Authority to re-develop New London State Pier into a heavy-lift cargo and deep-water port, creating 460 construction jobs for the redevelopment of State Pier. There's also $40 million slated for improvements to Rhode Island's port infrastructure.<br>At the same time actual installation of Revolution Wind is set to cost roughly $1.5 billion. These funds will go towards supporting workers and businesses across New England, and will create an estimated 1,200 direct construction jobs and dozens of permanent operations and maintenance jobs in Connecticut and Rhode Island. Thousands of other indirect or induced jobs also stand to be created through downstream economic benefits across the local economy.<br>For all the above reasons, I am honored to comment in favor of the approval of Revolution Wind. I thank BOEM and its dedicated staff for managing and overseeing this comment period and for accepting my input on this considerable achievement for improving energy efficiency here in the US. I am proud to be able to support a project that create thousands of jobs, reduce carbon emissions, and put downward pressure on energy prices in the years ahead. Thank you again to BOEM for holding this comment period and taking the time to consider my own comment on this matter. | |
| BOEM-2022-0045-0051 | 1 | I am a Rhode Island resident writing in support of the approval of the proposed Revolution Wind Offshore Wind Farm Project. I believe that projects like this one are critical to our ability to produce energy with low carbon footprints that will help reduce climate change. I understand that there will be some negative impacts related to this project, including disruption of viewsheds as well as some potential disruption of current fisheries operations. The proposed plan seems to take reasonable steps to attempt to ameliorate fisheries impacts. However, I think it is important to recognize that development of any energy source will have some type of negative impacts. This project seems vastly preferable to me over alternative sources of energy that could include things like plants that use fossil fuels or large scale solar farms that would replace existing habitats on land. Additionally, fisheries industries are already being impacted negatively by climate change, so helping to reduce future climate change through use of less carbon-intensive energy will help fisheries (though admittedly in a way that is difficult to quantify directly). One other key point is that Rhode Island does not generate much of its own energy, and suffers in energy markets as a result. Utility costs in Rhode Island are quite high, and this project has the potential to benefit many residents by providing clean energy at a reasonable cost into the future. Ultimately, this project will also help contribute to a worldwide effort to develop green energy sources that mitigate climate change impacts over the next century, benefiting humans and ecosystems worldwide. In short, this project seems to provide a large benefit for a fairly low cost that will extend for decades. | Thank you for the comment. |
| BOEM-2022-0045-0057 | 1 | On behalf of Nouveau Consulting, I submit the following comments for the record in the matter of Revolution Wind for your agency's consideration. As a former regulator and national energy infrastructure expert, I write to lend my support for Revolution Wind, an in-development offshore wind farm that, once complete, will provide the states of Connecticut and Rhode Island with renewable power. We thank the Bureau of Ocean Energy Management (BOEM) for its comprehensive | Thank you for the comment. |

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| | | Draft Environmental Impact Statement (DEIS. Knowing first-hand how intensive federal reviews can be, this 2,000-page plus DEIS is a testament to the thorough work conducted by agency staff. After reviewing the DEIS, we believe there is a purpose and a need for this project to move forward as proposed. The alternatives can be successfully addressed, including a no-action alternative raised through the scoping meetings and other comments. Rhode Island has set one of the country's most ambitious clean energy goals: to be powered by 100% renewables by 2030. Connecticut has also established an ambitious goal: to have 100% of the state's electricity generated from zero carbon sources by 2040. Completing Revolution Wind will be crucial to these states reaching their respective goals; this project will help meet energy diversification and baseline energy goals while simultaneously reducing carbon emissions. As the country trends toward energy independence, an "all the approach" to our energy mix must rely on renewable projects like this one. Aside from the long-term benefits, Revolution Wind is estimated to generate 1,200 good-paying union jobs in Rhode Island and Connecticut during construction. Once construction is completed, additional permanent jobs will be created for the project's operation and maintenance. There are also sure to be indirect jobs created by contractors and sub-contractors. Additionally, Revolution Wind's developers – Orsted and Eversource - will invest millions of dollars into Connecticut and Rhode Island local economies. It is also noteworthy these developers currently maintain some of the largest offshore wind farms in the world. It is noteworthy that BOEM considered 18 alternatives and carried forward 6 for further analysis in the DEIS. While the agency has not yet taken a position on the alternatives, I appreciate the time and attention taken to date. In establishing an energy policy that is reliable, affordable, and diversified, regulators and agencies must take a holistic "all-of-the-above" approach to electric generation and related infrastructure. Offshore wind has proven its ability as a renewable to consistently generate electricity that is both consistent and economically competitive with other forms of generation—agenda when it comes to bringing new energy infrastructure projects online. A large piece of this energy strategy should include offshore wind, an underutilized resource. In March of 2021, the Department of Energy (DOE), Department of the Interior (DOI), and Department of Commerce (DOC) announced a goal to deploy approximately 30GW by 2030, which should power approximately 10 million American homes.1 To meet the current and even larger 2050 challenge, significant new offshore wind farms must be permitted and built. The scale of this challenge is both exciting and daunting. In response to those suggesting the costs of scaling wind power are excessive, data indicates the cost per kilowatt hour has decreased by 24-50% since 2014.2 Further, wind turbine efficiencies are increasing, and Advanced optimization technology of turbine design is crucial to further success. Given the innovation continuing to occur within the industry, we can better understand the benefits of offshore wind generation within the ecosystem compared to onshore facilities.3 Thus, the long-term benefits of this project are evident: reduction of GHG emissions from traditional generation fuel sources, new economic development through investment and job creation, and positive impact on grid resilience, thereby promoting domestic energy security. Thank you for your time and the opportunity to comment on the matter. | |
| BOEM-2022-0045-0117 | 1 | Hi, my name is Amanda Barker. That's A-M-A-N-D-A, B-A-R-K-E-R. I live in Cranston, Rhode Island. And I'm a Policy Associate with Green Energy Consumers Alliance. We are a nonprofit working on decarbonizing our electricity, transportation, and building sectors. And our organization wants to emphasize that offshore wind is the biggest lever that we can pull to reduce our greenhouse gas emissions, address the climate crisis, and meet our energy needs. Revolution Wind, alone, will produce enough clean energy to power more than 350,000 homes and displace more than 1 million metric tons of carbon pollution. This is especially critical to Rhode Island, as greenhouse gas emission deductions are mandated under the Act on Climate. The State is also mandated to transition to 100-percent renewable energy by 2033. And the 400 megawatts that Rhode Island could procure from Revolution Wind is crucial in achieving these mandates. We want to emphasize that the no action Alternative should not be considered. Without the expansion of offshore wind, fossil-fuel energy facilities will either come online or be kept online to meet our future energy demands. This would threaten their reliability and increase pollution, energy costs, and the climate crisis. I want to be clear, though, that our organization is not advocating for you to rush this. We want a thorough review to limit environmental impacts, ensure local economic benefits, and social equity. But we urge you to expedite the process as much as responsible development will allow. The greenhouse gas emissions' reductions from this project are far too great to not proceed swiftly. Thank you for the opportunity to comment | Thank you for the comment. |
| BOEM-2022-0045-0118 | 1 | And I also appreciate the timely release of the DEIS for Revolution Wind, as it is a critical component of keeping our States and the region on track to meet our climate decarbonization goals. In particular, aligning with the Biden-Harris Administration's ambitious goals and the Justice 40 Initiative, this is truly a major milestone in the overall permitting process. So, keeping in mind that my testimony comes on behalf of the Audubon Society of Rhode Island and our work is | Thank you for the comment. |

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| | | focused in Rhode Island, I will speak to how critical we think this project is to meeting the Act on Climate Goals. More specific and technical comments on the DEIS will be provided with our Partner Coalitions. But I would like to emphasize that, within the six Alternative proposals presented today, there is one that we would like to urge BOEM not to consider, which is no action or denial of this projection, because that would harm our State's efforts to address climate change, increase our reliance on fossil fuels, and decrease the environmental benefits that would be realized by this project.<br>We recognize the urgency of the climate crisis and the recent IPCC Reports are telling us that the biggest threat posed to birds, wildlife, people, and all living things is climate change. So that's where we want to focus our energy and the type of Policies that we advocate for. In Rhode Island, we've made our commitment very clear to 100-percent renewable electricity by 2033, additional offshore wind procurement beyond Revolution Wind of up to 1,000 megawatts, and Labor Standards and renewable energy projects. And keeping in mind the 2021 Act on Climate Goals, we want to really ensure that our Electricity Sector is moving in the direction towards a clean energy economy, because we're going to rely on that Sector to decarbonize the other Sectors, including Transportation and the Building Sector. I want to go ahead and also reference the Block Island Offshore Wind Project, because, when we're thinking about mitigating the impacts to our natural resources, or avoiding them, I have whole confidence that, with ongoing engagements such as this, education and outreach, and with thorough planning to avoid environmental impacts that include research and monitoring of wildlife and habitat, that BOEM, Ørsted, and Eversource can truly succeed in making this a project we're proud of. In Rhode Island, the first offshore wind project is an example. The University of Rhode Island Surveys characterizing bird use offshore Rhode Island conducted under the Ocean SAMP Project, is something that we can reference. And it ensure that the Block Island Windfarm Project did not include the areas most critical for marine birds. So, lastly, in conclusion, when issuing the Final EIS, we would be looking to underscore that we see fundamental responsible devel (phonetic) -- what we foresee as being important for fundamentally building a project that's responsible is maximizing economic benefits through prioritizing the use of domestic content, and ensuring the creation of high-quality Union jobs that are equitable. And this is very important for Environment Justice Communities that are overburdened by pollution and should have a seat at the table and access to these career opportunities. Second, the importance of stringent protection of wildlife and habitat through every stage of a project development and peration. And third, as mentioned earlier, robust engagement of the community and Expert Stakeholders. So, in conclusion, Rhode Island sees the Revolution Project as essential for meeting our carbon emission reduction goals. And we urge you to move forward with the published schedule for Revolution Wind and keep this project on track to make it a reality. | |
| BOEM-2022-0045-0117 | 2 | My name is Robert Groves, R-O-B-E-R-T, G-R-O-V-E-S. I'd like to thank BOEM for this opportunity to speak in support of Revolution Wind's Draft Environmental Impact Statement. I have been a Professional Mariner for 25 years. Fourteen of those years has been in tugboats here along the east coast. I have fished commercially in small-scale fishing. And I worked in the offshore supply industry down in the Gulf of Mexico, down in [indiscernible]. So I have been around a little bit and seen a few things. I strongly believe in a need to accelerate and advance renewable energy and offshore wind. I have solar panels on my roof, so I practice what I preach. But in particular, I strongly support the development and construction of Ørsted's Revolution Wind Project. The ocean environment is being affected by climate warming today. And I want to thank BOEM for doing the rigorous work of evaluating this offshore wind project. I grew up in Florida and it breaks my heart to see the pictures coming out of Fort Meyers. And it's only speeding up. We need to get offshore windmills spinning and creating massive amounts of clean energy as soon as possible. And I certainly appreciate the work that it's providing me and other Mariners, and my fishing cohorts. I've recently captained Sea Service vessels on the fishing vessel, New Horizon. I did 60 days out there, about 60 miles south of Nantucket. So I appreciate the safety and the professionalism that I see already. Fishermen are familiar with these waters and know how to communicate with other Fishermen. So our results are better than those conventional vessels, I think, in communicating with the Fishermen that we're interacting with out there. It is clear to me that Ørsted and other offshore wind companies have worked with real interest in reducing conflict. Scouting is just one example. Also, anyone who has fished has horror stories about one life-threatening situation after another. Health and safety are always a concern for guys on the water. And Offshore Wind Developers who are using Sea Services are applying and funding very high standards to boats and Crews for upgrades and training. This is a big deal. I know a lot of guys just can't make a living fishing fulltime anymore. I saw a lot of them coming out of New Bedford and Point Judith, having to come work on tugboats because the fishing just wasn't there. So, it's outstanding that the Fishermen are being included in this work. Revolution Wind is critical for jobs, for safety, and for our environment. Please keep this Proposal moving rapidly forward through its process. Thank you very much | Thank you for the comment. |

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| BOEM-2022-0045-0118 | 2 | I'm picking up my comments right where Priscilla left off on the definition of responsible development, and that is something that we continue to evolve as a community of Advocates who are concerned around the existential threat of the climate crisis and the need to make really difficult decisions about the kinds of infrastructure that we will build, knowing that they will certainly have impacts on wildlife and habitat, and communities. And so, our definition of responsible development certainly entails avoiding, minimizing, mitigating, and monitoring impacts to wildlife, as well as robust Stakeholder engagement and the maximizing of local economic benefits, and high labor standards. So while I'm going to talk to you primarily about wildlife impacts right now, I just wanted to underscore that our definition of responsible sweeps far beyond that. So, what we see in Revolution Wind and in the Draft EIS is really an -- is the potential to meet the high bar that we set to support a project. We've been weighing in at every stage of this area of the ocean's consideration for offshore wind development. And we're thrilled to be here today at this critical milestone, and so close to, hopefully, a successful and positive Record of Decision. We recognize that building at least 704 megawatts here in this area is critical to meeting both State and Federal clean energy goals. And I want to underscore that we do want to see full buildout at a scale able to meet the commitments in all three PPAs attached to this Project Proposal. We will be submitting detailed written, technical comments. So I'm just going to very briefly summarize what we're grappling with, in relation to the specific Alternatives that we just heard about. So, we are strongly in favor of the considerations and concerns that were addressed in Alternatives C and E, though I recognize that, when you look at those both on a map together, they don't necessarily leave enough area for full buildout of the amount of generation needed in this area. So, want to be very clear that not being able to build a full 704 megawatts we would consider an unacceptable outcome. And yet, we have really -- we're really thrilled with the work that was done to develop Alternatives C and E. So what we're just encouraging is that we hope there's an outcome that both uplifts the concerns that were considered there perhaps with a combination -- some form of a combination of the two, perhaps also with Alternative F, if that can be helpful, or perhaps maybe not full application of either one of the areas. But, we do hope to see an out pin that can address our concerns that are intended to be addressed in -- or effectively addressed in each of those Alternatives, but that leaves enough area on the map to meet the full commitments in the Project Power Purchase Agreements. | Thank you for the comment. |
| BOEM-2022-0045-0115 | 3 | Good afternoon. Thank you for um this opportunity to to comment. My name is J. D. Chesloff. I am the presidency of the Massachusetts business roundtable. Um, you know I do think it's interesting in the first three commenters. So far you have to start from the Environment community so from the Labor community it's with the business community which I think speaks to the the widespread support for the project just a little bit of background. The roundtable is a group of about nine years. So Ceos senior executives for employers across Massachusetts, including worse than ever Source. We do support the revolutionary revolution when projects strongly. We sent in some comments earlier. I would just summarize real quickly, really three reasons behind our support for the project. The first, obviously, that it helps to meet the state's very aggressive climate goals. And this is ah an item about climate sustainability that has risen to the top of Oh, the business community agenda! And we we agree with some of the comments before that offshore wind is just an important part of the solution to our climate. Goals Number two really is around competitiveness, and we hear over and over again from employers in Massachusetts about cost of living cost, of doing business and mobility impacting the competitiveness of the State. And I, you know, I. We view offshore wind and this project as part of a broader economic development strategy to build a new industry and create jobs in Massachusetts. I think it's a really important part of that puzzle. And then third around workforce. And I think the previous speaker from the Union Rhode Island talked about this as we build out this industry. And through this project we're going to need to have a pipeline of talent particularly diverse talent to make it all happen. I couldn't help but think that when Travis was going through the project really around the presentation, you could see all the opportunities for jobs and and workforce as as part of the implementation. And so, you know, we're encouraged very broadly by revolution wins positive Um, local, economic and community impact that are really looking to it as a model for what this industry is capable of in terms of providing job creation supply chain opportunities, workforce development, initiatives, environmental education for redevelopment, and more. So we're all really excited about and happy to lend our support and appreciate your consideration of our comments. Thank you. | Thank you for the comment. |
| BOEM-2022-0045-0117 | 3 | Hello, everyone. Thank you for holding this meeting. Really appreciate it being in-person after several years of having these virtually. It's really nice to see people's faces. I'm Susannah Hatch, S-U-S-A-N-N-A-H, H-A-T-C-H. I'm a Director of Clean Energy Policy at the Environmental League of Massachusetts. I'm also the Regional Lead for a regional coalition called New England for Offshore Wind, which is a coalition of over 100 organizations: [indiscernible] advocacy organizations, Labor | Thank you for the comment. |

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| | | Unions, businesses, and academic institutions. And I just saw a familiar face. We support an expeditious and thorough environmental review of the Revolution Wind Project. I want to just highlight a few things here. I'm going to keep it high-level. We will be submitting comments in writing, as well. But just want to highlight, as a number of other folks have, that this is the best opportunity for renewables that New England has. It's likely -- State analyses and independent analyses have shown that it's likely that offshore wind is going to provide nearly 50 percent of the region's electricity by 2050. So it's absolutely critical, as a source of energy, for the States to not only keep the lights on, but meet those climate goals and mandates that all six New England States have. The economic benefits are also astounding. Not only would it help minimize price spikes, which we are currently seeing both in New England and across the country due to the conflict in Ukraine. So that is going to be extremely helpful. But the economic benefits are also going to be quite impressive, including the number of jobs that we're going to see on our shores. I do want to flag the MOU between Ørsted and North America's Building Trades Unions. That's a really important MOU and one will help drive creation of high-quality jobs in the region. And it's also important that we are driving equitable access to economic opportunity, as well. We believe in responsible development of offshore wind and believe that offshore wind can be developed responsibility for wildlife and for habitat. We will be studying some of the Alternatives that were discussed tonight. But for now, I just want to highlight that we do not think that the no action Alternative is one that should be considered, because the result would be a continued overreliance on methane gas in our region, which is spiking energy crisis as well as causing pollution, particularly in our most vulnerable communities. So, I will stop there. And I'd just thank BOEM for the hard work that you all have been doing. We've been struggling to keep up with all the comment periods, and really appreciate the work. Thank you. | |
| BOEM-2022-0045-0118 | 3 | I have been a Commercial Fisher my entire life. For generations, we have depended on the very waters for our livelihood where Ørsted Revolution Wind will be constructed. I'm here to add my support for the project's DEIS and to urge you to expedite its full approval. Like everyone who fishes, or transits, through these Lease areas, we are extremely concerned about offshore wind development. It just didn't seem like a very good idea. We were all very concerned that closing down these fishing grounds could crush our business. We also heard that these offshore green companies hailing from across the Atlantic didn't have any real interest in in our industry or working with us. The information that we were receiving was extremely concerning. Commercial fishing has grown far more challenging due to consolidation, quotas, and over regulations. It has become extremely difficult to make a living as a Commercial Fisherman. So my family and a group of Fishermen dug in to try to answer the questions for ourselves. Is offshore wind the final nail in our coffin, or can it be a new opportunity? Everyone is entitled to their own opinions and I am offering ours. We found that some of the information being put out there was just incorrect. The most important issue was that these windfarms in the U.S. will not be closed to fishing. And the turbines will be spaced to allow safe fishing and safe passage. They are spaced 1 nautical mile apart, leaving plenty of area to set gear and transit. The windfarms also provide a habitat for sea life. The fish like to congregate around them. We've found that many other things have proven to be less alarming than they sounded in the press. About 18 months ago, we qualified to become Vessel Partners with Sea Services. And with their supported funding, we upgraded our two vessels' health and safety platforms, and that resulted in much needed additional work. We have since scouted for about 180 days in the northeast and mid-Atlantic. I am very proud to say that there was zero gear conflicts. And through Sea Service, we have opportunity to work up close with Ørsted and a few other Offshore Wind Developers. And this has allowed us to build trust and to realize that there is a sincerity to their vision working together. Ørsted has shown us that they very much wanted to work with Fishermen, actively seek out and hire Fishermen, because of their knowledge of the area. Our family believes the future of these two industries in that combination lies in the difference between struggling generation of fishing and a diverse, thriving family business. Therefore, I offer my complete and enthusiastic support. | Thank you for the comment. |
| BOEM-2022-0045-0115 | 4 | I'm. Pleased to speak in support of the Revolution Wind Energy Project today on behalf of the city of New London and our development partners. Of course, that never source. New London is the fourth most distressed city in Connecticut, and faces many of the challenges shared by other New England cities working to regain their prominence as the economic centers of their region. Revolution Win will play a major role in the economic revitalization of New London as one of three offshore wind energy projects that will be staged, assembled and shipped from State Peer in the port in London, together with Southport wind and sunrise, when revolution win, will guarantee hundreds of direct jobs at the revitalized peer and thousands of indirect jobs and economic development opportunities in New London and across the region over the next ten years. These are jobs and business opportunities that we desperately need. In addition, the Host City agreement between New London, the State of Connecticut, and the joint development team of warsted and ever source represents a significant | Thank you for the comment. |

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| | | and guaranteed source of revenue that will benefit the hard working taxpayers of my city But jobs and economic development are only some of the positive impacts. We will see from revolution wind and the offshore wind industry as the mayor of a four hundred year old port city with homes lining our shoreline, and with one of the premier public beaches on the East coast. I am keenly aware of the need to address climate change. Revolution Wind is designed to provide three hundred and four megawatts of clean, sustainable energy to Connecticut, and four hundred megawatts to Rhode Island enough electricity to power more than three hundred and fifty thousand homes in re across both States. To put it another way, the carbon emission reductions from the from the project are equivalent to taking. Taking more than two hundred thousand cars off the road in revolution. Win will play a significant role in helping both both States achieve their clean energy goals. In the years to come these individual goals will contribute to the national goal of generating thirty gigawatts of electricity from offshore wind energy by two thousand and thirty. For all these reasons I am pleased to support revolution. When I am proud that one of the nation's first commercial-scale, offshore wind energy projects will be produced from the port of New London. Thank you very much for the opportunity. | |
| BOEM-2022-0045-0117 | 4 | How are you doing? My name is Scott Yerman, S-C-O-T-T, Y-E-R-M-A-N. I live in Westerly, Rhode Island. I've been fishing for 40 years, starting with my father when I was eight years old. I don't particularly enjoy speaking at public hearing. I am actually glad to be here tonight to support Ørsted's Revolution Wind Project. There are three things that I want to share. The concerns that remain out there are real about offshore wind. And I share them. But, after really digging into offshore wind with my father and other Fishermen, who are now Vessel Partners in the Sea Services Group, I came away much more realized than I thought possible. Particularly with the windfarms remaining open for fishing and the turbines spaced a mile apart, my biggest concerns were resolved. If more people did the same work, I'm pretty sure that they would come to the same conclusions we had. Offshore wind and commercial fishing will be fine side-by-side in years to come. Ørsted's Team have been straightshooters with us from the beginning, few years back. We were tough on them as Fishermen, and we like straight talk. And, as it turns out, so does Ørsted. They do what they say. Can't say -- can't ask for more than that. Ørsted is providing guys like me with a new way to earn money. And it has already been good for me and for my family. I'm looking forward to working on Revolution Wind, once it's approved and construction next year. Thank you. | Thank you for the comment. |
| BOEM-2022-0045-0118 | 4 | I have been a Commercial Fisherman for 35 years. I am here tonight to support the Revolution Wind DEIS. Offshore wind is coming and we are making it work for us. At Sea Services Vessel Partners, we upgraded our two vessels health and safety platforms. We have scouted for our fixed gear for six months in around 90,000 miles of ocean ahead of our large research vessels in the northeast and the mid-Atlantic. I am proud to say that there were zero resulting gear entanglements. With the fishing regulations displacing many Fishermen, we need these opportunity to supplement shrinking fishing income. | Thank you for the comment. |
| BOEM-2022-0045-0115 | 5 | Good afternoon. My name is Greg Ohadoma. I'm The Policy associate at the Northeast Clean Energy Council, or NCEC. NCEC is leading the Justin Roberts transition to a clean energy economy across New England and New York. The Revolution Wind Project being developed jointly by our State and ever source represents a cleaner future energy future. We not only to medicate in Rhode Island, but also the region and the country's transition to a carbon free electricity. This is all done by also ensuring that also wind, energy, wildlife, and our natural resources thrive together. The clean energy is one of the fastest growing sectors of the economy. The Revolution Wind Project will generate jobs in Rhode Island and Connecticut. Well, each State's reliance on carbon emitting it energy sources and ensuring the reliability of our grid Ulster wind has the potential to drive economic recovery. A stimulate coastal economies up and down the East coast. Human project devotes will, oh, create a cleaner for sustainable Rhode Island and Connecticut. It's estimated that the project will generate about one thousand two hundred jobs across both States during this construction phase, and dozens of good paying, permanent, full-time operations and maintenance positions on servicing the wind farm with with thousands of indirect, and you Jobs also anticipated, and NCEC, urges both to keep this published schedule for the Revolution wind project and make a reality. The BOEM consider, taking no action, know that it would harm both State's efforts to addressing climate change. The expansion of offshore wind capacity is essential for the decarbonization and for the realizing of greenhouse gas emissions reduction commitments to the New England states. The transition to a clean energy is critical. As Rhode Island and Connecticut continue to focus on bringing more clean carbon-free sources to the region. Rhode Island has one of the most ambitious, clean energy goals in the nation, percent renewable energy by two thousand and thirty three, and roushing. What Is it critical in helping Rhode Island and helping that communicate, hoping that it could also catch up in its carbonization promises. Again, NCEC Supports this development to reduce carbon emissions in the region, and it urges to keep its published schedule for the revolutionary project. It moves through the EIS space. Thank you. | Thank you for the comment. |

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| BOEM-2022-0045-0118 | 5 | My son and I are the owners of New London Seafood Distributors, a New London, Connecticut-based unloading facility. We have owned the business since 1989. It is homebase for a dozen commercial fishing vessels, both large and small, operating inshore in Long Island Sound, and offshore up to 100 miles. We are vital to their operations providing fuel, ice, arranging shipping of their annual 6 million to 8 million pounds of seafood to various markets in New York, Massachusetts, Pennsylvania, and Maryland. I write on behalf of both New London Seafood Distributors and as a Co-Founder of Sea Services North America, a multistate consortium of active Fishermen seeking to help build U.S. offshore windfarms. I write in full support of Ørsted's/Eversource's Revolution Wind Project. While offshore wind's development presents uncertainty to Fishermen, it is just uncertainty. There is no doubt that uncertainty can be frightening. And while the concerns raised by others was important, we have to be willing to deal with the facts rather than fear-based narratives. We have done a great deal of investigation and research, and found that each of the concerns raised have been raised in wind projects around the world with virtually no correlation between early concerns and actual commercial impact where fishing grounds remained open. Moreover, here, in the U.S., we are calling on global data in industry best practices to find solutions that will address the need for green energy, fishing concerns and fears of what is being labeled as "unknown". As Commercial Fishermen, local Businessmen, and concerned citizens, we are first concerned about our community and profitability. Other Fishermen decided to pursue dollars in the form of disruption payments. But we have found another way. We have decided to pursue a sustainable and scalable way to participate in the development to be constructively at the table. So once we achieved a level of comfort with the Ørsted Team, we began to look for ways for our vessels, along with others, to work the waters for the offshore wind industry. We have spent time and energy with the Ørsted's Revolution Wind Team. And we can say that they are the very best in the offshore industry. Their investment in a project means a great deal for several New England fishing communities. And we are already seeing the economic impact in New London. We want to see Revolution Wind move forward rapidly. We have worked for nearly four years with Ørsted's New England Team. And they have been straightforward, accessible, and as open as we think they can be. We understand the concerns of some of our Fishing Colleagues. But given the level of commitment to investment, education, job creation, reduction of fossil fuels, we have seen the -- excuse me -- we have seen the benefits and know that coexistence is a good thing for the greater good. Two years ago, two Associates and I took a trip to Kilkeel, Northern Ireland, to meet with a group of Fishermen organized into an efficient cooperative that provides scout and safety vessels when they are not fishing. We learned firsthand how the windfarms have impacted them and how they, and the community, have profited by them. We shared our concerns, discussed how they have worked together for positive income -- outcome -- I'm sorry. The results we saw were more than encouraging. And we decided to put in the time and effort to duplicate their model. That model has become Sea Services North America, LLC. We recognize Ørsted's commitments to Fishermen as being the first to offer a substantial Commercial Contract that includes local Fishermen to provide scout and safety vessels on the Revolution Wind Project. We completed thousands of miles of scouting with no issues. And with that success, it is providing further opportunities to Commercial Fishermen and scout vessels. That effort was rewarded with Contracts that will supplement Fishermen's revenue that is capped by regulations and quotas. That new revenue source comes at a cost. Learning technology, upgrading health, safety, environmental standards, and actually doing the work is required. The opportunities are very real. And with Ørsted's commitment, this is not a zero-sum game. It is a win-win. We strongly urge you to move forward with Revolution Wind Project, forward with all the proper appropriate speed. | Thank you for the comment. |
| BOEM-2022-0045-0113 | 6 | The utilization of domestic content in offshore wind projects is also relevant to a number of our national offshore wind goals. Securing a domestic offshore wind supply chain is essential to ensure that offshore wind projects can be deployed effectively and on time. The March 2022 offshore wind energy supply chain report by the National Renewable Energy Laboratory (NREL) states that supply chain constraints caused by global bottlenecks are one of the greatest risks for achieving the NOWT.21 The modeling in the report also shows that average and maximum job creation utilizing 25% domestic content versus 100% domestic content in offshore wind projects results in a difference of approximately 30,000-40,000 jobs from 2023-2030.22 In addition, across renewables, even a modest increase in manufacturing produces an additional 45,000 good manufacturing jobs per year and an additional $5 billion in wages through the 2020s, as the U.S. continues greening its electricity grid.23 Further, domestic content requirements are unlikely to influence wind power capital costs. | Thank you for the comment. |
| BOEM-2022-0045-0070 | 6 | We support the development of offshore wind on our coast and have already taken important steps to ensure we are well positioned and prepared to play a central role in enabling and supporting current and future projects, as evidenced by the | Thank you for the comment. |

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| | | port hosting the first purpose-built offshore wind terminal in the northeast, the New Bedford Marine Commerce Terminal. The development of this new industry has the potential to create thousands of local jobs, promote port infrastructure, and advance the Commonwealth and the Nation's climate and renewable energy goals. We also have been educated in the extremely complex operational needs and process of permitting, surveys, design work and environmental review not only for this project, but for the over a dozen projects that are currently in the pipeline. We are committed to supporting these developments and deploying the resources of our full-service port on behalf of this emerging industry, while we continually service a thriving fishing fleet and weigh the effects that the outcome of this work will have on the continued success of our fishing industry. | |
| BOEM-2022-0045-0113 | 7 | National security is also protected by utilizing domestic content. A jointly-commissioned summary report of the U.S. Department of Energy (DOE) and the North American Electric Reliability Corporation (NERC), assessing risks to the U.S. electricity generation and distribution infrastructure observed that the "bulk power system is dependent on long supply chains, often with non-domestic sources and links" and determined that the "increased reliance on foreign manufacturers, with critical components and essential spare parts manufactured abroad (e.g. HV transformers)" means the "supply chain itself represents an important potential vulnerability."25 The report recommends that "efforts should be considered to bring more of the supply chain and manufacturing base for these critical assets back to North America." | Thank you for the comment. |
| BOEM-2022-0045-0115 | 8 | My name is Laurie White, and I'm The President of the Greater Providence Chamber of Commerce in Providence, Rhode Island, and thank you for reporting us this opportunity to say a few words today in support of project. We are in strong support of revolution. Wind, and one of our members, Forsted has become a true Rhode Island success story. Gorstad has opened a Us. Headquarters in Providence, and has helped to shape the blue economy here in Rhode Island, in conjunction with a number of our colleges, universities, and small businesses. We are very strongly supportive of the application we have testified for this entity in in previous months to indicate that we believe that the blue economy offshore wind industry a strong catalyst for businesses, particularly small businesses that are looking to reposition, their industry, and also to make a strong statement in port of a sustainable, our our planet, and for our climate the greater Providence Chamber of Commerce continues to offer its services to assist. Ah, these planning entities to understand the impact on small business, and also to continue to be a resource to our business members, working in conjunction with our and and colleagues within the environmental community, and within organized labor as well. We listened intently to Patrick Trolley, secretary, treasurer of the Afl. Cio, and also to our colleagues in Massachusetts Jd Cheslock fast. This is Round Table, also very interested in the comments of the Mayor from here in London. So together we can make a strong statement in behalf of this industry and continue to keep more stead to be a major employer. | Thank you for the comment. |
| BOEM-2022-0045-0119 | 8 | I wanted to uh testify tonight, not only for myself, which uh very much is the case. Um, but also on behalf of my membership. Uh, I am a representative of the International Union of Painters and Allied Trades District Council Eleven. We handle um All the aspects of finishing trades throughout Southern New England, including Rhode Island, Connecticut, and parts of Massachusetts and Um. I'm. Also tonight representing the Brown Building and Construction Trades Council, which is ten thousand members and sixteen different crafts, based in the State of Rhode Island. And i'm also testifying, like I said, for myself, as a father of two young daughters uh three, and now almost eight months old. The reality is that climate change is upon us. We do not have a choice but to act. And projects like this revolution wind are a huge part of the solution. In fact, they are a key part of the solution. The reality is that these projects not only will have a positive environmental impact in the small area where they are, but even more so in the macro impact of what we're facing as a country, and really as a globe and a species in the ravages of climate change, these wind turbines will produce renewable energy without putting forward any fossil fuels, and in the small impact they actually have a great benefit for the fisheries and the areas where they're sited. But I also talk about what we specialize in, which is ensuring that working people of diverse backgrounds have an opportunity to move oftentimes from a situation of poverty into the middle class with hard work, schooling, training, learning a skill set that protects our nation's infrastructure. I don't know if Brother Maximo is going to join us tonight, but I want to tell a quick story about one of my members who worked on the Block Island Wind Farm. These are five turbines that were installed off of the coast of Block Island on those turbines, My good friend and brother Maximo worked on this project with hundreds of other tradespeople from the State of Rhode Island and across New England. Maximo was able to purchase his first home in the State of Rhode Island. From working on that project, I can say that this project changed his life as a man who lived and grew up in the south side of Providence. Dominican American background projects like this offer that pathway, that ladder into the middle class. We focus on ensuring that people from across the urban Center and Providence | Thank you for the comment. |

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| | | Pawtucket, Central Falls, and wherever people are from have an opportunity to learn a trade, and then move into again that living that we view as the American dream which not all of us get handed to us. Some of us have to work very hard to get to This project is needed. Projects of its type are needed, and we are so happy to support it, and include and make sure that there's pre apprenticeship, apprenticeship, prevailing wages, and training offered to people, so that we can get these projects done, and provide the energy, the clean, renewable energy that America needs. | |
| BOEM-2022-0045-0119 | 9 | My organization brings together environmental advocates and the clean energy industry here in New England to promote the region's renewable energy resources. I thank you for the opportunity this evening to provide Renew's perspective concerning the draft environmental impact standard uh submitted by a revolution wind Renew, uh, recognizes that offshore wind projects uh, above all, must be developed with strong and reasonable protections in place to meet our coastal and marine environment and wildlife. Uh and on behalf of Renew, I'd like to offer my appreciation to BOEM for working, to ensure offshore wind is developed um and accomplished responsibly approval of the many offshore land projects now here off the coast of New England is pivotal. Um for not just New England, but also the entire Atlantic coast. To realize our nation's renewable energy potential and to reduce a carbon reduction are to provide carbon reduction, or rather and revolution wind, and the several other projects in adjacent lease areas that are now under contract will also provide significant economic development benefits for New England, and we expect further economic development development benefits up and down the east coast. Uh, for example, uh a recent economic study that was conducted by American clean power reported that offshore wind development off the Atlantic coast could translate into fifty-seven billion dollars in direct investment, and eighty-three thousand well paying jobs by two thousand and thirty. This is all while stabilizing retail electricity rates and emitting no climate-altering greenhouse gas emissions, Revolution Wind, along with other wind projects with contracts being developed here in my region, will strengthen the clean energy industry by creating green jobs. Um! And so will also help New England reach its goals for renewable energy and reduction of greenhouse gas emissions. The two contracting States have requirements for one hundred percent uh clean energy grid. Connecticut has established a one hundred percent zero carbon electric sector by two thousand and forty, while the other Contracting State, Rhode Island, Uh, as of this year, requires a hundred percent of electricity demand, be from renewable energy by two thousand and thirty-three. So So this project and the others are instrumental for this region for my region. To me it's um clean energy requirements, and as a become a major source of economic development For those reasons. Um, we see that BOEM determination on the Revolution Wind, and other projects advanced and permitting, will sign a clear message to the entire offshore wind industry and welcoming it. Uh, in making these the major investments in the clean energy sector. So with that I thank you for the opportunity for me to provide these comments. | Thank you for the comment. |
| BOEM-2022-0045-0119 | 10 | Save the Sound appreciates opportunity to present these comments on the Revolution Wind Farm proposal, and to express our longstanding support for reasonably cited and operated offshore wind projects. Uh the mission of save the sound is to protect and improve the land, air, and Water of Connecticut Long Island sound Um, using legal and scientific expertise to bring people together to achieve results that benefit our environment, for current and future generations. And uh revolution, wind um, and other offshore. When projects are really poised to play an essential role in the ability of Connecticut, Rhode Island and the entire region to meet critical greenhouse gas reduction and clean energy goals. Um, Accordingly, Uh, We've been encouraging a robust procurement of these resources that maximize the deployment of offshore wind energy, while also satisfying stringent, environmental standards. Um and I do uh uh associate myself with some of the comments we heard at the top as well. Um, which I will get you in a moment. Um as noted in the draft uh environmental impact statement. Uh, the current project will provide three hundred and four megawatts of clean, mobile energy to Connecticut and four hundred megawatts Rhode Island. Uh: through separately executed power purchase agreements with each State And these procurements, as you just heard, support Connecticut's goal of securing a hundred percent zero carbon electricity by two thousand and forty um, and they also for the support uh the Federal Government's goal of thirty gigawatts by two thousand and thirty um, and uh, that's even a nationwide. A pretty modest uh goal uh independent analysis is indicated that just in the northeast region. Uh, we're going to need between thirty to forty-five gigawatts of offshore wind resources uh to sufficiently to to displace uh fossil fuel generation and achieve our net zero emission goals by two thousand and fifty um as the first offshore wind to sign a power purchase agreement with Connecticut. We're particularly interested in seeing this project fulfill its promise of delivering clean energy, providing good jobs and enhancing the local economies. Um, But this does, however, require careful balancing of the need to maximize energy output, minimizing disturbances to marine mammals and the marine environment. Um and uh A along those lines so | |

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| | | uh to the extent that the DEIS is not uh separately evaluating potential impacts to uh the North Atlantic Right whale, um! That really is a serious oversight. There have been numerous conversations among offshore wind developers and environmental groups. Um, with respect to um addressing impacts to the North Atlantic and to uh to minimizing those um, I suspect. Um, if there is a a discrete evaluation of those impacts. Um, it's going to change some of the outcomes of the alternatives Analysis. i'm thinking specifically as we look at the potential for larger size turbines and uh reducing the number of foundations that are needed. Um, taking advantage of the technological advances in wind turbine design uh not only is going to allow us to to sort of shake that for foot footprint. Um, but that's going to have uh probably significant benefits. | |
| BOEM-2022-0045-0119 | 12 | So the environment is, you know, very important to me and my family. My kids. Uh, I appreciate BOEM facilitating offshore wind and doing it a responsible, safe way. Uh by day I I an industrial painter, I paint bridges, power plants, and the like. So I've seen the impact in my own industry. Just you know, folks. I know a few folks that worked on the for the offshore Wind Farm. We built a couple of years back, and it like as a call or a couple of calls back mentioned It was. It was life altering. And you see a whole new industry popping up, and all new training certifications for working folks, and it's really inspiring, And it's something we really need here. It's not just good for the environment. I think it's something that's good for our economy, and some that's good for our industry. It's nice to sit and just think about where it could go. The possibilities are endless, and you know Rhode Island's workforce is geared up ready for it. Excited, excited about it, excited about the new industry, ready to take the training, ready to perform the work safely. And you know responsibilities to ensure that there's as little, you know, negative environmental impacts as possible. So yeah, we're I'm fully in favor of it. I think it's great on many fronts, and I guess i'll leave it there. Sounds great. Thank you, folks. | Thank you for the comment. |
| BOEM-2022-0045-0115 | 13 | Thank you for the opportunity. Sorry for not being available earlier. Little technical difficulty. I'm President and Ceo, of the Chamber of Commerce, of Eastern Connecticut, cover forty two towns in the region, and we have a thousand four hundred and companies, and I'm here to, you know, enthusiastically support the Revolution Wind Project First, for two main reasons, which have been much has been said already about the two reasons. One is the economic development that that the whole offshore wind business brings to Connecticut, and the second reading reason is the we all have today. Both our skin and never source, have been great partners in the region. This is the start of this project. They've been devoted to working with everybody at a number of meetings on the subject. To bring people up to date is another one, scheduled or later in November. So, for all the reasons I have been mentioned previously, and on behalf of my board, and one thousand or one hundred companies that belong to the Chamber at night, enthusiastically support this project and would urge approval as soon as possible. Thank you for the time. | Thank you for the comment. |
| BOEM-2022-0045-0118 | 13 | And I'm a lifelong Fisherman. My background is mainly in the lobster industry working the areas in and around these windfarms are going to be built. Five years ago, I had a heart attack, which sidelined me from the careers of fishing in the northeast. This was a huge change for me personally, financially. I went to work ashore for a seafood company cutting fish. This last year, I approached Scott Yerman, the owner of the fishing vessel, New Horizon. I have known and worked with the Yerman family for years at the dock in New London, Connecticut. I had heard they were involved in offshore wind. We discussed the duties I would participate in and go back to sea aboard the New Horizon. The hours of rest, wheelhouse duties, Crew drills, training fit comfortably. They made arrangements for me to make -- to take the SPCW training [indiscernible]. I joined the Crew for this year's scout duties working with a survey ship. My fishing experience and being able to communicate with fishing vessels working in these Lease areas made for successful profile of the seas and with zero gear interactions on our watch. I am very proud to be back making a living on the ocean and to be working together with my fellow Fishermen to make this entire project a success. Fishermen are extremely independent by nature. I can't argue with that. I'm one, myself. I also know that we need a new source of energy. Will Fishermen be impacted? Yes. Will it put them out of business? No. Good Fishermen always find a way. I've seen Ørsted working with Fishermen firsthand. And I appreciate that BOEM is here looking for answers. | Thank you for the comment. |
| BOEM-2022-0045-0119 | 13 | I'd like to start by thanking BOEM for this opportunity to offer these comments in strong support of the Revolution Wind Project, and on behalf of climate jobs. Rhode Island. We are a coalition of Rhode Island, Rhode Island labor unions, environmental advocates, and community organizations that are working together to establish a just transition to a green economy in Rhode Island. Together we are committed to working together to make sure that Rhode Island is a national leader in the development of an equitable pro worker pro climate twenty-first century economy. So in the last two years, as many of you, I am sure, are aware Rhode Island has set ambitious carbon emissions, um and energy, clean energy goals that | Thank you for the comment. |

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| | | are essential to combating climate change and creating a healthier environment throughout the State with the passage of the two thousand and twenty-one act on Climate Rhode Island is now required to achieve net zero emissions, economy wide by two thousand and fifty, and with last year's passage of the one hundred percent renewable energy standard. Rhod Island is also required to increase its renewable energy supply to one hundred percent by two thousand and thirty three. This swift and efficient development of offshore wind projects, such as Revolution Wind, are absolutely key to Rhode Island meeting these clean energy targets, the over seven hundred megawatt Revolution Wind Project will deliver four hundred megawatts of clean energy to Rhode Island, and over three hundred megawatts to Connecticut, producing enough clean energy to power, more than three hundred and fifty thousand homes and displace by eliminating future emissions. More than one million metrics of carbon pollution. In addition to these environmental benefits, revolution wind will also serve as a key driver of jobs, economic growth and investment. So, as both brothers, Robert Hill and Justin Kelley have already mentioned. Um, we can start to recover from the unprecedented social and economic impacts of the Co. Covid, nineteen pandemic uh, with the approval of revolution wind pro of the Revolution Wind project and developed by orsted and eversource. It will directly lead to the creation of union jobs that come with family sustaining wages and good benefits and revolution wind is expected to generate one thousand two hundred jobs in Rhode Island and Connecticut during the project's development and construction. In addition to dozens more during operation and maintenance positions throughout the life of the Wind Farm. So, as a community leader, I understand that the opportunity offshore wind presents for not only our State, but our entire region in the country, and I strongly believe that Americans should not have to choose between good jobs and clean a clean environment. We can, in fact, have both, and revo the Revolution Wind project is an opportunity to not only drive the nation's clean energy future, but also create quality, family sustaining union jobs at the same time. So I urge BOEM to move forward with revolution wind's permitting process uh BOEM has provided six alternatives for further review, and within those six alternatives is really only one that BOEM should not consider, and that is no action, No action would harm our State's efforts to address climate change, while also eliminating quality job opportunities and sustainable work for hard working local trades people that come with this project. We need revolution Wind to be built offshore wind is critical to the future of our nation's security, environment, and economic recovery, and I urge BOEM to stick to its publishing schedule for re the Revolution wind project and put our trades people to work as soon as possible. I thank you for the opportunity to comment. Um, Thank you. | |
| BOEM-2022-0045-0118 | 14 | And our customers are looking for environmentally produced good seafood. I am in favor and many of my customers are in favor of a windfarm project such as this. But, as a Fisherman of three generations, I think there's a better way to catch a fish. And with your managing the sea, there's never been a better time to -- let's put it this way. The old-fashioned fights and fish traps, put them in the sea, if you're already putting a hole in the sea. Keep in consideration of a better way to catch a mouse. And in this case, I think the windfarm and your Leases did that. I am concerned about safety at sea. There's -- putting hundreds poles standing in the middle of March, when we have problems with Crewmembers who can't take a watch, is going to be a problem. And I've thought of an idea like that lights that come on in a garage as you walk by it. I think something that requires that, and I'm also asking that a better way of these fish getting us Permits to allow us to catch fish in a different way within that area to prove that there's no effect on the sea. If you put one right next to a pole and another couple hundred -- another 5 to 10 miles down the way, you would actually see, if it's the same method. You'd be able to prove if it had an effect or not. And that's just -- like this man here was saying, this proof is in the putting, then. So if you permit us to do two different ways in the close and the farther way, without troll gear, between pots or traps, and that's my idea. But I fully support this operation. I look forward to working with the windfarm industry. | Thank you for the comment. |
| BOEM-2022-0045-0069 | 21 | The localized impacts from the construction and operation of the Revolution Wind Farm to marine and avian organisms may be significant; however, this project will result in substantial reduction of regional fossil fuel generation and lower emissions of nitrogen oxides and carbon dioxide. Therefore, on balance, the RIDEM is supportive of the Revolution Wind Farm and its contribution to mitigating the impacts of climate change. | Thank you for the comment. |

## Technical Editing

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| BOEM-2022-0045-0100 | 27 | In footnote 12, the citation for the document that BOEM refers to does not appear in the subsection for 3.3 in Appendix B - References Cited section. Please clarify what document this footnote refers to by adding it to "References Cited". | Thank you for the comment. Edits have been made. |

# Non-Codable and Out-of-Scope Comments

## Non-Codable Comments

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| BOEM-2022-0045-0006 | 1 | This pertains to the corruption involving the bidding process for Port Operations in New London as it relates to the CT State Pier project.<br>As a result of this process, businesses other than the wind-fann industry are unable to utilize any of the state pier space. In addition, a road-salt providing company doing business at the pier was forced out by the new operating company who happens to operate a road salt company of their own in Neiw Haven I In addition, union labor was removed from the operation at the pier and the operating company transferred existing business over to their New Haven port location ..<br>There has been considerable publicity on this subject and I can forward large volumes of it, all on paper, for your review. I have some full notebooks of typewritten articles and material so far.<br>The environmental issue remains a problem, concerning space between the 2 piers, which has not been properly resolved. The agencies involved with this process would seem to have been affected by politics.<br>The incredible cost increases, to be paid primarily by the CT taxpayers, are still skyrocketing and will continue to do so as more difficulties are encountered, such rocks interfering with pile-driving. The cost over-run from this will be staggering, although no estimates have been given as of yet, to no ones surprise !<br>Please help to correct this flawed project. Please do not proceed with blindly approving it for political reasons.<br>A copy of this letter is being sent to President Biden. If he is encouraging such projects, with people and businesses being steamrolled, then i am hardly feeling encouraged to vote Democratic in the coming election, much less vote for Mr. Biden himself in 2024 ... and I never thought I would make that statement, considering the times in which we live. | This comment submission is not code-able. It addresses a project other than the Revolution Wind Farm and Revolution Wind Export Cable. |
| BOEM-2022-0045-0106 | 1 | This comment submission is a duplicate of BOEM-2022-0045-0107 and was not coded. | This comment submission is a duplicate of BOEM-2022-0045-0107 and was not coded. |
| BOEM-2022-0045-0083 | 1 | This comment submission is a duplicate of BOEM-2022-0045-0111 and was not coded. | This comment submission is a duplicate of BOEM-2022-0045-0111 and was not coded. |
| BOEM-2022-0045-0076 | 1 | This comment submission is a duplicate of BOEM-2022-0045-0078 and was not coded. | This comment submission is a duplicate of BOEM-2022-0045-0078 and was not coded. |
| BOEM-2022-0045-0032 | 1 | This comment submission is a duplicate of BOEM-2022-0045-0023 and was not coded. | This comment submission is a duplicate of BOEM-2022-0045-0023 and was not coded. |
| BOEM-2022-0045-0055 | 1 | This comment submission is a duplicate of BOEM-2022-0045-0024 and was not coded. | This comment submission is a duplicate of BOEM-2022-0045-0024 and was not coded. |
| BOEM-2022-0045-0056 | 1 | This comment submission is a duplicate of BOEM-2022-0045-0029 and was not coded. | This comment submission is a duplicate of BOEM-2022-0045-0029 and was not coded. |
| BOEM-2022-0045-0081 | | This comment submission is not code-able. It is addressed to an agency other than BOEM and discusses that agency's permitting decision. | This comment submission is not code-able. It is addressed to an agency other than BOEM and discusses that agency's permitting decision. |
| BOEM-2022-0045-0104 | 1 | This comment submission is a duplicate of BOEM-2022-0045-0080 and was not coded. | This comment submission is a duplicate of BOEM-2022-0045-0080 and was not coded. |
| BOEM-2022-0045-0120 | 1 | This comment submission is a duplicate of BOEM-2022-0045-0113 and was not coded. | This comment submission is a duplicate of BOEM-2022-0045-0113 and was not coded. |
| BOEM-2022-0045-0121 | 1 | This comment submission is a duplicate of BOEM-2022-0045-0122 and was not coded. | This comment submission is a duplicate of BOEM-2022-0045-0122 and was not coded. |

## Out of Scope Comments

| FDMS Submission # | Comment # | Comment | Response |
|---|---|---|---|
| BOEM-2022-0045-0078 | 4 | Transmission<br>Optimized interconnection and regional transmission are of the utmost importance to our collective efforts to meet state and federal decarbonization and renewable energy goals, increase energy reliability, minimize costs, and minimize impacts on the environment and coastal communities. This is even more important in light of the joint Request For Information recently issued by the states of Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island to solicit comments by October 28, 2022 from interested stakeholders, electric transmission industry representatives, offshore wind developers, and others regarding changes and upgrades to the regional electric transmission system needed to integrate offshore wind resources in areas of the region requiring new transmission to integrate into the New England electric system. These states are also seeking comments on a conceptual framework for a multistate Modular Offshore Wind Integration Plan. For this reason, TNC encourages BOEM to solicit input from State Energy Offices and energy regulators to ensure that as the footprint for new Offshore Wind lease areas is expanded beyond the current lease areas in southern New England, all projects within that footprint are capable of integration with a shared grid. Ultimately, BOEM’s new leases should contain a condition that requires all bidders to describe how use of the lease area will be optimized for connection to regionalized offshore transmission. Including these considerations early on in the process will encourage bidders to design their projects to enable potential use of shared transmission, if and when, it becomes available. | Thank you for your comment. An analysis of regional transmission falls outside the scope of the NEPA document. BOEM’s regulations require BOEM to analyze Revolution Wind’s proposal to build a commercial-scale wind energy facility on the Renewable Energy Lease Number OCS-A 0498. The purpose and need in the EIS reflect the requirement per those regulations, whereas BOEM’s purpose as stated in Section 1.2 is to determine whether to approve, approve with modifications or disapprove Revolution Wind’s COP, is needed to fulfill BOEM’s duties under the lease. As part of the NEPA process alternatives were considered and screened if it was outside the jurisdiction of the lead agency as described in Appendix K. |
| BOEM-2022-0045-0122 | 20 | d. USCG’s Lighting and Marking Regulations:<br><br>In its October 2019 Draft Proposed Guidelines for Providing Information on Lighting and Marking of Structures Supporting Renewable Energy Development, BOEM discusses the USCG’s permits for private aids to navigation with respect to WTGs. (PATONs) 33 CFR Part 66. It also provides recommendations for lighting and paint and markings. Is BOEM continuing to work with the USCG to develop lighting requirements that protect the Viewshed? Will the USCG and BOEM modify the lighting requirements when experience and technical developments allow for less adverse Viewshed lighting? | Thank you for your comment. This request falls outside the scope of the NEPA document. BOEM and the applicant will continue to consult with the USCG to assess compatibility of the lighting requirements for RWF in accordance with Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Programs with USCG practices (https://www.boem.gov/sites/default/files/documents/renewable-energy/2021-Lighting-and-Marking-Guidelines.pdf). |

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